

CONTROL OF COMMON AQUATIC WEEDS

Aquatic weed control begins with identification of the problem plant.

Step 1. Determine growth habit of plant:

EMERGENT	- most of plant above water
SUBMERGED	- may have flowers or seeds above water
OPPOSITE LEAVES	
ALTERNATE LEAVES	
WHORLED LEAVES	
FLOATING LEAVES	- leaves float on water
FREE-FLOATING	- duckweed and watermeal
ALGAE	- simple non-vascular plants

Step 2. Locate appropriate growth habit section and identify weed.

Step 3. After identifying plant, determine best treatment from the options listed. Suppliers are given at end of section. If restrictions on water use are listed, then see the restrictions table at the end of this section and the label.

This publication is not intended to be a complete source of information on herbicide applications. Always read and follow the instructions on the label. The **USER** always assumes complete responsibility for effects of herbicide treatments.

Consider non-herbicide treatments listed under Alternative Treatment heading under each weed.

Extension Fact Sheets are available: Aquatic Weed Management – Control Methods (SRAC 360) and Aquatic Weed Management - Herbicides (SRAC 361).

Common Sense in Aquatic Weed Control

The number one cause of rooted weed problems is shallow water. This allows sunlight to strike the bottom and permits rooted plants to sprout and grow.

The number one cause of algae problems in ponds is excess nutrients, especially from cattle, lawns or un-pumped septic systems.

No chemical control is permanent. If conditions are good for weed growth (shallow water, excess nutrients, etc), then weeds will return.

Usually the safest and most effective time to apply herbicides is early spring.

If weed growth is heavy, treat no more than one-fourth of pond and wait 2 weeks before treating subsequent section. To do otherwise, invites a fish kill due to lack of oxygen as weeds decay.

Muddy ponds are difficult to treat chemically because many herbicides bind with clay particles. Do not stir up mud while applying herbicides.

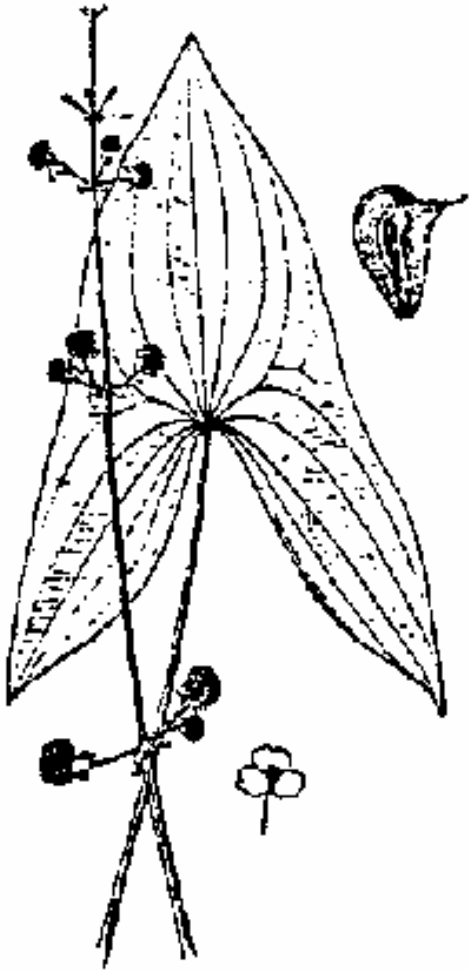
For safe herbicide applications, usually **the volume of the pond must be measured exactly**. Pond owners almost always overestimate pond size, resulting in over-application of herbicide. To calculate pond volume first determine average water depth by dropping a weighted line to the bottom at many locations in the pond. Next pace off perimeter of pond to determine surface acres or see if your county Soil Conservation Service office can determine surface acres from an aerial photograph.

Pond volume = average depth (feet) x surface acres.

One part per million (ppm) equals 2.7 lbs active ingredient per acre foot of water.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

EMERGENT



ARROWHEAD (*Sagittaria* spp.)

Arrowhead shaped leaves.

Three petaled white flowers in whorls of three.

Tuberlike roots are edible - "Duck Potatoes."

Milky sap.

For photos - see websites at the end of this section

Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
2,4-D (38.9%) ae liquid	Excellent	\$10-20/ surface acre	2 oz per gal water sprayed on plants or 2-4 pt/acre	21 days irrigation and domestic	Take steps to reduce spray drift
Aquamaster (53.8% glyphosate)	Excellent	\$66-115/ surface acre	4.5-7.5 pts/ surface acre	0 days except water intakes, rice	Best results in summer or fall when actively growing. Nonionic surfactant (e.g., Ortho X-77 or Aqua King).
Reward (Diquat)	Good	\$65/surface acre	1 gal/ surface acre	human, livestock, irrigation	Nonionic surfactant (e.g., Ortho X-77 or Aqua King).

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

EMERGENT

WATERWILLOW (*Justicia americana*)

Willow-like leaves, opposite attachment.

2-3 feet tall.

Small orchid-like flowers - white with purple spots on lower petal.

For photos - see websites at the end of this section



Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
2,4-D (38.9% ae liquid)	Excellent	\$10-20/ surface acre	2 oz/gal water sprayed on plants or 2-4 pt/acre	21 days irrigation and domestic	Take steps to reduce spray drift

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

EMERGENT

BULLRUSH (*Scirpus* spp.)

Up to 9 feet tall.

Smooth, round, hollow stems.

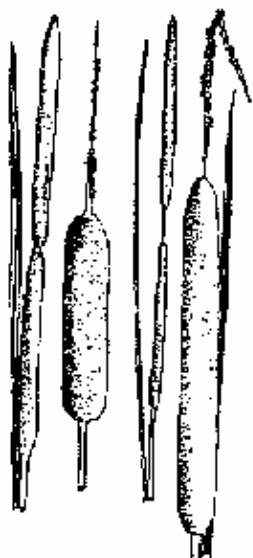
For photos - see websites at the end of this section



Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
2,4-D (38.9% ae liquid)	Excellent	\$10-20/surface acre	2 oz per gal water sprayed on plants or 2-4 pt/acre	21 days irrigation and domestic	Take steps to reduce spray drift
Aquamaster (53.8% glyphosate)	Excellent	\$66-115/surface acre	4.5-7.5 pts/surface acre	0 days except water intakes, rice	Best results in summer or fall when actively growing. Nonionic surfactant (e.g., Ortho X-77 or Aqua King).

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

EMERGENT



CATTAILS (*Typha* spp.)

Best herbicide results when 3 feet tall and actively growing.
Best to control before seed spikes form.

For photos - see websites at the end of this section

Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
Reward (Diquat)	Good	\$65-130/ acre	5 oz/4 gal water sprayed on plants	human, livestock, irrigation	Nonionic surfactant (e.g., Ortho X-77 or Aqua King).
2,4-D (38.9% ae liquid)	Good	\$10-20/acre	4 oz/gal of water sprayed on plants or 2-4 pt/acre	21 days, irrigation and domestic	Take steps to reduce spray drift
Aquamaster (53.8% glyphosate)	Excellent	\$66-115/ acre	Boom rate: 4.5-6.0 pt Aquamaster plus surfactant in 3-30 gal water per surface acre. Hand rate: 1 oz Aquamaster plus surfactant per gal water per surface acre.	0 days except water intakes, rice	Best results in summer or fall when actively growing and at or beyond the early to full bloom stage. Nonionic surfactant (e.g., Ortho X-77 or Aqua King).

Alternative Treatments:

Use brush attachment on weed eater - cut and then recut growth before seed spikes form.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

EMERGENT

SMARTWEED (*Polygonum hydropiperoides*) Jointed stems, "tufts" at joints. Leaves alternate. Flowers pink or white on spike. Up to 3 feet tall.

For photos - see websites at the end of this section

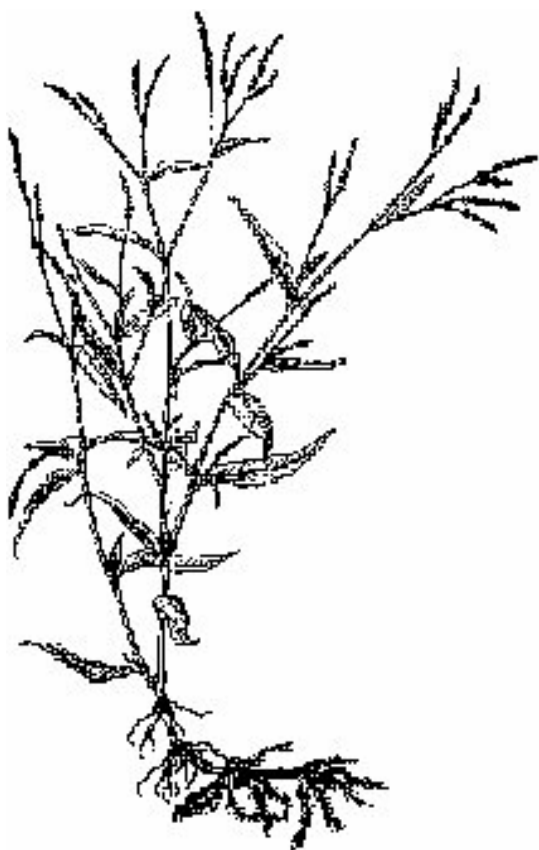
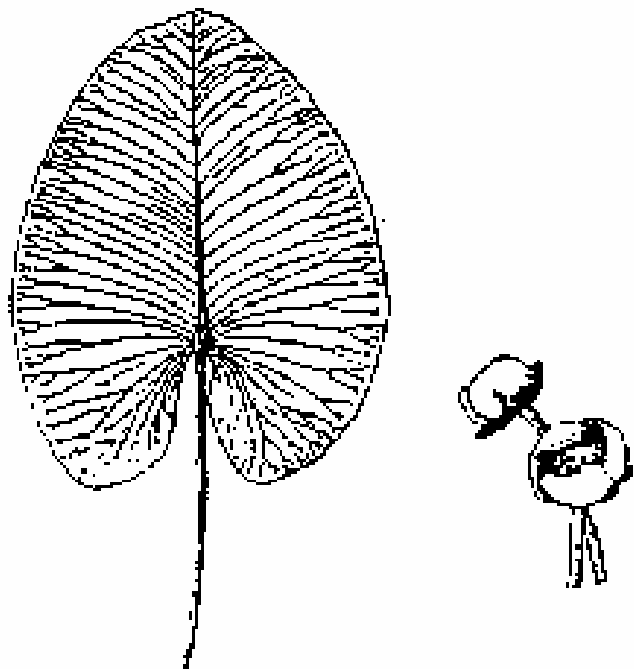


illustration provided by:
IFAS, Center for Aquatic Plants
University of Florida, Gainesville, 1993

Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
2,4-D (38.9% ae liquid)	Good - Excellent	\$10-20/ surface acre	2-4 pts/ surface acre	21 days irrigation and domestic	Take steps to reduce spray drift
Aquamaster (53.8% glyphosate)	Fair - Excellent	\$66-115/ surface acre	4.5-7.5 pts/ surface acre	0 days except water intakes, rice	Nonionic surfactant (e.g., Ortho X-77 or Aqua King).

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

EMERGENT



SPATTERDOCK (*Nuphar luteum*)

Oval heart shaped leaves.
Stem extends to tip of leaf.
Yellow flower often confused with lily
or lotus

Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
2,4-D (38.9% ae liquid)	Excellent	\$10-20/ surface acre	8 oz/5 gal water sprayed on plants or 2-4 pt/acre	21 days irrigation and domestic	Take steps to reduce spray drift
Aquamaster (53.8% glyphosate)	Good - Excellent	\$66-115/ surface acre	Boom rate: 6 pt Aquamaster plus surfactant per 3-30 gal water per surface acre. Hand rate: 1 oz Aquamaster plus surfactant per gal water per surface acre.	0 days except water intakes, rice	Apply when most plants are in full bloom. Best results in summer or fall months. Nonionic surfactant (e.g., Ortho X-77 or Aqua King).
Sonar (fluridone)	Excellent	\$235-700/ surface acre	0.5-1.5 quarts/ surface acre	30 days for irrigation, water intake restrictions	Slow acting, hazard to trees at water's edge, whole pond treatment only.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

SUBMERSED WITH ALTERNATE LEAF ATTACHMENT

PONDWEEDS (*Potamogeton* spp.)

Long, flexible rooted stems.

Leaves variable.

Also see Pondweed figures in floating leaved section.

AMERICAN PONDWEED
PONDWEED

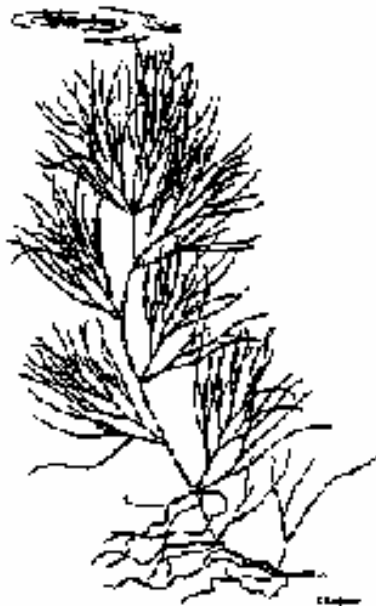
(*P. nodosus*)



SAGO
CURLYLEAF

PONDWEED

(*P. pectinatus*)



For photos - see websites at the end of this section

(*P. crispus*)



Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
Reward (Diquat)	Good	\$130/ surface acre	2 gal/ surface acre	human, livestock, irrigation	Do not treat muddy water.
Aquathol K (granular) (endothall)	Excellent	\$34-68/ acre foot	27-54 lb/ acre foot	human, livestock, irrigation	Application hazard requires special care
Aquathol K (liquid) (endothall)	Excellent	\$18-39/acre foot	0.6-1.3 gal/ acre foot	human, livestock, irrigation	
Sonar (fluridone)	Excellent	\$235-700/ surface acre	0.5-1.5 quarts/ surface acre	30 days for irrigation, water intake restrictions	Slow acting, hazard to trees at water's edge, whole pond treatment only.

Alternative Treatment:

Stock 10 grass carp per vegetated acre. If bass or other predatory fish are present, then 10 inch grass carp should be used. Effects are seen 2 years after stocking. See section on grass carp.

Water dye: 1 gallon per acre, 3x per year, before leaves grow to surface.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

SUBMERSED WITH OPPOSITE LEAF ATTACHMENT



NAIADS ("Ni-ads")
 Small fruits in leaf axils.
 Attached to pond bottom.
 Can be confused with FILAMENTOUS ALGAE.

For photos - see websites at the end of this section

SOUTHERN NAIAD
(Najas guadalupensis)
 Stem up to 2 feet long.

illustration provided by:
 IFAS, Center for Aquatic Plants
 University of Florida, Gainesville, 1990



Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
Reward (Diquat)	Excellent	\$65/ surface acre	1 gal/ surface acre	human, livestock, irrigation	Do not treat muddy water.
Aquathol K (granular) (endothall)	Excellent	\$100/acre foot	80 lb/acre foot	human, livestock, irrigation	Application hazard requires special care
Aquathol K (liquid) (endothall)	Excellent	\$9-30/acre foot	large area: 0.3-1.0 gal/ acre foot	human, livestock, irrigation	
2,4-D (ester)	Fair	\$50-100/ acre	2.5-5 gal/ acre	21 days irrigation and domestic	Ester is much more toxic to fish but fish kills seldom occur at these doses.
Sonar (fluridone)	Excellent	\$235-700/ surface acre	0.5-1.5 quarts/ surface acre	30 days for irrigation, water intake restrictions	Slow acting, hazard to trees at water's edge, hole pond treatment only.

Alternative Treatment:

Stock 10 grass carp per vegetated acre. If bass or other predatory fish are present, then 10 inch grass carp should be used. Effects are seen 2 years after stocking. See section on grass carp.

Water dye: 1 gallon per acre, 3x per year.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

SUBMERSED WITH WHORLED LEAF ATTACHMENT

ELODEA (*Elodea* spp.)

3 leaves per whorl on upper branches.

Warning: Reproduces from fragments.

Up to several feet long.

GIANT EGERIA (*Egeria densa*)

4-6 leaves per whorl on upper branches.

3/4 inch white flowers.

Warning: Reproduces from fragments.

Up to 9 feet long.

For photos - see websites at the end of this section



Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
Reward (Diquat)	Elodea: Excellent Egeria: Good	\$130/surface acre	2 gal/surface acre	human, livestock, irrigation	Do not treat muddy water.
Sonar (fluridone)	Excellent	\$235-700/surface acre	0.5-1.5 pt/surface acre	30 days for irrigation, water intake restrictions	Slow acting, hazard to trees at water's edge, whole pond treatment

Alternative Treatment:

Stock 10 grass carp per vegetated acre. If bass or other predatory fish are present, then 10 inch grass carp should be used. Effects are seen 2 years after stocking. See section on grass carp.

Water dye: 1 gallon per acre, 3x per year.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

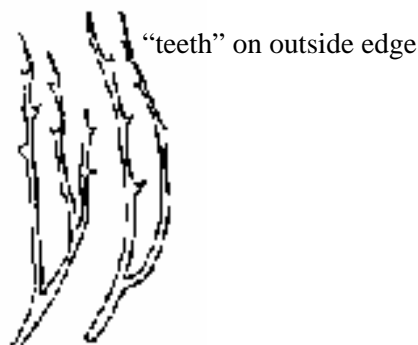
SUBMERSED WITH WHORLED LEAF ATTACHMENT



COONTAIL (*Ceratophyllum* spp.)

Threadlike forked leaves without nodules.
Usually without roots.
Can be confused with Chara -- see algae section at end.

For photos - see websites at the end of this section



Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
2,4-D (liquid)	Good	\$50-200/surface acre	2.5-10 gal/surface acre	21 days irrigation and domestic	
Reward (Diquat)	Excellent	\$130/surface acre	2.0 gal/surface acre	human, livestock, irrigation	Do not treat muddy water.
Aquathol K (liquid) (endothall)	Excellent	\$18-39/ acre foot	0.6-1.3 gal/acre foot	human, livestock, irrigation	Application hazard requires special care
Aquathol K (granular) (endothall)	Excellent	\$68/acre foot	54 lb/acre foot	human, livestock, irrigation	
Sonar (fluridone)	Excellent	\$235-700/surface acre	0.5-1.5 quarts/surface acre	30 days for irrigation, water intake restrictions	Slow acting, hazard to trees at water's edge, whole pond treatment only.

Alternative Treatment:

Stock 10 grass carp per vegetated acre. If bass or other predatory fish are present, then 10 inch grass carp should be used. Effects are seen 2 years after stocking. See section on grass carp.

Water dye: 1 gallon per acre, 3x per year.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

SUBMERSED WITH WHORLED LEAF ATTACHMENT

WATERMILFOIL (*Myriophyllum* spp.)

Fine feather-like leaves.
 Rooted to bottom.
 Warning: Reproduces by fragments.

For photos - see websites at the end of this section



Leaves rough and stiff.
 WATERMILFOIL



Leaves soft, flexible and limp.
 EURASIAN WATERMILFOIL

Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
Aquathol K (granular)	Excellent	\$100/acre foot	81 lb/acre foot	human, livestock, irrigation	
Reward (Diquat)	Excellent	\$65-130/surface acre	1-2 gal/ surface acre	human, livestock, irrigation	Do not treat muddy water.
Sonar (fluridone)	Excellent	\$235-700/surface acre	0.5-1.5 quarts surface acre	30 days for irrigation, water intake restrictions	Slow acting, hazard to trees at water's edge, whole pond treatment only.
2, 4-D (granular)	Excellent	\$280 - 560/surface acre	5 lbs/ 2000 sq ft 100 - 200 lbs/surface area	21 days irrigation and domestic	
2, 4-D (liquid)	Excellent	\$50-200/ surface acre	2.5 - 10 gal/ acre	21 days irrigation and domestic	Higher rate for acers with high water exchange

Alternative Treatment:

Stock 10 grass carp per vegetated acre. If bass or other predatory fish are present, then 10 inch grass carp should be used. Effects are seen 2 years after stocking. See section on grass carp.

Water dye: 1 gallon per acre, 3x per year.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

SUBMERSED WITH WHORLED LEAF ATTACHMENT



STONEWARTS

Most with musty-garlic smell.

Most gritty to the touch.

Attached to bottom (no true roots).

(See Under Algae Section)

For photos - see websites at the end of this section

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

FLOATING-LEAVED

CREeping WATER PRIMROSE (*Ludwigia* spp.)

Bright yellow flowers in summer.
Spongy white "roots" along stem.

For photos - see websites at the end of this section



Leaf shape varies.



Lays flat on water surface,
rooted at shore.

Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
2,4-D (38.9% ae liquid)	Excellent	\$10-20/surface acre	2 oz/gal water sprayed on plants or 2 -4 pt/acre	21 days irrigation and domestic	Take steps to avoid spray drift
Aquamaster (53.8% glyphosate)	Excellent	\$66-115/surface acre	1-1.3 oz plus surfactant per gal water sprayed on plants.	0 days except water intakes, rice	Apply thoroughly when plants are at or beyond bloom, before fall color change. Nonionic surfactant (e.g., Ortho X-77 or Aqua King).

Alternative Treatment:

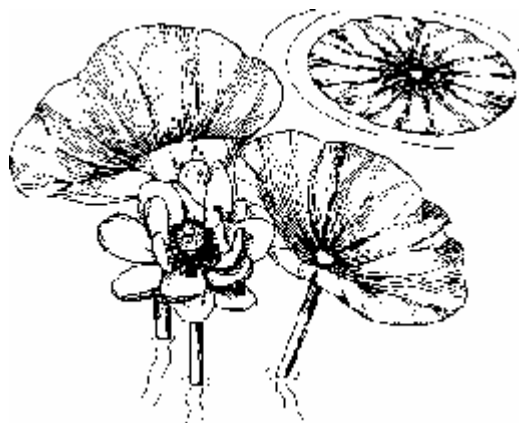
Pull out by hand or drag before plants set seed.

Stock 10 grass carp per vegetated acre. If bass or other predatory fish are present, then 10 inch grass carp should be used. Effects are seen 2 years after stocking. See section on grass carp.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

FLOATING-LEAVED

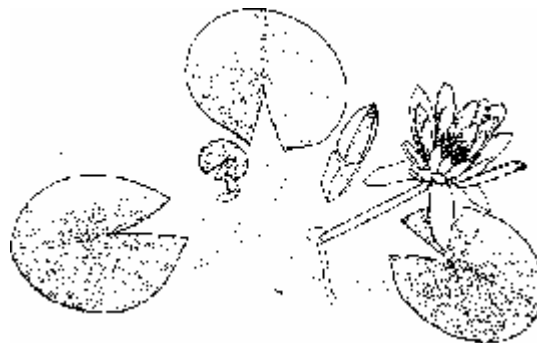
AMERICAN LOTUS (*Nelumbo lutea*)



Large round leaves that extend above water. Completely round leaf with stem attachment in center.

WATER LILY (*Nymphaea* spp.)

For photos - see websites at the end of this section



Circular leaves with a slit from edge to center. Often confused with Spatterdock
illustration provided by: IFAS, Center for Aquatic Plants University of Florida, Gainesville, 1990

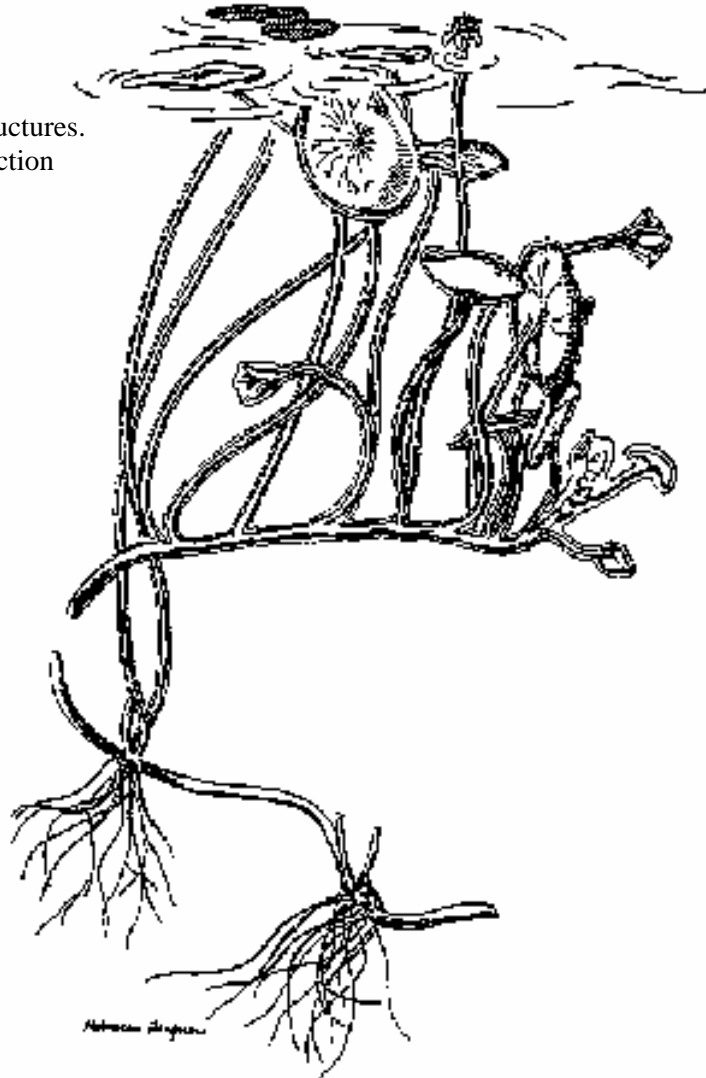
Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions -See table at end of section	Remarks
2,4-D (38.9% ae liquid)	Excellent	\$45-78/ surface acre	8 oz in 5 gal water sprayed on plants or 2-4 pts/acres	21 days irrigation and domestic	Take steps to reduce spray drift
Aquamaster (53.8% glyphosate)	Good-Excellent: lotus Poor: lillies	\$66-115/ surface acre	Boom rate: 4 pt plus surfactant per 3-30 gal water per surface acre. Hand rate: 1 oz plus surfactant per gal water per surface acre.	0 days except water intakes, rice	Treat when actively growing at or beyond bloom stage. Repeat treatments may be needed to control regrowth from seeds and tubers.
Sonar (fluridone)	Excellent: lillies Fair: lotus	\$235-700/surface acre	0.5-1.5 quarts/surface acre	30 days for irrigation, water intake restrictions	Slow acting, hazard to trees at water's edge, whole pond treatment only.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

FLOATING-LEAVED

WATERSHIELD (*Brasenia schreberi*)

Round, floating leaves.
 Jelly on young stems, buds and lower leaf structures.
 For photos - see websites at the end of this section



Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
2,4-D (liquid)	Excellent	\$50-200/ surface acre	2.5-10 gal/ surface acre	21 days irrigation and domestic	Take steps to reduce spray drift
Aquamaster (53.8% glyphosate)	Good	\$70-110/ surface acre	4.5-7.5 pts/ surface acre	0 days except water intakes, rice	Spray on leaves. Nonionic surfactant (e.g., Ortho X-77 or Aqua King).
Sonar (fluridone)	Good	\$235-700/ surface acre	0.5-1.5 quarts/ surface acre	30 days for irrigation, water intake restrictions	Slow acting, hazard to trees at water's edge, whole pond treatment only.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

FLOATING-LEAVED

PONDWEEDS (*Potamogeton* spp.)
Long, flexible rooted stems.
Leaves variable.
For photos - see websites at the end of
this section



AMERICAN PONDWEED
(*P. nodosus*)



VARIABLE-LEAF PONDWEED
(*P. diversifolius*)

See Pondweeds under SUBMERSED WITH ALTERNATE LEAF ATTACHMENT

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

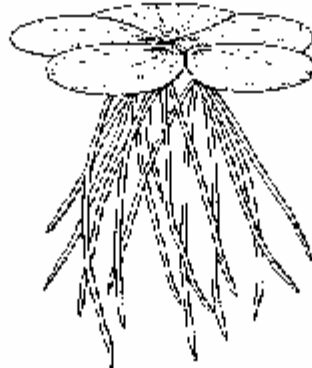
FREE-FLOATING

DUCKWEEDS (*Lemna* spp.)

Specks of green often covering entire pond surface. Major food for ducks.
Cattle: no harm from duckweeds. Fish: can lead to low oxygen kill.



LESSER DUCKWEED
4 mm or less.
Single root.



BIG DUCKWEED
Pumpkin seed size.
Cluster of roots.



WATERMEAL
1 mm or less.
Rootless.

Note: If treatment with herbicides is needed, do completely: even spraying duckweeds in damp areas above water level.

Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
Reward (Diquat)	duckweed: Good watermeal: fair	\$110/acre	5 oz in 2-6 gal water sprayed on plants.	1-5 days drinking, irrigation	Nonionic surfactant. Seine to remove plants first. Spray damp shorelines repeat treatment may be needed.
2,4-D (38.9% ae liquid)	duckweed: fair watermeal: fair	\$5-10/ surface acre	2-4 pts/acre	21 days	Take steps to reduce spray drift. Seine to remove plants first. Spray damp shorelines. Repeat treatment may be needed.
Sonar (fluridone)	duckweed: Excellent watermeal: Fair-Good	\$235-700/ surface acre	0.5-1.5 quarts surface acre	30 days for irrigation, water intake restriction	Slow acting, hazard to trees at water's edge, whole pond treatment only.

Note: Spray all plants including those washed up on shore to prevent rapid regrowth by survivors.

Alternative Treatments:

Use a minnow seine to remove duckweed after the wind has blown it to shore.

Stock 10 grass carp per vegetated acre. If bass or other predatory fish are present, then 10 inch grass carp should be used. See section on grass carp.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

STONEWARTS

ALGAE-SUBMERSED

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CHARA (“Care-ah”)
Musty-garlic odor.
Bristly to the touch.
Often gritty from calcium carbonate.
Also see COONTAIL under Submersed with Whorled Leaf Attachment.



NITELLA
Very similar to Chara.
Lacks nodules seen on “leaves” of Chara.

Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
Copper Sulfate ¹	Excellent	\$2-6/acre foot	See footnote 1 below	None	Corrodes metal. Toxic to sheep.
Citrine-Plus (liquid) (chelated copper)	Excellent	\$31/acre foot	1.2 gal/acre foot	None	Dilute 9:1 with water. Toxic to sheep.
Citrine-Plus (granular) (chelated copper)	Excellent	\$111/ surface acre	60 lb/surface acre	None	Toxic to sheep.
Hydrothol (endothall)	Good	\$150-600/ acre	2.5-10 gallons/ acre	7-14 days for most uses	<u>Application hazard - requires special care</u>

¹ Safe dose for fish and an effective dose for control of chara/nitella is based on the total alkalinity of the water. OSU irrigation in water test will provide total alkalinity.

If total alkalinity is less than 40 mg/l, then do not use copper sulfate or chelated copper: fish are at risk of copper toxicity. If total alkalinity is between 40 and 200 mg/l, then recommended pounds of copper sulfate per acre foot=(total alkalinity/100) x 2.7. **Note:** It is best to avoid creating hot spots which might harm fish. Apply copper sulfate by placing in a sack and towing behind boat in a crazy spider web pattern. If total alkalinity is more than 200 mg/l, then plain copper sulfate will not be effective. Use chelated copper or add 8 pounds of citric acid per acre foot at the same time. Use the formula above to determine pounds of copper sulfate needed.

Alternative Treatment:

Stock 10 grass carp per vegetated acre. If bass or other predatory fish are present, then 10 inch grass carp should be used. Effects are seen 2 years after stocking. See section on grass carp.

Water dye: 1 gallon per acre, 3x per year.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

ALGAE

No Figure

No Figure

FILAMENTOUS ALGAE

Stringy, hair-like, totally without leaves.

Often in mats floating to surface.

Confused with NAIAD see under submersed with opposite leaves.

For photos - see websites at the end of this section

PLANKTONIC ALGAE (Phytoplankton)

A dense green color to water.

Sometimes brown or other colors.

Herbicide	Effectiveness	Cost (Approximate)	Dose (Approximate)	Water Use Restrictions - See table at end of section	Remarks
Copper Sulfate ¹ (CuSO ₄)	Excellent	\$2-6/acre foot	Lbs CuSO ₄ = (total alkalinity/100) x 2.7 per acre foot	None	Corrodes metal. Toxic to sheep.
Cutrine-Plus ¹ (liquid) (chelated copper)	Excellent	\$16/acre foot	0.6 gal/acre foot	None	Dilute 9:1 with water. Toxic to sheep.
Cutrine-Plus ¹ (granular) (chelated copper)	Excellent	\$111/ surface acre	60 lb/surface acre	None	Toxic to sheep.
Reward (Diquat)	Good – filamentous Poor - planktonic	\$110-220/ surface acre	1-2 gallons/ surface acre	Human, livestock, irrigation	Do not apply to muddy water.
Hydrothol (endothall)	Good – filamentous Good - planktonic	\$17-65/ surface acre	2.2-8.6 pints/ surface acre	7-14 days for most uses	<u>Application hazard – requires special care</u>

¹ Safe dose for fish and an effective dose for control of algae is based on the total alkalinity of the water. OSU irrigation water test will provide total alkalinity.

If total alkalinity is less than 40 mg/l, then do not use copper sulfate or chelated copper: fish are at risk of copper toxicity.

If total alkalinity is between 40 and 200 mg/l, then recommended pounds of copper sulfate per acre foot=(total alkalinity/100) x 2.7. **Note:** It is best to avoid creating hot spots which might harm fish. Apply copper sulfate by placing in a sack and towing behind boat in a crazy spider web pattern.

If total alkalinity is more than 200 mg/l, then plain copper sulfate will not be effective. Use chelated copper or add 8 pounds of citric acid per acre foot at the same time. Use the formula above to determine pounds of copper sulfate needed.

Alternative Treatment:

For filamentous algae only:

Stock 10 grass carp per vegetated acre. If bass or other predatory fish are present, then 10 inch grass carp should be used. Effects are seen 2 years after stocking. See section on grass carp. Other plants will be eaten before filamentous algae.

For filamentous and planktonic algae:

- Consider reducing nutrients going into pond from cattle by fencing them out. Provide water for cattle with a freeze-proof tank below dam. See SCS Engineering Bulletin No. 210-0-5.
- If cattle must have access, consider Aquashade or similar EPA approved dyes that control algae by reducing light. One gallon per acre of water with 4 foot average depth, 3x per year.
- Heavily polluted stock-watering ponds may call for a livestock water test since nitrates may be at a harmful level.

CONTROL OF COMMON AQUATIC WEEDS (CONT'D)

Grass Carp

Grass carp effects are not usually seen until late in the second year after stocking.

Recreational fishing ponds with less than 25% weed coverage should generally not be stocked with grass carp. To open up shore fishing spots try spot herbicide treatments instead.

They **do not** reproduce in ponds. The concern is that escaped grass carp may breed in rivers and become a problem fish there.

They do tend to escape over spillways, so spillway and drain barriers should be used. For spillways, make short panels that can be moved and linked together like livestock panels. Weld rebar in a horizontal pattern on 1 inch centers.

Do not stock grass carp in ponds managed for ducks since they will eliminate plants preferred by waterfowl.

Do not stock where they might escape into public waters.

Aquatic Herbicide Suppliers

Aquacenter, Inc.
P.O. Box 4877
Greenville, MS 38704
1-800-748-8921 1-800-333-9154

Boatcycle
Box 494
Henderson, TX 75653

Chemical & Turf Specialty Co.
3208 SE I-240
Oklahoma City, OK 73135
405-677-0132

Estes Chemicals, Inc.
9410 East 55th Street
Tulsa, OK 74145
918-234-0560

Estes Chemicals, Inc.
1819 NW 5th Street
Oklahoma City, OK 73016
1-800-234-9795 1-800-850-7274

Southern Aquaculture Supply
P.O. Box 326
Lake Village, AR 71653

Inclusion on this list does not imply endorsement by the Oklahoma Cooperative Extension Service nor does exclusion imply lack of endorsement. Contact author of this section to be added to this list.

General Restrictions on Use of Treated Water (Number of Days)

- Refer to label for actual withdrawal times -

Herbicide	Human			Animal	Irrigation	
	Drinking	Swimming	Fish Consumption	Drinking	Turf	Food Crops
Aquathol K (granular)	7 ^z	0	3	7 ^z	7 ^z	7 ^z
Aquathol K (liquid)	7 ^z	0	3	7 ^z	7 ^z	7 ^z
Copper sulfate	0 ^c	0	0	0	0	0
Cutrine Plus (granular)	0	0	0	0	0	0
Cutrine Plus (liquid)	0	0	0	0	0	0
Hydrothol	7-25	0	3	7-25	7-25	7-25
Reward (Diquat)	1-3	0	0	1	1-3	5
2,4-D (granular)	21	0	0	0	21	21
2,4-D (liquid)	21	0	0	0	21	21
Aquamaster	0 ^A	0	0	0	0	0 ^B
Sonar A.S.	0	0	0	0	30	30
Sonar 5P	0	0	0	0	30	30
Sonar SRP	0	0	0	0	30	30

^A See label for special restrictions near potable water intakes.

^B Do not apply to flooded rice fields.

^C If used for drinking no more than 4.0 ppm should be applied.

^Z Longer waiting periods required for doses greater than 0.5 ppm, see label

Costs of Aquatic Weed Treatments

Herbicide	Approximate Prices	Approximate Treatment Costs
Aquathol K (liquid)	\$130/2.5 gal	\$52-520/surface acre
Aquathol K (granular)	\$90/40 lbs	\$180/1,000/surface acre
Copper sulfate	\$30/50 lbs	\$1-5/acre ft
Cutrine Plus (liquid)	\$25/gal	\$25-100/surface acre
Cutrine Plus (granular)	\$50/30 lbs	\$100/surface acre
Hydrothol (liquid)	\$150/2.5 gal	\$2-17/acre ft (algae)
		\$40-200/acre ft (rooted plants)
Hydrothol (granular)	\$100/40 lbs	\$8-30/acre ft (algae)
		\$68-340/acre ft (rooted plants)
Reward	\$110/gal	\$55-220/surface acre
Aquamaster	\$300/2.5 gals	\$60-90/surface acre
Sonar (liquid)	\$470 /qt	\$235-705/surface acre
Sonar (liquid)	\$1,300/gal	\$160-490/surface acre
Sonar (granular)	\$750/40 lb	\$190-560/surface acre
2,4-D (liquid)	\$50/2.5 gals	\$10-50/surface acre
2,4-D (granular)	\$70/25 lbs	\$280-420/surface acre
Aquashade	\$40/gal	\$40/acre (3x per year)
Grass Carp 3-6 inches	\$2.00-3.00	stock 10 per vegetated acre
10 inches	\$5.00-7.00	
Surfactants	\$10-20 gal	\$1-2/25 gals spray mix

Sources of Information Used

Aquatic Weeds: Their Identification and Methods of Control, Illinois Department of Conservation, Fishery Bull. No. 4, 1988.

Aquatic Plants of Oklahoma. E. N. Nelson and R. W. Couch, Oral Roberts University, 1985.

How To Identify and Control Water Weeds and Algae. J. C. Schmidt, Applied Biochemists, 1987.

Aquatic Weed Management: Herbicides, Southern Regional Aquaculture Center, Publication No. 361.

Aquatic Plant Identification and Herbicide Use Guide. Volume II: Aquatic Plants and Susceptibility to Herbicides. U.S. Army Corps of Engineers Technical Report A-88-9, November, 1988.

Water Plants for Missouri Ponds, Whitley et al., 1990, Missouri Department of Conservation.

TIPS FOR SUCCESSFUL HERBICIDE USE

- USE CLEAN TAP WATER IN SPRAY MIX, NEVER POND WATER.
- USE SURFACTANT THAT IS SPECIFIED ON LABEL.
- APPLY WHEN PLANTS ARE ACTIVELY GROWING AND BEFORE SEEDS FORM.
- **KARMEX** IS NOT APPROVED FOR POND OR LAKE USE. IT KILLS TREES WITH ROOTS IN THE WATER. SAFETY OF FISH FOR HUMAN CONSUMPTION FOLLOWING KARMEX USE IS UNKNOWN.

Photos of Aquatic Weeds

<http://aquaplant.tamu.edu>

SUGGESTED MAINTENANCE PRACTICES FOR ROADSIDE WEED AND BRUSH CONTROL

Right-of-way vegetation management is a very important part of the overall roadside maintenance program. The vegetation adjacent to the road surface is a functional part of the road. In addition to mechanical methods, herbicides are used for managing right-of-way vegetation. When used correctly, herbicides can selectively control undesirable weeds and leave nearby beneficial plants unharmed.

This Extension circular summarizes herbicides, rates of application per acre, water carrier rates, timing of application, and important comments for a vegetation management program. These programs include control of johnsongrass, annual grasses and broadleaves, silver bluestem (silver beardgrass), switchgrass, bermudagrass encroachment, aquatic weeds, and suppression of bermudagrass growth and development (growth regulation) along roadside right-of-ways in Oklahoma. With respect to recommended timing of applications, refer to the spray zone map (Figure 1) based on your location within Oklahoma.

Please remember these are only suggestions and the following information is for preliminary planning. There is no substitute for an applicator scouting roadside areas regularly to note the conditions of the desired species, weeds present, and their stage of development. Be sure to follow the manufacturer's directions, not withstanding the information contained in this circular. Read and follow all label directions.

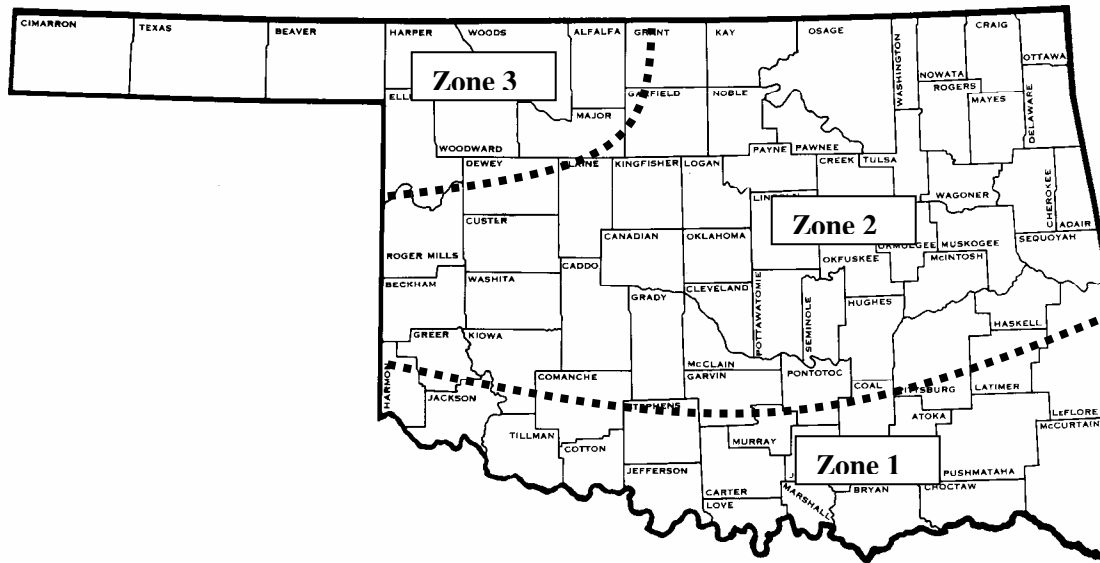


Figure 1. Seasonal herbicides spray zones along Oklahoma roadsides. Seasonal spray zones are based on many factors. Optimize your weed control results by following the recommended treatment dates for your specific zone.

SUGGESTED MAINTENANCE PRACTICES FOR ROADSIDE WEED AND BRUSH CONTROL (CONT'D)

ACTIVITY	HERBICIDE(S) AND RATE(S) OF APPLICATION PER ACRE	TIME OF APPLICATION
Johnsongrass Control (Postemergence)	Glyphosate + sulfometuron. Apply 16 to 24 fluid ounces of product + 1 ounce of product, respectively in 20 to 40 gallons of water per acre. MOA Group 9.	Zone 1: April 20 - May 31 Zone 2: May 10 - June 15 Zone 3: May 20 - June 30
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. Application should be made after bermudagrass has broken dormancy and is 100 percent green and actively growing. 2. Add glyphosate to the tank mixture first and then add the sulfometuron. 3. Applications should not be made to areas that have little or no bermudagrass to release. It is recommended that a roadside needs at least 30 percent bermudagrass cover. If not, use a MSMA program until you achieve recommended coverage. 4. Applications should not be made on newly sprigged or seeded areas. This treatment will slow the rate of coverage from sprigs and inhibit seed germination. 5. Do not apply to saturated soils or if rainfall will occur within 2 to 6 hours. Rainfall will wash the glyphosate from the plants and reduce the level of control. Generic glyphosates need to remain on foliage for at least 6 hours before any significant rainfall event. 6. If Roundup Pro Concentrate® is used; apply 13 to 19 fluid ounces of product per acre. 7. Glyphosate rates higher than 16 fluid ounces of product per acre should not be used in the western one-third of Oklahoma. 8. Do not mow roadsides prior to treatment. Wait at least 10 days after treatment before mowing or weed control may be reduced. 		
Johnsongrass Control (Postemergence)	Glyphosate + Plateau®. Apply 12 to 16 fluid ounces of product + 4 fluid ounces of product per acre, respectively in 20 to 40 gallons of water per acre. MOA Group 9.	Zone 1: April 20 - May 31 Zone 2: May 20 - June 15 Zone 3: May 20 - June 30
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. Application should be made after bermudagrass has broken dormancy and is 100 percent green and actively growing. 2. Add glyphosate to the tank mixture first and then add the Plateau®. 3. Plateau® is only available through direct purchase from the manufacturer (BASF). 4. Applications should not be made to areas that have little or no bermudagrass to release. It is recommended that a roadside needs at least 30 percent bermudagrass cover. If not, use a MSMA program until you achieve this recommended coverage. 5. Applications should not be made on newly sprigged or seeded areas. This treatment will slow the rate of coverage from sprigs and inhibit seed germination. 6. Do not apply to saturated soils or if rainfall will occur within 2 to 6 hours. Rainfall will wash the glyphosate from the plants and reduce the level of control. Generic glyphosates need at least 6 hours before any significant rainfall event. 7. If Roundup Pro Concentrate® is used; apply 10 to 13 fluid ounces of product per acre. 8. Do not mow roadsides prior to treatment. Wait at least 10 days after treatment before mowing or weed control may be reduced. 		

SUGGESTED MAINTENANCE PRACTICES FOR ROADSIDE WEED AND BRUSH CONTROL (CONT'D)

ACTIVITY	HERBICIDE(S) AND RATE(S) OF APPLICATION PER ACRE	TIME OF APPLICATION
Johnsongrass Control (Postemergence)	Glyphosate + Outrider®. Apply 12 to 24 fluid ounces of product + 0.75 to 1.33 ounces of product per acre, respectively in 20 to 40 gallons of water per acre. MOA Group 9.	Zone 1: April 20 - June 30 Zone 2: May 10 - July 30 Zone 3: May 20 - August 15
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. This treatment will produce less noticeable injury to bermudagrass. It has the greatest level of bermudagrass safety of any of the suggested johnsongrass treatments especially at later applications. 2. Application should be made after bermudagrass has broken dormancy and is 100 percent green and actively growing. 3. Add glyphosate to the tank mixture first and then add the Outrider®. 4. Applications should not be made to areas that have little or no bermudagrass to release. It is recommended that a roadside needs at least 30 percent bermudagrass cover. If not, use a MSMA program until you achieve recommended coverage. 5. Applications should not be made on newly sprigged or seeded areas. This treatment will slow the rate of coverage from sprigs and inhibit germination of seeds. 6. Do not apply to saturated soils or if rainfall will occur within 2 to 6 hours. Rainfall will wash the glyphosate from the plants and reduce the level of control. Generic glyphosates need to remain on foliage for at least 6 hours before any significant rainfall event. 7. If Roundup Pro Concentrate® is used, apply 10 to 19 fluid ounces of product per acre. 8. After mowing wait until johnsongrass has 12 to 24 inches of regrowth before treating. Wait at least 10 days after treatment before mowing or weed control may be reduced. 9. The addition of certain amine-form broadleaf weed control herbicides to this treatment can result in reduced johnsongrass control (antagonism). This is not desirable and one should consult the Outrider® label before tank-mixing. 10. Glyphosate rates higher than 16 fluid ounces of product per acre should not be used in the western one-third of Oklahoma. 		
Johnsongrass Control (Postemergence)	MSMA. Apply 2 to 3 pounds of active ingredient per acre in 40 gallons of water per acre. MOA Group 17.	Zone 1: April 15 - July 30 Zone 2: May 10 - August 15 Zone 3: May 20 - August 15
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. Two or three applications per year will be required to control johnsongrass. Treatments should start when johnsongrass reaches 12 to 18 inches in height and retreatments should be made when regrowth is 12 to 18 inches tall (retreatments usually will be made on a 3 to 4 week interval maximum). 2. Preemergence seedling johnsongrass control may be achieved by adding sulfometuron or Outrider® at 1 ounce product per acre when the first MSMA treatment is made. Do not add sulfometuron or Outrider® to subsequent MSMA treatments. 3. Never apply MSMA to standing water, creeks, rivers, or ponds. Be sure to shut off spray rigs when passing over bridges. 4. MSMA, alone, can be used on newly sprigged or thin roadsides, as MSMA will produce very little injury or slow bermudagrass growth and development. 5. MSMA should not be applied to young bermudagrass seedlings until they have produced stolons from 1 to 3 inches in length. 		

SUGGESTED MAINTENANCE PRACTICES FOR ROADSIDE WEED AND BRUSH CONTROL (CONT'D)

ACTIVITY	HERBICIDE(S) AND RATE(S) OF APPLICATION PER ACRE	TIME OF APPLICATION
Winter Annual Grass and Broadleaf Weed Control Using Postemergence Herbicides	Campaign® + ammonium sulfate (AMS). Apply 2 to 4 pints of product per acre + 17 pounds of product per 100 gallons of carrier (AMS is used only with low end rates of Campaign®) in 20 to 40 gallons of water per acre. MOA Group 4 and 9.	Zone 1: February 15 - March 20 Zone 2: February 25 - March 31 Zone 3: March 10 - April 15
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. Apply to dormant bermudagrass. Applications made to bermudagrass that is beginning to green-up will result in temporary discoloration and slight bermudagrass green-up delay. 2. Campaign® should be applied at a rate of 3 to 4 pints of product per acre alone. Campaign® applied at 2 pints product per acre requires the addition of AMS. The AMS treatment will significantly reduce treatment costs while maintaining acceptable weed control. 3. Targeted weeds must be actively growing and may take 2 to 3 weeks before showing any phytotoxicity symptoms from the herbicides (this is because of the cool temperatures). 4. This product is for the control of emerged weeds only, there is no preemergence control of weeds with this treatment. 5. Precautions should be taken to avoid drift to susceptible nontarget plants. 6. AMS should be mixed thoroughly into the tank first, then add the Campaign®. 7. This treatment needs to be applied before targeted weeds reach 6 inches tall to assure good coverage and control. 8. Roadsides that are infested with musk thistle would benefit from an addition of Overdrive® at 2 ounces per acre. 9. The addition of Milestone VM® at 4 ounces product per acre to this treatment would provide 3 to 5 months of summer annual broadleaf weed control. 		
Annual Ryegrass Control Using Postemergence Herbicides	Campaign® + glyphosate + ammonium sulfate (AMS). Apply 2 pints product + 16 fluid ounces of product per acre + 17 pounds of product per 100 gallons of carrier in 20 to 40 gallons of water per acre. MOA Group 4 and 9.	Zone 1: February 15 - March 10 Zone 2: February 20 - March 25 Zone 3: March 5 - April 5.
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. This treatment should only be substituted for a traditional Campaign® program when annual ryegrass becomes a problem in the clear zone. 2. Annual ryegrass requires higher herbicide rates to achieve successful control. 3. If Roundup Pro Concentrate® is used apply at 13 fluid ounces of product per acre. 4. Apply to dormant bermudagrass. Applications made to bermudagrass that is beginning to green-up will result in temporary discoloration and slight bermudagrass green-up delay. 5. Targeted weeds must be actively growing and may take 2 to 3 weeks before showing any phytotoxicity symptoms from the herbicides (this is because of the cool temperatures). 6. This product is for the control of emerged weeds only, there is no preemergent (residual) control of weeds with this treatment. Milestone VM® at 4 ounces product per acre may be added to this treatment to provide 3 to 5 months of summer annual broadleaf weed control. 7. Precautions should be taken to avoid drift to susceptible nontarget plants. 8. This treatment needs to be applied before targeted weeds reach 6 inches tall to assure good coverage and control. 		

SUGGESTED MAINTENANCE PRACTICES FOR ROADSIDE WEED AND BRUSH CONTROL (CONT'D)

ACTIVITY	HERBICIDE(S) AND RATE(S) OF APPLICATION PER ACRE	TIME OF APPLICATION
Annual Ryegrass Control Using Postemergence Herbicides	Glyphosate. Apply 32 fluid ounces of product per acre in 20 to 40 gallons of water per acre. MOA Group 9.	Zone 1: February 15 - March 10 Zone 2: February 20 - March 25 Zone 3: March 5 - April 5
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. This treatment should only be substituted for a traditional Campaign® program when annual ryegrass becomes a problem in the clear zone. 2. Annual ryegrass requires higher herbicide rates to achieve successful control. 3. If Roundup Pro Concentrate® is used apply at 25 fluid ounces of product per acre. 4. Apply to dormant bermudagrass. Applications made to bermudagrass that is beginning to green-up will result in temporary discoloration and slight bermudagrass green-up delay. 5. Targeted weeds must be actively growing and may take 2 to 3 weeks before showing any phytotoxicity symptoms from the herbicides (this is because of the cool temperatures). 6. This product is for the control of emerged weeds only, there is no preemergence control of weeds with this treatment. Milestone VM® at 4 ounces product per acre may be added to this treatment to provide 3 to 5 months of summer annual broadleaf weed control. 7. Precautions should be taken to avoid drift to susceptible nontarget plants. 8. This treatment needs to be applied before targeted weeds reach 6 inches tall to assure good coverage and control. 		
Early Postemergence and Preemergence Control of Winter and Summer Broadleaf Weeds	Milestone VM® + non-ionic surfactant. Apply 4 ounces of product per acre + 0.25 percent solution in 20 to 40 gallons of water per acre. MOA Group 4.	Zone 1: February 15 - March 10 Zone 2: February 25 - March 31 Zone 3: March 5 - April 5
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. This treatment can be tank-mixed with any of the Winter Annual Weed Control Treatments to add a residual component. 2. This treatment produces good postemergence control of emerged winter broadleaf weeds and provides 4 to 5 months of residual control of many common summer annual broadleaf weeds. 3. This treatment will provide 40 to 50 percent kochia suppression if applied and activated with rainfall before kochia emerges. 4. A quality non-ionic surfactant should be used that has a minimum of 80 percent active ingredient if used alone. 5. Precautions should be taken to avoid drift to susceptible nontarget plants. 6. This product can provide summer broadleaf weed control from March applications. This reduces potential to damage broadleaf crops that are planted after April or May. It reduces the need for summer applications of Vanquish® to control broadleaf weeds. 		

SUGGESTED MAINTENANCE PRACTICES FOR ROADSIDE WEED AND BRUSH CONTROL (CONT'D)

ACTIVITY	HERBICIDE(S) AND RATE(S) OF APPLICATION PER ACRE	TIME OF APPLICATION
Early Postemergence and Preemergence Control of Winter and Summer Broadleaf Weeds	Diuron 80 WDG® + non-ionic surfactant. Apply 3 to 5 pounds product per acre + 0.25 percent solution in 25 to 40 gallons of water per acre. MOA Group 7.	Zone 1, 2, and 3: January 15 – February
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. Diuron 80 WDG® is used primarily in areas infested with kochia. 2. This recommendation is specific to the Diuron 80 WDG® Loveland Industries product as it is currently labeled for recommended rates. 3. A quality non-ionic surfactant should be used that has a minimum of 80 percent active ingredient if used alone. 4. Application should be made on completely dormant bermudagrass. 5. Applications should never be made to saturated or frozen soils (there is a potential for runoff if application is followed by rain). 6. Regardless of right-of-way width, always leave an untreated buffer zone. 7. Diuron 80 WDG® can be used with imazapyr or glyphosate treatments to provide long-term total vegetation control around signs and guardrails. 		
General Broadleaf Weed Control Using Postemergence Herbicides	Vanquish® + non-ionic surfactant. Apply 1 to 2 pints of product per acre + 0.25 percent solution, respectively. In 20 to 40 gallons of water per acre as a broadcast application or 50 to 100 gallons per acre as a handgun or backpack application. MOA Group 4.	Zone 1, 2, and 3: March 15 – June 30
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. A quality non-ionic surfactant should be used that has a minimum of 80 percent active ingredient. 2. Precautions should be taken to avoid drift to susceptible crops. This herbicide can volatilize at higher air temperatures. 3. One timely application per year should control most broadleaf weeds including kochia. 4. Because of different carrier rates, a single tank mixture should not be used for both broadcast and handgun applications. This could cause a severe over or under application of targeted herbicide rates. 5. Vanquish® should provide good broad spectrum broadleaf weed control, however, refer to label for specific weed species. 6. Better control can be achieved by treating smaller seedlings or early vegetative stage weeds that are no taller than 3 inches. 7. For best results on biennial weeds, applications should be made to rosettes or at the early vegetative stage when plants are no taller than 6 inches. 8. This treatment is also very effective at controlling the state noxious weed, scotch thistle when applied in March through April. 		

SUGGESTED MAINTENANCE PRACTICES FOR ROADSIDE WEED AND BRUSH CONTROL (CONT'D)

ACTIVITY	HERBICIDE(S) AND RATE(S) OF APPLICATION PER ACRE	TIME OF APPLICATION
Musk Thistle Control Using Postemergence Herbicides	Overdrive® + non-ionic surfactant. Apply 2 to 4 ounces product per acre + 0.25 percent solution. In 20 to 40 gallons of water per acre or 50 to 100 gallons per acre as a handgun or backpack application. MOA Group 4.	Zone 1, 2, and 3: March – May 10
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. Currently, this is the most economical treatment for controlling musk thistle. 2. Rates less than 4 ounces per acre are made under a 2ee label and is approved for Oklahoma Department of Transportation and pasture use only. The 2ee label must be in possession during the application. Applications at 2 ounces per acre must be made to the rosette stage of growth, poor control will result if applied to bolted (flowered) thistles at this rate. 3. A quality non-ionic surfactant should be used that has a minimum of 80 percent active ingredient if used alone. 4. Due to different carrier rates, a single tank mixture should not be used for both broadcast and handgun applications. This could cause a severe over or under application of targeted rates. 5. Applications should be made to actively growing thistles prior to bolting. 6. Extreme growing conditions such as drought or near freezing temperatures prior to, at, and following time of application may reduce thistle control. 7. Precautions should be taken to avoid drift to susceptible nontarget plants. This herbicide can volatilize at higher air temperatures. 8. By law (Oklahoma Noxious Weed Law), musk thistles must be prevented from flowering statewide. 9. The 2 ounces per acre rate makes an excellent tank-mix partner with Campaign® + AMS at recommended rates to control musk thistle. 		
Musk Thistle Control Using Postemergence Herbicides	Transline® + non-ionic surfactant. Apply 6 to 10 fluid ounces of product per acre + 0.25 percent solution. In 20 to 40 gallons of water per acre as a broadcast application or 50 to 100 gallons of water per acre as a handgun or backpack application. MOA Group 4.	Zone 1, 2, and 3: March – May 10
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. A quality non-ionic surfactant should be used that has a minimum of 80 percent active ingredient. 2. Due to different carrier rates, a single tank mixture should not be used for both broadcast and handgun applications. This could cause a severe over or under application of targeted rates. 3. Applications should be made to actively growing thistles prior to bolting. The lower rate can be used when treating the rosette stage. 4. Extreme growing conditions such as drought or near freezing temperatures prior to, at, and following time of application may reduce thistle control. 5. Precautions should be taken to avoid drift to susceptible nontarget plants. 6. By law (Oklahoma Noxious Weed Law), musk thistles must be prevented from flowering statewide. 		

SUGGESTED MAINTENANCE PRACTICES FOR ROADSIDE WEED AND BRUSH CONTROL (CONT'D)

ACTIVITY	HERBICIDE(S) AND RATE(S) OF APPLICATION PER ACRE	TIME OF APPLICATION
Scotch Thistle Control Using Postemergence Herbicides	Metsulfuron methyl + non-ionic surfactant. Apply 1 ounce of product per acre + 0.25 percent solution. In 20 to 40 gallons of water per acre broadcast application or 50 to 100 gallons per acre as a handgun or backpack application. MOA Group 2.	Zone 1, 2, and 3: March - April
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. A quality non-ionic surfactant should be used that has a minimum of 80 percent active ingredient. 2. Due to different carrier rates, a single tank mixture should not be used for both broadcast and handgun applications. This could cause a severe over or under application of targeted rates. 3. Broadcast applications should be made to rosettes that are 6 inches or smaller in diameter. 4. Poor results will occur if applications are made during drought conditions. 5. Refer to label for other susceptible species. 6. Precautions should be taken to avoid drift to susceptible crops, gardens, and nontarget areas. 7. By law (Oklahoma Noxious Weed Law), scotch thistle must be prevented from flowering statewide. 		
Silver Bluestem Control Using Postemergence Herbicides	Glyphosate. Apply 24 fluid ounces of product per acre in 20 to 40 gallons of water per acre. MOA Group 9.	Zone 1: April 20 - May 31 Zone 2: May 10 - June 15 Zone 3: May 20 - June 30
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. Sprayer equipment must be properly calibrated to ensure desirable silver bluestem control and minimize bermudagrass injury. 2. Glyphosate, alone, is used in areas where there is little or no previous history of johnsongrass. In areas where there is a history of johnsongrass, glyphosate plus Outrider®, sulfometuron, or Plateau® should be used. If a summer preemergent is not added to the treatment in areas where there are johnsongrass seeds in the soil, the seeds could germinate and create an even bigger problem than the silver bluestem that was controlled. This is because glyphosate has no soil activity. 3. Do not apply glyphosate if rainfall will occur within 2 to 6 hours. Rainfall will wash the glyphosate off the plants and reduce the level of control. Generic glyphosate products need at least 6 hours before a significant rainfall event. 4. If Roundup Pro Concentrate® is used, apply 19 fluid ounces of product per acre. 5. Do not mow roadsides prior to treatment. Wait at least 10 days after treatment before mowing or weed control may be reduced. 		

SUGGESTED MAINTENANCE PRACTICES FOR ROADSIDE WEED AND BRUSH CONTROL (CONT'D)

ACTIVITY	HERBICIDE(S) AND RATE(S) OF APPLICATION PER ACRE	TIME OF APPLICATION
Silver Bluestem Control Using Postemergence Herbicides	Glyphosate + sulfometuron. Apply 24 fluid ounces of product + 1 ounce of product per acre, respectively in 20 to 40 gallons of water per acre. MOA Group 9.	Zone 1: April 20 - May 31 Zone 2: May 10 - June 15 Zone 3: May 20 - June 30
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. Glyphosate + sulfometuron should be used in areas where there is a past history of johnsongrass problems. If the history of an area is not known, then it is best to add the sulfometuron to the glyphosate treatment. The sulfometuron is soil active and will help prevent johnsongrass seeds from emerging. 2. Spray equipment must be properly calibrated to ensure desirable silver bluestem control and minimal bermudagrass injury. 3. Application should be made after bermudagrass has broken dormancy and is green and actively growing. 4. Add the glyphosate to the tank mixture first then add the sulfometuron. 5. Applications should not be made to areas that have little or no bermudagrass to release. It is recommended that a roadside needs at least 30 percent coverage of bermudagrass, if not, use a MSMA program until this is achieved. 6. Applications should not be made on newly sprigged or seeded areas. This treatment will slow the rate of coverage from sprigs and inhibit germination of seeds. 7. Do not apply to saturated soils or if rainfall will occur within 2 to 6 hours. Rainfall will wash the glyphosate from the plants and reduce the level of control. Generic glyphosates need at least 6 hours before a significant rainfall event. 8. Do not mow roadsides prior to treatment. Wait at least 10 days after treatment before mowing or weed control may be reduced. 9. If Roundup Pro Concentrate® is used, apply at 19 fluid ounces of product per acre. 10. This treatment should not be used in the western one-third of Oklahoma. Use glyphosate only treatments to control silver bluestem in western Oklahoma. 		
Switchgrass Management (Ropewick or Wiper Application)	Glyphosate. Apply 1:2 ratio of herbicide to water. MOA Group 9.	Zone 1, 2, and 3: May - June (followed by mowing).
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. This treatment is to be selectively applied with either a ropewick or wiper-type applicator. 2. An important component of switchgrass management is timely mowings following application. Switchgrass areas should be mowed approximately 1 month and 3 months after treatment. Mowing should occur when switchgrass regrowth begins producing seed heads. 3. Dense stands of switchgrass will require wiping in 2 directions. 4. Do not wipe bermudagrass with this treatment as severe damage will occur. 5. Do not apply to plants that are drought stressed. Wait for a 1/2 to 1 inch rain before making the application. 6. Do not apply if rainfall will occur within 2 to 6 hours. Rainfall will wash glyphosate from the plants and reduce the level of control. Generic glyphosates need at least 6 hours before any significant rainfall event. 7. Do not use drift control products with this treatment. 8. Equipment used should include polyester over acrylic fiber core ropes or canvas and should be cleaned daily with detergent and water. This will remove wax buildup and allow for an even flow of herbicide across the wiping surface. 9. Applications made to plants noticeably covered with dust will result in reduced control. 10. This treatment followed by timely mowings will take a minimum of 2 years to remove switchgrass from safety areas. 11. Do not mow switchgrass areas prior to treatment. 12. Switchgrass should be wiped as low as possible without wiping the bermudagrass. 		

SUGGESTED MAINTENANCE PRACTICES FOR ROADSIDE WEED AND BRUSH CONTROL (CONT'D)

ACTIVITY	HERBICIDE(S) AND RATE(S) OF APPLICATION PER ACRE	TIME OF APPLICATION
General Brush Control	Tordon K® + Garlon 4 Ultra®. Refer to labeled rates for specific brush species. Apply 50 gallons of water per acre as a broadcast application or a minimum of 100 gallons of water per acre as a handgun application. MOA Group 4.	Zone 1, 2, and 3: May - July (see comments).
COMMENTS <ol style="list-style-type: none"> 1. This herbicide treatment can volatilize at higher air temperatures. 2. The use of this treatment will cause a very quick brown-out of the brush species in 7 to 14 days. Public acceptance of the treatment should be considered before choosing this treatment. 3. Refer to herbicide labels for susceptible target species. This treatment, applied in early summer to new leaves, should give very good control of most brush species found along Oklahoma roadsides. 4. Handgun applications should be made on a spray-to-wet basis using a minimum of 100 gallons per acre for low-density brush and up to 250 gallons per acre for high-density brush areas. 5. Due to different carrier rates, it is not recommended that a single tank mixture be used for both broadcast and handgun applications. This could cause a severe over or under application of targeted rates. 6. Most brush species are susceptible to this treatment, extreme caution should be used to prevent off-target movement of fine spray particles. 7. Always use a quality drift control additive to reduce the number of fine spray particles. This will help reduce the hazard of off-target drift. 8. Follow label rates for the specific brush species you are targeting. 9. Use extreme caution when treating near any ground water. Leave a buffer zone around all ground water sources. 10. Tordon K® is a restricted use herbicide because of its potential to move to groundwater sources. 11. Brush should not be removed following application for a minimum of 1 month. 		
General Brush Control	Krenite S® + crop oil. Refer to label for specific brush control rates. Apply a minimum of 100 gallons of water per acre as a handgun application or broadcast application.	Zone 1, 2, and 3: June - October (see comments).
COMMENTS <ol style="list-style-type: none"> 1. Little or no foliage brown-out will occur after treatment. Leaves will drop off the tree in a normal fashion and the following spring the tree will not produce any new leaves. 2. The addition of a crop oil is critical to aid in absorption of the herbicide through the waxy leaves. 3. Handgun applications should be made on a spray-to-wet basis using a minimum of 100 gallons per acre for low-density brush and up to 250 gallons per acre for high-density brush areas. 4. Refer to herbicide label for susceptible species. This treatment does not produce as broad a spectrum of brush control as Tordon K® + Garlon 4 Ultra®. Identifying problem brush species is very important. 5. Thorough coverage of the entire target plant is necessary for complete control of susceptible species as this treatment has little if any translocation in the treated brush. 6. Do not apply Krenite S® if rainfall will occur anytime during the day of application. The Krenite S® will be washed off the leaves and reduce the level of control. 7. Applications made in October should be made before fall leaf discoloration. 		

SUGGESTED MAINTENANCE PRACTICES FOR ROADSIDE WEED AND BRUSH CONTROL (CONT'D)

ACTIVITY	HERBICIDE(S) AND RATE(S) OF APPLICATION PER ACRE	TIME OF APPLICATION
General Brush Control	Glyphosate—foliar spot treatment only. Apply 1.5 gallons of product per acre in 100 gallons of water per acre—handgun only. MOA Group: 9	Zone 1, 2, and 3: June - October.
COMMENTS <ol style="list-style-type: none"> 1. Do not make broadcast applications with this treatment. This herbicide treatment will cause severe damage or death of desirable grass understories if applied as a broadcast treatment. 2. This treatment should be applied as a foliar spot treatment using a handgun application only. 3. Apply the herbicide mixture on a spray-to-wet basis. 4. At this rate of application the grass understory will be killed at the base of the spot treatment. 5. Do not apply glyphosate if rainfall will occur within 2 to 6 hours. Rainfall will wash the glyphosate off the plant and reduce the level of control. Generics require 6 hours before they are rainfast. 6. Refer to the herbicide label for susceptible target species. 7. This treatment should only be used on low-density brush areas. 8. If Roundup Pro Concentrate® is used, apply at 1.25 gallons of product per acre. 		
Brush Control Using Cut Surface Treatments	Glyphosate (cut surface treatments only). Apply 1:1 water to herbicide ratio. MOA Group: 9	Zone 1, 2, and 3: May – September.
COMMENTS <ol style="list-style-type: none"> 1. All brush manually cut by Oklahoma Department of Transportation crews and not previously treated with a herbicide should receive a cut stump treatment to prevent resprouting. 2. Applications should be made immediately after cutting or as soon as possible. Delay in application of more than 30 minutes may result in reduced performance on hard-to-control species. 3. Apply using a backpack sprayer or squirt bottle. 4. Remove wood chips from the stump before application. It is only necessary to treat the outside 1/3 of the top of the cut stump as this is where the cambium layer is found. The cambium will move the herbicide to the roots. Treat the entire circumference of the cut surface. 5. It would be useful to include an agricultural dye in this treatment to prevent waste and mark treated stumps. Use a water soluble dye with glyphosate and oil soluble dye with Garlon 4 Ultra®. 6. No drift control product should be used with this treatment. 7. The Garlon 4 Ultra® + oil carrier treatment (low volume dormant basal) should be used in the dormant season instead of glyphosate. 		

SUGGESTED MAINTENANCE PRACTICES FOR ROADSIDE WEED AND BRUSH CONTROL (CONT'D)

ACTIVITY	HERBICIDE(S) AND RATE(S) OF APPLICATION PER ACRE	TIME OF APPLICATION
Brush Control Using Dormant Basal Stem and Cut Surface Treatments	Garlon 4 Ultra® + oil carrier. Apply 4:1 oil to herbicide ratio (low volume dormant basal and cut surface). Apply 20:1 oil to herbicide ratio (high volume dormant basal only). MOA Group: 4	Zone 1, 2, and 3: Year-round, especially during the dormant season.
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. Low volume applications are made by lightly spraying the cambium area (outside 1/3 of the top of the cut surface) or entire circumference of the trunk (dormant basal) to the point of wetting but not runoff. This treatment usually requires the additional purchase of very small nozzle tips that will produce a fine spray. This low volume solution is very concentrated, if runoff occurs the expensive herbicide is wasted. 2. High volume applications are made by spraying the entire circumference of the trunk (dormant basal) to the point where the mixture is allowed to runoff and pool at the base of the target for a few seconds. Most backpack or small hand-pump sprayers when purchased have nozzle tips designed to make this type of treatment. 3. High volume (20:1 oil to herbicide) mixtures should not be used for cut surface applications. 4. It is critical that the entire cambium area (cut surface) or entire circumference of the trunk (dormant basal) is treated to ensure complete control no matter what ratio of oil to herbicide is used. Failure to get good coverage will result in possible resprouting. 5. Dormant basal stem treatments should be made to trees with stems 6 inches or less in diameter. 6. Trunks that are 0 to 3 inches in diameter should be treated to a height of 18 inches. Trunks larger than 3 inches in diameter should be treated to a height of 24 inches. 7. The addition of an oil soluble dye may assist in getting the desired coverage from these treatments as well as marking treated areas. 8. Backpack or small hand sprayers would work well for these treatments, but it is important to only use ones that have Viton seals. Garlon 4 Ultra® will cause rubber or pvc seals to leak. 9. Applications may be made up to the edge of water but may not be applied to brush in water. 10. No drift control product should be used with this treatment. 11. This treatment should be mixed with a penetrating oil as a carrier and should never be mixed with water as a carrier. 		
Bermudagrass Encroachment Control Using Postemergence Herbicides	Imazapyr + non-ionic surfactant. Apply 4 pints of product per acre + 0.5 percent solution, respectively in 40 gallons of water per acre. MOA Group: 2	Zone 1: April 25 – Sept 15 Zone 2: May 10 – Sept 15 Zone 3: May 20 - Sept 15
<p>COMMENTS</p> <ol style="list-style-type: none"> 1. Application is to be made to 100 percent green and actively growing bermudagrass. 2. This treatment should only be applied once per year. 3. In areas that have not been treated with glyphosate plus a summer preemergence, a herbicide such as sulfometuron or diuron should be added to control weeds that germinate from seed. 4. Do not apply directly to water or wetlands. 5. Do not treat irrigation ditches. 6. Do not apply, drain, or flush equipment on or near desirable trees or other plants; onto areas into which their roots may extend; or locations where the chemical may be washed or moved into contact with their roots or into water features. 		

SUGGESTED MAINTENANCE PRACTICES FOR ROADSIDE WEED AND BRUSH CONTROL (CONT'D)

ACTIVITY	HERBICIDE(S) AND RATE(S) OF APPLICATION PER ACRE	TIME OF APPLICATION
Aquatic Weed Control in Standing or Moving Water <i>(Cattail, willow, cottonwood)</i>	Glyphosate (aquatic) + non-ionic surfactant. Apply 1 percent solution + 1 percent solution, respectively in 100 gallons of water per acre—handgun treatment only. MOA Group: 9	Zone 1, 2, and 3: May 15 – August.

COMMENTS

1. A non-ionic aquatic-approved surfactant is critical to the success of this herbicide treatment.
2. If the low end glyphosate rate is used then use the high end non-ionic surfactant rate.
3. Apply with a handgun or backpack sprayer only. This treatment should not be made as a broadcast application as the desirable grass understory may be damaged or destroyed.
4. In dense stands of willow or cattails, good coverage is critical. Plants should be treated from both sides if possible.
5. Plants that have not emerged at the time of treatment will not be controlled and they will require retreatment.
6. Do not apply if rainfall will occur within 2 to 6 hours. Rainfall will wash glyphosate from the plants and reduce control.

ACTIVITY	HERBICIDE(S) AND RATE(S) OF APPLICATION PER ACRE	TIME OF APPLICATION
Aquatic Weed Control in Standing or Moving Water <i>(Cattail, willow, cottonwood)</i>	Habitat® + aquatic-approved non-ionic surfactant or methylated seed oil. Apply 1 percent solution + 1 percent solution, respectively in 20 to 100 gallons of water per acre—handgun treatment only. MOA Group: 2	Zone 1, 2, and 3: May - July

COMMENTS

1. This is the best treatment for long-term cattail control.
2. A non-ionic aquatic-approved surfactant or methylated seed oil is critical to the success of this herbicide treatment.
3. When a low volume carrier rate is used target vegetation should receive approximately 70 percent coverage. Low volume applications are made with back-pack sprayers equipped with small fan-type spray tips. The high volume carrier rate is a spray-to-wet application and is typically achieved with larger spray tips and powered handguns.
4. Apply with a handgun or backpack sprayer only. This treatment should not be made as a broadcast application as the desirable grass understory may be damaged or destroyed.
5. Refer to label for restrictions on treating irrigation ditches and in the vicinity of potable water intakes.
6. Plants that have not emerged or are underwater at the time of treatment will not be controlled.
7. This treatment is very slow to produce brown-out of target vegetation, it may take up to 12 weeks for final brown-out. Be patient the final results should be very good through 1 year-after-treatment.

Campaign®, glyphosate + 2,4-D, Monsanto Ag Co Diuron 80 WDG®, diuron, Loveland Industries, Inc. Garlon 4 Ultra®, triclopyr, Dow AgroSciences glyphosate (aquatic), glyphosate, many companies glyphosate, glyphosate, many companies Habitat®, imazapyr, BASF Imazapyr, imazapyr, many companies Krenite S®, fosamine, E.I. du Pont de Nemours & Co., Inc. metsulfuron methyl, metsulfuron methyl, many companies Milestone VM®, aminopyralid, Dow AgroSciences	MSMA, MSMA, many companies Sulfometuron, sulfometuron, many companies Outrider®, sulfosulfuron, Monsanto Agricultural Company Overdrive®, dicamba + diflufenzopyr, BASF Plateau®, imazapic, BASF Roundup Pro Concentrate®, glyphosate, Monsanto Agricultural Co Tordon K ¹ , picloram, Dow AgroSciences Transline®, clopyralid, Dow AgroSciences Vanquish®, diglycolamine salt of dicamba, Nufarm/Syngenta
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¹Restricted-Use-Pesticide

MOA Group Tables start on page 46 of the handbook.

ALFALFA FORAGE INSECT CONTROL SUGGESTIONS

To protect insect pollinators, do not spray during full bloom. If necessary to control insects for maximum seed production, use insecticides least damaging to pollinators.

Insect and Time Most Prevalent	Damage and/or Insect Description	Insecticide (MOA Group) and Amount Per Acre		Comments		
Alfalfa Seed Chalcid June to September	Small wasp. Two to three generations per year.	Proaxis ^r (3)	2.56- 3.84 oz	¹ See footnotes on alfalfa seed chalcid.		
Alfalfa Weevil Affects mainly the first cutting. Usually 1 generation per year Note: There are no alfalfa varieties adapted to Oklahoma conditions that are highly resistant to the alfalfa weevil; however, some varieties show tolerance to this pest.	Light green to green larvae with white to yellowish-white stripe down back paralleled by 2 faint white stripes on either side. Black head capsule. Skeletonizes leaves, causing an over-all grayish to whitish cast.	Pounce ^r 3.2EC ^r (3)	4.0-8.0 oz	Required waiting period before harvest * 0.1 lb active or less - 0 days Above 0.1 lb active - 14 days Lower rates (<0.2 lb AI/A) of permethrin have not been highly effective on heavy weevil populations. Lower rates (0.1) may serve to reduce (not eliminate) feeding under the windrow by moderate weevil populations when used just before (0-3 days) harvest		
		Warrior ^r (3)	2.56-3.84 oz	Do not apply within 1 day of harvest for forage or within 7 days of harvest for hay.		
		Baythroid ^r (3)	1.6 -2.8 oz	7 days Note: To enhance resistance management of budworm/bollworm complex in any nearby cotton do not apply pyrethroids to alfalfa from mid-May to late July.		
		Cobalt ^r (1B + 3) Furadan 4F ^r (1A)	19-38 oz 1.0-2.0 pt	See restrictions at end of section. 1.0 pt - 14 days Above 1.0 pt - 28 days.		
		Lorsban 4E ^r (1B) or Lorsban Advanced ^r (1B) Malathion 5E (1B) Methyl Parathion ^r (1B)	2.0 pt 2.0pt 1.5-2.0pt 1.0 pt	21 days 0 days 15 days. May cause some degree of burn to crop, depending on temperature.		
		Methomyl ^r (Lannate) (1A) Proaxis ^r (3) Silencer ^r (3)	3.0 pt 2.56-3.84 oz 2.56-3.8/oz	0 days Do not apply within 1 day of harvest for forage or within 7 days of harvest for hay. Do not apply within 1 day of harvest for forage or within 7 days of harvest for hay.		
		Application Information: Begin when 1.5-2 larvae per stem are found. This will equate to about 40 or more larvae per square foot. See Current Report CR-7177 for a definitive, more precise method indicating when to spray based on the degree-day concept.				
		For ground application, use 10-15 gal of total mix per acre. Use 15-20 gal when plants are rank and dense. For best results, by aircraft use 2 gal; 3 gals or more in heavy foliage.				
		Army Cutworm February and March, sometimes to April.	Consumes new growth. Especially damaging to newly planted stands. Economic injury level is 3-4 larvae per sq ft when larvae are 0.5 inch or less in length; 2-3 larvae per sq ft when they are over 0.5 inch in length.	Pounce ^r (3) Lorsban ^r (1B) or Lorsban Advanced ^r (1B) Baythroid ^r (3) Warrior ^r (3) Proaxis ^r (3) Javelin (11B2) Cobalt ^r (1B + 3) Silencer ^r (3)	2.0-8.0oz 1.0-2.0 pt 2.0pt 1.6-2.8 oz 1.92-3.2 oz 1.92-3.2 oz 0.25-1.5 lbs 13-26 oz 1.92-3.20oz	See comments: end of section. These materials may fail under heavy cutworm pressure. See chemical restrictions under alfalfa weevil section. See restrictions under alfalfa weevil. <i>Bacillus thuringiensis</i> (B.t.) 0 day* See restrictions at end of section.

ALFALFA FORAGE INSECT CONTROL SUGGESTIONS (CONT'D)

Insect and Time Most Prevalent	Damage and/or Insect Description	Insecticide (MOA Group) and Amount Per Acre		Comments								
Blister Beetles Spring and Summer Earliest on record in Oklahoma - May 14. Latest on record in Oklahoma - October 21.	Destroys foliage and flowers. Beetle bodies contain cantharidin, a toxic substance that can be detrimental to livestock, regardless of whether beetles are dead or alive.	Silencer ^r (3) Cobalt ^r (1B + 3) Warrior ^r (3) Proaxis ^r (3) Sevin XLR (1A)	2.5-3.84/oz 19-38 oz 2.56-3.84 oz 2.56-3.84 oz 0.5-1.0 qt	Heavy numbers of blister beetles in hay may cause sickness or death to horses. See OSU Fact Sheet EPP-2072 for more information. See restrictions at end of section. See restrictions under alfalfa weevil. See restrictions under alfalfa weevil. 7 days*								
Clover Leaf Weevil Spring	Closely resembles Alfalfa Weevil. Full grown larva 0.5 inch long., green to yellowish green, has pale white stripe down center of back and brown head capsule.	Methyl Parathion ^r (1B) Malathion5EC (1B) Proaxis ^r (3) Warrior ^r (3) Cobalt ^r (1B + 3) Silencer ^r (3)	0.5-1.0 pt 1.5 pt 2.56-3.84 oz 2.56-3.84 oz 19-38 oz 2.5-3.84/oz	See restrictions for other compounds under alfalfa weevil. See restrictions under alfalfa weevil. See restrictions under alfalfa weevil. See restrictions at end of section.								
Grasshoppers May to frost	Destroys foliage, usually starting at field borders.	Silencer ^r (3) Cobalt ^r (1B + 3) Dimethoate4E (1B) Proaxis ^r (3) Furadan ^r (1A) Malathion (1B) Warrior ^r (3) Lorsban ^r (1B) Baythroid ^r (3)	2.5-3.84/oz 7-13 oz 0.5-1.0 pt 2.56-3.84 oz 0.25-0.50 pt 1.5-20 pt 2.56-3.84 oz 0.5-1.0 pt 2.0-2.8 oz	See restrictions at end of section. 10 days* See restrictions under alfalfa weevil. 7 days* (only at this rate). See restrictions under alfalfa weevil. 0.5 pt = 7 days* 1.0 pt = 14 days* 7 days*								
Leafhoppers and Lygus Bugs Summer months	Small jumping or flying insects. Cause yellowing of leaves.	Cobalt ^r (1B + 3) Dimethoate (1B) Malathion (1B) Sevin 80S (1A) Methomyl ^r (1A) Lorsban ^r (1B) or Lorsban Advanced ^r (1B) Baythroid ^r (3) Pounce ^r (3) Warrior ^r (3) Baythroid ^r (3) Silencer ^r (3) Proaxis ^r (3)	7-13 oz 19-38 oz 0.5-1.0 pt 1.5-2.0 pt 1.25 lb 1.5-3.0 pt 0.5-1.0 pt 2.0pt 0.8-2.8 oz 4.0-8.0 oz 1.92-3.2 oz 0.8-2.8 oz 2.5-3.84/oz 1.92-3.20 oz	Leafhopper rate only. Plant bug rate only. See restrictions at end of section. Greatest damage by Lygus Bugs is to seed production. To protect pollinators, apply insecticides before bloom. Malathion and Methomyl are not labeled for leafhoppers. 0.5 pt= 7 days* 1.0= 14 days * 7 days * For leafhoppers, consider yield potential and stand age before deciding to treat. Recommendations should be based on plant height and number of leafhoppers per 20 sweeps across each 40-acre block of alfalfa. <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">Alfalfa Height (Inches)</td> <td style="text-align: center;">Leafhoppers in 20 Sweeps</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">12+</td> <td style="text-align: center;">20</td> </tr> </table>	Alfalfa Height (Inches)	Leafhoppers in 20 Sweeps	3	4	6	10	12+	20
Alfalfa Height (Inches)	Leafhoppers in 20 Sweeps											
3	4											
6	10											
12+	20											

* Required waiting period before harvest.

ALFALFA FORAGE INSECT CONTROL SUGGESTIONS (CONT'D)

Insect and Time Most Prevalent	Damage and/or Insect Description	Insecticide (MOA Group) and Amount Per Acre		Comments
<p>Defoliating Caterpillars (Alfalfa Caterpillar, Green Cloverworm, Corn Earworm, Armyworm, Webworms)</p> <p>Summer</p>	<p>See OSU EPP- 7159 for detailed description of each species</p>	<p>Malathion (1B) Methomyl^r (1A) Sevin 80S (1A) Lorsban^r (1B) or Lorsban Advanced^r(1B) Warrior^r (3) Mustang MAX^r (3) Steward SC (22)</p> <p>Silencer^r(3) Cobalt^r (1B + 3)</p> <p>Baythroid^r (3)</p> <p>Proaxis^r (3) Pounce^r (3) Javelin (<i>Bacillus thuringensis</i>) (11B2) Agree (B.t.) (11B2)</p>	<p>2.0 pt 0.75-1.5 pt 1.25-1.625 lb 1.0-2.0 pt 2.0pt 1.92-3.2 oz 2.24-4.0 oz 9.2-11.3 oz</p> <p>2.5-3.84/oz 13-38 oz</p> <p>1.6-2.8 oz</p> <p>2.56-3.84 oz 2.0-8.0 oz 0.25-1.5 lb 0.5-2.0 lb</p>	<p>Read insecticide label carefully. Specific rates may apply for each or only a few species. Even heavy (5-6/sweep) defoliator infestations may be adequately controlled by simply cutting alfalfa early. Decisions to treat should be based on number of larvae and noticeable damage. For webworms specifically, control is generally poor if worms and/or webs are large. Treat early in outbreaks.</p> <p>Highest rate for beet armyworm Rate varies depending on species. See restrictions at end of section.</p> <p>Use of synthetic pyrethroids is not suggested in cotton-growing areas. See note under alfalfa weevil section.</p> <p>0 days. * 0 days.*</p>
<p>Pea Aphid Usually early March, April and May</p>	<p>Large green aphid with dark bands at base of each antennal segment. Causes chlorosis and wilting of leaves. Economic injury level is about 50 aphids/stem for 10 inch alfalfa, about 100 aphids/stem when alfalfa is 20 inches tall. Usually present over entire plant.</p>	<p>Silencer^r(3) Cobalt^r (1B + 3) Dimethoate (1B) Furadan^r (1A) Lorsban^r (1B) or Lorsban Advanced^r(1B) Malathion (1B) Methyl Parathion^r (1B) Proaxis^r (3) Methomyl^r (1A) Pounce^r (3) Mustang MAX^r (3) Baythroid^r (3)</p>	<p>2.5-3.84/oz 13-26 oz 0.50-1.0 pt 0.50-2.0 pt 1.0-2.0 pt 2.0pt 1.5 pt 0.50-1.0 pt 2.56-3.84pt 1.5-3.0 pt 2.0-8.0 oz 2.24-4.0 oz 1.6-2.8 oz</p>	<p>See restrictions at end of section. Several resistant varieties are available. See Current Report CR-2106 for information on variety insect resistance level and adaptability in Oklahoma.</p>
<p>Blue Alfalfa Aphid Usually early March April and May, but may persist later.</p>	<p>Large green aphid. Similar in appearance to pea aphid, but lacks dark antennal bands at base of each segment. Often found in high numbers on terminals. Heavy infestations may cause severe stunting. Economic injury level is about 20 aphids/stem for 10 inch alfalfa, and about 40 aphids/stem when alfalfa is 20 inches tall.</p>	<p>Silencer^r(3) Cobalt^r (1B + 3) Dimethoate (1B) Furadan^r (1A) Lorsban^r (1B) or Lorsban Advanced^r(1B) Malathion (1B) Methyl Parathion^r (1B) Proaxis^r (3) Pounce^r (3) Warrior (3) Baythroid^r (3) MustangMAX^r (3)</p>	<p>2.5-3.84/oz 13-26 oz 0.50-1.0 pt 0.50-1.0 pt 1.0-2.0 pt 2.0pt 1.5 pt 0.50-1.0 pt 2.56-3.84oz 2.0-8.0 oz 2.56-3.84oz 1.6-2.8 oz 2.24-4.0 oz</p>	<p>See restrictions at end of section. Currently, no well-adapted varieties for Oklahoma exhibit high resistance to the blue alfalfa aphid. See Current Report CR-2106. See chemical restrictions at end of this section.</p>

* Required waiting period before harvest.

ALFALFA FORAGE INSECT CONTROL SUGGESTIONS (CONT'D)

Insect and Time Most Prevalent	Damage and/or Insect Description	Insecticide (MOA Group) and Amount Per Acre		Comments
Spotted Alfalfa Aphid Most common in summer and fall but may occur throughout year	Small tan-colored aphid with black spots in rows over surface of body. May deposit large amounts of honeydew. Plants wilt yellow and die. Economic injury levels are similar to the blue alfalfa aphid (above).	Silencer ^r (3) Cobalt ^r (1B + 3) Dimethoate (1B) Lorsban ^r (1B) or Lorsban Advanced ^r (1B) Malathion (1B) Methyl Parathion ^r (1B) Proaxis ^r (3) Pounce ^r (3) Mustang MAX ^r (3) Warrior ^r (3)	2.5-3.84/oz 13-26 oz 0.5-1.0 pt 1.0-2.0 pt 1.5 pt 0.50-1.0 pt 2.56-3.84oz 2.0-8.0 oz 2.24-4.0 oz 2.56-3.84oz	Suppression only. See restrictions at end of section. Several well-adapted resistant varieties are available. See Current Report CR-2106. In the fall, even light populations (1-3 aphids/stem) can devastate seedling alfalfa stands. See chemical restrictions at end of this section.
Variegated Cutworm Late April or May	Most common occurrence is on regrowth after first cut. In some years may destroy regrowth for period of 2-3 weeks. Larvae may attain nearly two inches in length. Tan to mottled black in color with distinctive light yellow, diamond shaped markings along the center of the back.	Silencer ^r (3) Cobalt ^r (1B + 3) Javelin (11B2) Lorsban ^r (1B) or Lorsban Advanced ^r (1B) Methomyl ^r (1A) Methyl Parathion ^r (1B) Pounce ^r (3) Baythroid ^r (3) WarriorT ^r (3) Proaxis ^r (3)	2.5-3.84/oz 13-26 oz 0.25-1.5 lb 1.0-2.0 pt 2.0pt 0.75-3.0 pt 0.50-1.0 pt 2.0-8.0 oz 1.6-2.8 oz 1.92-3.2 oz 1.92-3.2 oz	See restrictions at end of section. If larvae are large control is usually poor. See chemical, restrictions at end of this section.

^rRestricted-Use-Pesticides

MOA Group Tables start on page 46 of the handbook.

For additional information, see the following:

- OSU Extension PSS-2072 - Blister Beetles in Alfalfa
- OSU Extension PSS-2097 - Alfalfa Weevil and Its Management in Oklahoma
- OSU Extension EPP-7159 - Field Key to Larvae in Alfalfa
- OSU Extension EPP-7184 - Alfalfa Aphids in Oklahoma
- OSU Extension Current Report CR-7177 - Scouting for the Alfalfa Weevil in Oklahoma
- OSU Extension Current Report CR-7179 - Integrated Control of the Alfalfa Weevil

*Required waiting periods before harvest.

ALFALFA FORAGE INSECT CONTROL SUGGESTIONS (CONT'D)

When insecticides are applied to alfalfa that will be grazed or mowed for hay, certain precautions for use of materials must be taken. The following waiting periods from application to grazing or cutting have been established:

¹Alfalfa Seed Chalcid — Control with insecticides is usually unsatisfactory due to persistence of attack and restrictions against using chemicals with long residual effects. To avoid the necessity of spraying for this insect and thereby harming beneficials; alfalfa seed should be produced as early in the season as possible.

All B.t. products — 0 days to harvest, 12 hour re-entry interval.

Baythroid[®] — One application per cutting only, and up to three applications per season. Avoid application of this product in cotton producing areas from mid-May to late July. Do not apply by ground within 25 feet, or by air within 150 feet of any body of water. Increase the buffer zone to 450 feet when ultra-low volume (ULV) application is made. 7 days to harvest.

Cobalt[®] — Do not cut or graze treated alfalfa within 7 days of application of 13 ounces, within 14 days of application of 26 ounces, or within 21 days after application of rates above 26 ounces. Do not make more than 4 applications per season. Do not make a second application of any product containing chlorpyrifos within 10 days of first application.

Furadan[®] — Additional waiting periods, 0.5 pts rate, 7 days; 1 pt, rate, 14 days; above 1 pt rate, 28 days. Do not apply Furadan more than twice per season, or more than once per cutting. Do not use more than 0.5 lb in the second cutting.

Dimethoate — 10 days to harvest.

Lorsban[®] — (all formulations in this section) Do not make more than four applications per year. Tank mixes of 1 pt Lorsban plus .75 pt of Furadan have provided good control of both aphids and alfalfa weevils, while shortening the harvest interval to 14 days. Additional waiting periods; .5 pt rate, 7 days; 1 pt rate, 14 days; above 1 pt rate, 21 days. Do not make more than four applications per year or apply more than once per crop cutting.

Malathion — 0 days for up to 1.5 lbs, 5 days for more than 1.5 lbs.

Methyl Parathion[†] — 15 days to harvest.

Methomyl[†] — 0 days to harvest for hay; 7 days for grazing or feeding to livestock.

Mustang MAX[†] — 3 days to harvest.

Pounce[®] (Permethrin) — Do not apply more than 0.2 lb active per cutting. Do not apply permethrin products in cotton producing areas from mid-May to late July.

Proaxis[®] — Do not apply more than 0.24 pints per acre per cutting. Do not apply more than 0.96 pints per acre per season. Avoid application when bees are actively foraging. This chemical is Gamma-cyhalothrin; if it is used in the same season as lambda-cyhalothrin (Warrior[®]) then read the label carefully for use rate limitations. One day for harvest of forage and 7 days to harvest for hay.

Sevin — 7 days to harvest.

Silencer[†] — Do not apply more than 0.24 pts per acre per cutting or more than 0.96 qts. per acre per season. Do not apply with 1 day of harvest for forage or within 7 days of harvest for hay.

Warrior[®] — **Avoid** application around bee shelters or when bees may be actively foraging. Do not apply more than 0.03 lb a.i. per acre per cutting or more than 0.12 lb a.i. per acre per season. One day for harvest of forage and 7 days to harvest for hay.

[†] Restricted use pesticides.

This section was not revised in 2008.

ALFALFA WEED CONTROL

Estimated Levels of Weed Control Normally Expected with Alfalfa Herbicides^a

Herbicide	Broadleaf Weeds													Grass Weeds							General or Restricted use				
	Black Nightshade	Chickweed	Common Ragweed	Curly Dock	Dandelion	Field Pennygrass	Giant Ragweed	Henbit	Kochia	Lambsquarters	Pigweed	Plantain	Shepherdspurse	Smartweed	Wild Mustard	Barnyardgrass	Crabgrass	Cheat	Downy Brome	Fall Panicum		Foxtails	Italian Ryegrass	Volunteer Grain	Yellow Nutsedge
<i>PREPLANT TRTS.</i>																									
Balan	0	8	0	0	0	0	0	5	7	9	9	0	0	0	0	9	9	9	9	9	9	9	8	0	Gen
Eptam	8	7	5	0	0	6	0	9	6	9	9	0	7	5	6	9	9	9	9	9	9	9	8	8	Gen
Treflan	2	9	-	0	0	5	-	6	7	9	9	-	3	-	3	9	9	9	9	9	9	9	9	0	Gen
<i>POSTEMERGENCE</i>																									
Buctril	9	6	9	0	0	8	8	8	6	9	8	0	9	9	8	0	0	0	0	0	0	0	0	0	Gen
Butyrac 200	2	6	9	5	8	9	9	6	6	8	8	2	9	6	9	0	0	0	0	0	0	0	0	0	Gen
Gramoxone Extra ^f	9	8	9	0	0	9	9	9	5	8	9	5	9	9	9	8	7	9	9	9	9	9	6	0	Res
Poast Plus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	9	9	9	9	9	9	8	0	Gen
Pursuit	9	8	6	0	0	8	7	8	8	6	9	-	9	9	9	6	7	3	3	7	8	4	0	5	Gen
Raptor	9	8	7	0	0	8	8	8	7	8	9	-	9	8	9	6	7	3	3	7	8	4	0	4	Gen
Roundup Original Max	9	9	9	9	8	9	9	9	8	9	9	9	9	9	9	9	9	9	9	9	9	9	9	7	Gen
Select	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	9	9	9	9	9	9	8	0	Gen
<i>SPOT APPLICATIONS</i>																									
Roundup Original Max ^d	9	9	9	9	8	9	9	9	8	9	9	9	9	9	9	9	9	9	9	9	9	9	9	7	Gen
<i>DORMANT SEASON</i>																									
Gramoxone Extra ^f	9	8	9	0	0	9	9	9	5	8	9	5	9	9	9	8	7	9	9	9	9	9	6	0	Res
Karmex DF	7	6	8	-	3	6	-	5	8	7	7	-	9	7	8	7	7	-	-	-	6	-	-	-	Gen
Kerb ^f	6	8	5	0	0	5	5	8	-	6	6	0	5	5	5	8	8	9	9	6	8	9	9	0	Gen
MCPA Amine	6	6	-	-	5	7	-	6	5	6	6	-	7	-	7	0	6	4	4	5	6	4	6	-	Gen
Sencor	5	9	8	6	7	9	5	9	9	9	9	8	9	9	9	6	5	9	9	6	6	9	5	0	Gen
Sinbar	6	9	-	5	6	9	9	9	-	-	-	8	9	9	9	9	-	9	9	-	-	9	9	-	Gen
Velpar	6	9	-	5	8	9	9	9	-	-	-	8	9	9	9	9	-	9	9	-	-	9	9	-	Gen
Velpar AlfaMax	6	9	-	-	8	9	9	9	8	8	8	8	9	9	9	9	-	9	9	-	-	9	9	-	Gen

^a Rating scale: 0 no control; 5 or less poor; 6 poor-fair; 7 fair; 8 fair-good; 9 good. Ratings assume the herbicides are applied in the manner suggested in the guidelines and according to the label under optimum growing conditions.

^b Product should not be used as a selective "over-the-top" control application. Only use after alfalfa cutting and prior to reinitiation of alfalfa

^c Only use over-the-top of Roundup Ready alfalfa varieties.

^d Treatment will kill most all green plants including alfalfa. Do not treat more than 10% of the total field area at one time.

This section was not revised in 2008.

ALFALFA WEED CONTROL (CONT'D)

Rotational Cropping Restrictions in Months for Alfalfa Herbicides

Herbicide	Crop							
	Alfalfa	Canola	Corn	Cotton	Peanut	G. Sorghum	Soybean	Wheat
Balan	a	a	a	a	a	a	a	a
Buctril	1	1	1	1	1	1	1	1
Butyrac 200	a	a	a	a	a	a	a	a
Eptam	a	a	a	a	a	a	a	a
Glyphosate	0	0	0	0	0	0	0	0
Gramoxone Max ^f	0	0	0	0	0	0	0	0
Karmex DF	24	24	24	24	24	24	24	24
Kerb ^f	12	12	3 to 5 ^a	12	12	12	12	12
MCPA Amine	a	a	a	a	a	a	a	a
Poast Plus	0	0	4	0	0	4	0	4
Pursuit	4	b	18.5 ^c	18.5	0	18.5	0	4
Raptor	-	40	9	18 ^d	0	18	9	4
Sencor	4	-	4	8	-	-	4	4 to 8 ^a
Sinbar	12	24	24	24	24	24	24	24
Select	1	1	1	1	1	1	1	1
Treflan	0	0	14	0	0	14	0	14
Velpar	24	24	12 ^c	24	24	24	24	24
Velpar AlfaMax	24	24	12 ^f	24	24	24	24	24

^a See labeled.

^b Only Clearfield or Sumner Canola varieties can be planted the year following a Pursuit application. See label.

^c Clearfield corn hybrids can be planted anytime. See label.

^d The restriction is 18 months if at least 15 inches of rainfall has been received since the time of application and

^e If use rate did not exceed 1 lb/A and if at least 20 inches of rainfall is received. See label.

^f If use rate is not less than 6.6 acres per unit pack and if at least 20 inches of rainfall is received. See label.

ALFALFA WEED SUGGESTIONS

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Balan DF 70% WSP PPI applications: 2.0-2.5 lb /A	Active Ingredient: Benefin Similar Products: None MOA: 3	PPI. Apply and incorporate within 3 weeks prior to planting. Must be incorporated within 4 to 8 hours after application. A second incorporation is required for most equipment. Incorporate to a depth of 2 inches running 4-6 mph. Refer to label for incorporation equipment. Apply at a rate of 2.0 lb /A for coarse and medium textured soils. Apply at a rate of 2.5 lb /A for fine textured soils.	Do not apply to soils that are wet, cloddy, contain excessive plant residue or that are subject to prolonged periods of flooding as poor weed control or crop injury may result.
Buctril 2.0 lbs. ai per gallon All applications: 1-1.5 pts. /A	Active Ingredient: Bromoxynil Similar Products: Connect 20 WSP Moxy 2E MOA: 6	POST. Apply in the fall or spring to seedling alfalfa when the majority of the field has a minimum of 4 trifoliolate leaves. When stand is uneven and conditions favor leafburn, unacceptable crop injury may occur to plants in the 2 trifoliolate or smaller stage of growth. Applications made when temperatures are expected to exceed 70°F at and 3 days following application can result in unacceptable crop injury.	Do not apply when crop is under stress. Do not cut for feed or graze spring treated crop within 30 days following treatment. Do not cut for feed or graze fall or winter treated crop until spring, at least 60 days following treatment. Do not exceed 2 pt /A per crop season.
Butyrac 200 2 lb ai per gallon POST applications. 1 – 3 qt /A	Active Ingredient: 2,4-DB Similar Products: 2,4-DB 200 MOA: 4	POST. Apply to seedling forage legumes and seedling or established alfalfa. For control or suppression of smartweed and curled dock up to 3 inches tall, apply at 3 qt /A. For control of other target weeds, apply at a rate of 1 to 2 qt /A when target weeds are less than 3 inches tall, apply at a rate of 2 to 3 qt /A when greater than 3 inches tall. Use higher rates in dry, low humidity growing areas.	Do not graze or feed hay from treated established alfalfa to livestock within 30 days after application. Do not graze or feed seedling alfalfa, seedling clover or seedling birdsfoot trefoil within 60 days after application. Do not apply when crop is stressed from lack of moisture. Do not spray when the temperature exceeds 90°F and/or is predicted to exceed 90°F during the three days following application.
Eptam 7-E 7.0 lbs ai per gallon PPI applications: 3.5 pt /A POST applications: 2.25 to 3.5 pt /A	Active Ingredient: EPTC Similar Products: None MOA: 8	PPI. Apply and incorporate just before planting. POST (irrigated). Meter into the irrigation water applied to established stands prior to weed emergence. Use lower rate on very coarse textured soils.	PPI. Do not use if a grass or grain nurse crop is to be planted with the legume. Do not use if Atrazine was applied within the previous 12 months. POST (irrigated). Do not apply within 14 days of harvesting or grazing crop.
Gramoxone Max^r 3.0 lbs ai per gallon PRE applications: 1.7-2.7 pt /A Dormant Season applications (established stands): 0.7-1.3 pt /A POST applications (between-cuttings): 0.7 pt /A Dormant Season applications (first-year stands): 0.5-0.8 pt /A	Active Ingredients: Paraquat Similar Products: Cyclone Max Gramoxone Extra Gramoxone Super Tres <u>Rates may vary due to formulation.</u> MOA: 22	PRE. Apply prior to emergence of crop. Crop plants emerged at time of application will be killed. POST (established stands). Apply during the late fall or winter months after the last fall cutting and before the first spring cutting. POST (between-cuttings). Apply immediately after alfalfa has been removed for hay or silage. Foliage present at time of application will be desiccated. Do not apply more than twice during the first growing season. Dormant Season (first-year stands).	Do not apply through any type of irrigation equipment. Dormant Season (established stands). Do not harvest within 60 days of application. Do not apply more than once per season. Do not apply to crops that are not dormant, or that have broken dormancy as severe crop injury will result. POST (between-cuttings). Do not treat more than 5 days after cutting. Do not cut or harvest within 30 days of application. Do not apply more than twice during the first growing season. Dormant Season (first-year stands). Do not harvest within 60 days of application. Do not apply to crops that are not dormant, or that have broken dormancy as severe crop injury will result.

ALFALFA WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Karmex DF 80% DF Dormant Season applications: 1.5-3.0 lb /A	Active Ingredients: Diuron Similar Products: Direx 4L MOA: 7	Dormant Season. Apply before spring growth begins. Treat only stands that have been established for 1 year or more. Apply only when crop is dormant to avoid crop injury.	Do not apply to seedling alfalfa nor to alfalfa/grass mixtures. Do not apply to crops under stress from disease, insect damage, shallow root penetration, alkali spots, nor to flooded fields as crop injury may result. Do not spray on snow covered or frozen ground.
Kerb 50-W^r 50% WP POST applications: 1.0 to 4.0 lb /A	Active Ingredients: Pronamide Similar Products: None MOA: 15	POST. Apply during the fall or winter months prior to weed emergence. Optimum activity occurs when applications are made under cool temperature conditions (55°F or less) and are followed by rainfall or overhead irrigation. Applications should always be made before soil freeze-up. In established stands, application should be made after the last cutting when the weather and soil temperatures are cool. In fall seeded crops, applications should be made after crop has reached the trifoliolate leaf stage.	Do not use more than 4.0 lb /A per season. Do not graze or harvest for forage or dehydration within the following intervals after application: less than 3.0 lb /A- 25 days, 3.0 to 4.0 lb /A- 45 days. Do not use as a preplant or preemergence treatment or before the trifoliolate leaf stage has developed in new plantings as injury to the crop stand may result.
MCPA Amine 1.0 lbs ai per gallon POST applications: 1.0 pt /A	Active Ingredients: MCPA Similar Products: Chiptox Dagger MCP 2 Sodium MCP 4 Amine Sword MOA: 4	POST. Apply in the late fall following frosts when crop is dormant. Temperature at time of spraying should be above 40°F.	Do not forage or graze dairy or meat animals on treated areas within 7 days of slaughter and/or treatment. Do not apply through any type of irrigation system.
Poast Plus 1.0 lbs ai per gallon POST applications: 1.5-3.75 pt /A	Active Ingredients: Sethoxydim Similar Products: Poast <u>Rates may vary due to formulation.</u> MOA: 1	POST. Best control of annual grasses can be achieved when applied before grass weeds are mowed. If crop is irrigated, application 2-4 days after an irrigation is most effective. Spray spring and summer grasses as early in the season as possible. Spray fall-germinating weeds in the fall soon after they begin growing but before any killing frosts. Refer to label for application rates for specific regions and target weeds.	Do not apply more than 9.75 pt /A per season. Do not cut for dry hay within 14 days of application. Do not graze, feed, or cut for undried forage within 7 days of application. Do not apply through any type of irrigation equipment.
Pursuit DG 70% DG POST applications: 1.08-2.16 oz/A	Active Ingredients: Imazethapyr Similar Products: Pursuit W Pursuit W DG MOA: 2	POST. Apply to seedling crops in the second trifoliolate stage or larger and when the majority of the weeds are 1-3 inches tall or before rosettes exceed 3 inches. Apply to established crops in the fall, in the spring to dormant, or semi-dormant (less than 3 inches of regrowth), or between cuttings. Any application should be made before significant growth or regrowth.	Do not apply more than 2.18 oz /A per year. Do not apply more than 1.44 oz /A to alfalfa during the last year of the stand. Do not replant crop in treated field for 4 months following application.

ALFALFA WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Raptor 1.0 lb ai per gallon POST applications: 4-6 fl oz /A	Active Ingredients: Imazamox Similar Products: None MOA: 2	POST. Apply as an early postemergence treatment when weeds are actively growing and before they exceed a height of 3 inches. Delay application until the majority of the weeds are in the recommended growth stage. Apply to seedling alfalfa when the crop is in the second trifoliate stage or larger in growth. When applied to crops grown for seed, apply before bud formation. May be applied to established crops in the fall, winter, or in the spring to dormant, or semi-dormant crops, or between cuttings.	Do not cut or feed crop forage or hay for at least 20 days after application. Do not harvest seed for feed or food for at least 70 days following application.
Roundup Original Max 5.5 lb ai per gallon All applications: 22-44 fl oz/A	Active Ingredients: Glyphosate Similar Products: Roundup Products & Many Others <u>Rates may vary due to formulation.</u> MOA: 9	PRE. Apply before, during, or after planting, but after weed emergence. Application must be made prior to emergence of the crop. POST. Apply in declining alfalfa stands or any stand of alfalfa where crop destruction is acceptable. The treated crop and weeds can be harvested and fed to livestock after 36 hours. Spot Treatments. Apply in areas where the movement of domestic livestock can be controlled. Apply with wiper applicators to control or suppress weeds.	PRE. Do not graze or harvest within 8 weeks of application if a rate greater than 44 fl oz /A is applied. There are no grazing or haying restrictions if less than 44 fl oz /A is applied. POST. Do not apply more than 44 fl oz /A as a preharvest treatment. Preharvest application is not recommended for alfalfa grown for seed, as a reduction in germination or vigor may occur. Over-the-Top applications. Apply as a broadcast over-the-top application only to Roundup Ready alfalfa varieties. Spot Treatment. Do not graze or harvest within 14 days of application. Do not treat more than 10% of the total field area at one time.
Select 2EC 2.0 lb. ai per gallon POST applications: 6-16 fl oz /A	Active Ingredients: Clethodim Similar Products: None MOA: 1	POST. Apply at the grass sizes indicated in the label. If grass has been cut, apply after active growth has resumed.	Do not graze, feed or harvest for forage or hay within 15 days of application.
Sencor 75% DF Dormant Season applications: 0.33 to 1.33 lb /A	Active Ingredients: Metribuzin Similar Products: Sencor 4 MOA: 5	Dormant Season. Apply when weeds are less than 2 inches tall or before weed foliage is 2 inches in diameter. Refer to label for application rates for specific target weeds.	Do not apply before growth begins in the spring or before growth ceases in the fall. Do not graze or harvest within 28 days after application. Do not treat within 12 months of seeding.
Sinbar 80% WP Dormant Season applications: 1/2 to 1 1/2 lb /A	Active Ingredients: Terbacil Similar Products: None MOA: 5	Dormant Season. Make application in the fall after plants become dormant or in the spring before new growth starts. For semi-dormant and non-dormant varieties, apply in the fall or winter after last cutting or in the spring before new growth starts. POST-Harvest. Apply as a postharvest treatment at 1/2 - 3/4 lba/a for the control of pigweed and the suppression of other warm season annual weeds such as crabgrass and foxtails. Two applications (dormant and/or postharvest) may be made but must be at least 60 days apart and must not exceed 2 lb /A per year.	Do not apply to established stands after new growth starts in the spring, as injury to the crop may result. Postharvest applications: Do not apply after June 15 or to first year, spring-seeded alfalfa. Do not apply more than 0.5 lb /A to fall seeded, first year stands of alfalfa.

ALFALFA WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Treflan HFP 4 lbs ai per gallon POST applications: 4.0 pt /A	Active Ingredients: Trifluralin Similar Products: Treflan TR-10 Trifluralin HF Trust 10G Trust Herbicide MOA: 3	POST. Apply during dormancy or semi-dormancy, or during the growing season immediately after a cutting. Application must be made prior to the expected time of weed germination. To control bromegrass and cheat, apply immediately after a cutting between August 1 and October 1, but prior to weed germination.	Do not cut or graze crop within 21 days after application. Do not apply more than 4.0 pt /A per season.
Velpar L 2.0 lb ai per gallon Dormant Season applications: See Table	Active Ingredient: Hexazinone Similar Products: None MOA: 5	POST. Make a single application to non-dormant and semi-dormant varieties during the winter months when alfalfa is in the least active stage of growth. Where weeds have emerged, use a surfactant. Refer to label for weeds controlled at specific application rates.	Do not use on crops grown for seed. Do not exceed 3 pt /A on crops less than one year old. Do not add a surfactant when treating non-dormant varieties. Do not apply to snow-covered or frozen ground. Do not graze or feed forage or hay to livestock within 30 days following application. Do not use on seedling alfalfa, alfalfa-grass mixtures, or other mixed stands as injury may result to the seedling alfalfa or companion crop.

Velpar L (pt/A)			
Soil Texture	<1% Organic Matter	1-5% Organic Matter	>5% Organic Matter
Coarse	2-3 pt /A	2-3 pt /A	4-6 pt /A
Medium	2-3 pt /A	3-6 pt /A	4-6 pt /A
Fine	4-6 pt /A	3-6 pt /A	4-6 pt /A

Velpar AlfaMax MP 77.7 % DG Dormant Season applications: See Table	Active Ingredient: Hexazinone + Diuron Similar Products: None MOA: 5	POST. Make a single application to non-dormant and semi-dormant varieties during the winter months when alfalfa is in the least active stage of growth. Where weeds have emerged, use a surfactant. Refer to label for weeds controlled at specific application rates.	Do not use on crops grown for seed. Do not add a surfactant when treating non-dormant varieties. Do not apply to snow-covered or frozen ground. Do not graze or feed forage or hay to livestock within 30 days following application. Do not use on seedling alfalfa, alfalfa-grass mixtures, or other mixed stands as injury may result to the seedling alfalfa or companion crop.
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Velpar AlfaMax (pounds/acre)		
Soil Texture	1-5% Organic Matter	>5% Organic Matter
Coarse	1.5 – 2	3 – 4.3
Medium	2 – 4.3	3 – 4.3
Fine	2 – 4.3	3 – 4.3

MOA Group Tables start on page 46 of the handbook.

MANAGEMENT OF INSECT AND MITE PESTS IN CANOLA

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)	Rate of Product per Acre	Comments
<p>Aphids Cabbage aphid: small blue-gray aphid with short cornicles, and is usually covered with a powdery wax secretion.</p> <p>Green peach aphid: Pale green to yellow with long cornicles and three lark lines on abdomen.</p> <p>Turnip aphid: Pale gray green with short, swollen cornicles, 1/16 inches. Winged adults can be recognized by presence of transverse dark bands on last two abdominal segments.</p> <p><u>Damage:</u> High populations can cause stunting and discoloration of leaves. Feeding by cabbage aphid can stop terminal growth and reduce yield. Damage is of little consequence after pod formation is completed.</p> <p><u>Threshold</u> Treat rosette stage plants when aphids exceed 100 to 200 per plant. Treat bud and early bloom stage when infested plants (racemes) exceed 15%.</p>	<p><u>Planting Time</u></p> <p>Helix EXtra (4A)</p> <p>Prosper FX (4A)</p> <p><u>Post-Plant</u></p> <p>Azadirachtin (20B)</p> <p>Brigade 2EC (3) (bifenthrin)</p> <p>Methyl parathion (1B)</p> <p>Mustang MAX (3)</p> <p>Proaxis 0.5 CS (3)</p> <p>Warrior with Zeon (3) (lambda cyhalothrin)</p>	<p>23 fl oz/cwt seed</p> <p>21.3 fl oz/cwt seed</p> <p>1 pt</p> <p>2.1 to 2.6 fl oz</p> <p>1 pt</p> <p>4.0 fl oz</p> <p>3.84 fl oz</p> <p>3.84 fl oz</p>	<p>Research data indicates that aphids are a consistent pest of winter canola in fall and winter. The use of seed treatments is highly recommended for early-season management of aphids. Additional foliar insecticide applications may be necessary for late-season control of aphids.</p> <p>No PHI for harvest (Aza-direct, Ecozin)</p> <p>35 day PHI for harvest. (other names: Annex, Bifenture, Discipline, Empower, Fanfare, Sniper)</p> <p>28 day PHI for harvest. Do not graze treated fields</p> <p>7 day PHI for harvest. Do not make applications less than seven days apart</p> <p>30 Day PHI for harvest or grazing</p> <p>30 day PHI for harvest or grazing (other names: Grizzly Z, Lambda Cy, Silencer, Tiaga)</p> <p>Spray in evening during bloom to avoid killing honeybees. Notify beekeepers before spraying if possible.</p>
<p>Army cutworm Gray striped caterpillar that curls up in to a tight “C” when disturbed. Evident from January through March</p> <p><u>Damage:</u> Cuts plants at soil line, can kill plants if it enters the crown</p> <p><u>Threshold:</u> 4-5 per foot of row.</p>	<p>Brigade 2EC (3) (bifenthrin)</p> <p>Mustang MAX (3)</p> <p>Proaxis 0.5 CS (3)</p> <p>Warrior with Zeon (3) (lambda cyhalothrin)</p>	<p>2.1 to 2.6 fl oz</p> <p>4.0 fl oz</p> <p>3.84 fl oz</p> <p>3.84 fl oz</p>	<p>35 day PHI for harvest. (other names: Annex, Bifenture, Discipline, Empower, Fanfare, Sniper)</p> <p>7 day PHI for harvest. Do not make applications less than seven days apart</p> <p>30 Day PHI for harvest or grazing</p> <p>30 day PHI for harvest or grazing (other names: Grizzly Z, Lambda Cy, Silencer, Tiaga)</p>

MANAGEMENT OF INSECT AND MITE PESTS IN CANOLA (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)	Rate of Product per Acre	Comments
<p>Beet Armyworm Green caterpillar, darker above with a white stripe along the side of the body and a small black spot above the second pair of true legs, three pairs of true (thoracic legs) and four pair of abdominal prolegs.</p> <p><u>Damage:</u> Caterpillars can reduce seedling stand and chew conspicuous, irregular-shaped holes in leaves.</p> <p><u>Threshold:</u> Seedling, treat when scouting indicates 1 or more per row-ft. Treat when defoliation becomes severe, and larvae are present.</p>	Azadirachtin (20B)	Apply per label	No PHI for harvest
	<i>B. thuringiensis</i> (11B1,2)	Apply per label	No PHI for harvest
	Battalion 0.2 EC	5.8 fl oz	7 day PHI for harvest. Do not make applications less than seven days apart
	Brigade 2EC (3) (bifenthrin)	2.1 to 2.6 fl oz	35 day PHI for harvest. (other names: Annex, Bifenture, Discipline, Empower, Fanfare, Sniper)
	Methyl parathion (1B)	1 pt	28 day PHI for harvest. Do not graze treated fields
	Mustang MAX (3)	4.0 fl oz	7 day PHI for harvest. Do not make applications less than seven days apart
	Proaxis 0.5 CS (3)	3.84 fl oz	30 Day PHI for harvest or grazing
Warrior with Zeon (3) (lambda cyhalothrin)	3.84 fl oz	30 day PHI for harvest or grazing (other names: Grizzly Z, Lambda Cy, Silencer, Tiaga)	
<p>Cabbage looper Green caterpillar, with a thin white line along each side of the body, three pairs of thoracic legs and three pair of abdominal prolegs.</p> <p><u>Damage:</u> Caterpillars chew conspicuous, irregular-shaped holes in leaves.</p> <p><u>Threshold:</u> Treat when defoliation becomes severe, and larvae are present.</p>	Azadirachtin (20B)	Apply per label	No PHI for harvest
	<i>B. thuringiensis</i> (11B1, 2)	Apply per label	No PHI for harvest
	Brigade 2EC (3) (bifenthrin)	2.1 to 2.6 fl oz	35 day PHI for harvest. (other names: Annex, Bifenture, Discipline, Empower, Fanfare, Sniper)
	Methyl parathion (1B)	1 pt	28 day PHI for harvest. Do not graze treated fields
	Mustang MAX (3)	4.0 fl oz	7 day PHI for harvest. Do not make applications less than seven days apart
	Proaxis 0.5 CS (3)	3.84 fl oz	30 Day PHI for harvest or grazing
	Warrior with Zeon (3) (lambda cyhalothrin)	3.84 fl oz	30 day PHI for harvest or grazing (other names: Grizzly Z, Lambda Cy, Silencer, Tiaga)
<p>Diamondback moth Adult moths are light grayish-brown with a white diamond-shaped marking along back when wings are folded. Larvae are slightly tapered at each end and pale green in color. Wriggle rapidly when disturbed.</p> <p><u>Damage:</u> Larvae feed on all plant parts, preferring the undersides of older leaves.</p> <p><u>Threshold:</u> No threshold has been established.</p>	Azadirachtin (20B)	Apply per label	No PHI for harvest (Aza-direct, Ecozin)
	<i>B. thuringiensis</i> (11B1, 2)	Apply per label	No PHI for harvest (Dipel, Javelin, Leipnox, Xentari)
	Brigade 2EC (3) (bifenthrin)	2.1 to 2.6 fl oz	35 day PHI for harvest. (other names: Annex, Bifenture, Discipline, Empower, Fanfare, Sniper)
	Methyl parathion (1B)	1 pt	28 day PHI for harvest. Do not graze treated fields
	Mustang MAX (3)	4.0 fl oz	7 day PHI for harvest. Do not make applications less than seven days apart
	Proaxis 0.5 CS (3)	3.84 fl oz	30 Day PHI for harvest or grazing
	Warrior with Zeon (3) (lambda cyhalothrin)	3.84 fl oz	30 day PHI for harvest or grazing (other names: Grizzly Z, Lambda Cy, Silencer, Tiaga)

MANAGEMENT OF INSECT AND MITE PESTS IN CANOLA (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)	Rate of Product per Acre	Comments
<p>False chinch bug Adults 1/8 inch, long dirty gray, with brown or black markings, piercing mouthparts.</p> <p><u>Damage:</u> Feed in groups. Large numbers may cause wilting of heads or small plants.</p> <p><u>Threshold:</u> 140 or more per head</p> <p>Flowering: Treat when there is an AVERAGE of five to 10 per head. Early seed pod: Treat when there is an AVERAGE of 10 to 20 per head.</p>	<p>Azadirachtin (20B)</p> <p>Brigade 2EC (3) (bifenthrin)</p> <p>Methyl parathion (1B)</p> <p>Proaxis 0.5 CS (3)</p> <p>Warrior with Zeon (3) (lambda cyhalothrin)</p>	<p>Apply per label</p> <p>2.1 to 2.6 fl oz</p> <p>1 pt</p> <p>3.84 fl oz</p> <p>3.84 fl oz</p>	<p>No PHI for harvest</p> <p>35 day PHI for harvest. (other names: Annex, Bifenture, Discipline, Empower, Fanfare, Sniper)</p> <p>28 day PHI for harvest. Do not graze treated fields</p> <p>30 Day PHI for harvest or grazing</p> <p>30 day PHI for harvest or grazing (other names: Grizzly Z, Lambda Cy, Silencer, Tiaga)</p>
<p>Flea beetle Shiny black beetle about 1/16 inch long that jumps when disturbed.</p> <p><u>Damage:</u> Early spring. Feeding damage results in plant tissue that is scraped from leaf and/or small holes chewed in leaves. Can cause delayed development in cool growing conditions</p> <p><u>Threshold:</u> No threshold has been established.</p>	<p><u>Planting Time</u></p> <p>Helix EXtra (4A)</p> <p>Prosper FX (4A)</p> <p><u>Post-Plant</u></p> <p>Azadirachtin (20B)</p> <p>Battalion 0.2 EC</p> <p>Brigade 2EC (3) (bifenthrin)</p> <p>Methyl parathion (1B)</p> <p>Mustang MAX (3)</p> <p>Proaxis 0.5 CS (3)</p> <p>Warrior with Zeon (3) (lambda cyhalothrin)</p>	<p>23 fl oz/cwt seed</p> <p>21.3 fl oz/cwt seed</p> <p>Apply per label</p> <p>5.8 fl oz</p> <p>2.1 to 2.6 fl oz</p> <p>1 pt</p> <p>4.0 fl oz</p> <p>3.84 fl oz</p> <p>3.84 fl oz</p>	<p>30 waiting period for planting all crops except winter wheat following harvest. Do not use treated seed for feed, food or oil purposes.</p> <p>No PHI for harvest</p> <p>7 day PHI for harvest. Do not make applications less than seven days apart</p> <p>35 day PHI for harvest. (other names: Annex, Bifenture, Discipline, Empower, Fanfare, Sniper)</p> <p>28 day PHI for harvest. Do not graze treated fields</p> <p>7 day PHI for harvest. Do not make applications less than seven days apart</p> <p>30 Day PHI for harvest or grazing</p> <p>30 day PHI for harvest or grazing (other names: Grizzly Z, Lambda Cy, Silencer, Tiaga)</p>
<p>Harlequin bug Black shield-shaped with orange, red and yellow markings. Measures 3/8 inch long. Eggs barrel shaped and laid in clusters.</p> <p><u>Damage:</u> Adults and nymphs pierce stalks, leaves with sucking mouthparts.</p> <p><u>Threshold:</u> No threshold has been established.</p>	<p>Azadirachtin (20B)</p> <p>Brigade 2EC (3) (bifenthrin)</p> <p>Methyl parathion (1B)</p> <p>Mustang MAX (3)</p> <p>Proaxis 0.5 CS (3)</p> <p>Warrior with Zeon (3) (lambda cyhalothrin)</p>	<p>Apply per label</p> <p>2.1 to 2.6 fl oz</p> <p>1 pt</p> <p>4.0 fl oz</p> <p>3.84 fl oz</p> <p>3.84 fl oz</p>	<p>No PHI for harvest</p> <p>35 day PHI for harvest. (other names: Annex, Bifenture, Discipline, Empower, Fanfare, Sniper)</p> <p>28 day PHI for harvest. Do not graze treated fields</p> <p>7 day PHI for harvest. Do not make applications less than seven days apart</p> <p>30 Day PHI for harvest or grazing</p> <p>30 day PHI for harvest or grazing (other names: Grizzly Z, Lambda Cy, Silencer, Tiaga)</p>

MANAGEMENT OF INSECT AND MITE PESTS IN CANOLA (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)	Rate of Product per Acre	Comments
<p>Grasshopper 1-2 inches, outer wings leathery, inner wings clear or colored. Enlarged hind legs designed for jumping.</p> <p><u>Damage:</u> Chew leaves. Leaves may have ragged edges or leaf blade may be completely chewed. Small plants may be killed.</p> <p><u>Threshold:</u> 15-20 per square yard. If nymph populations exceed threshold field borders (25-40 per square yard), treat before they move into sorghum.</p>	Battalion 0.2 EC	5.8 fl oz	7 day PHI for harvest. Do not make applications less than seven days apart
	Brigade 2EC (3) (bifenthrin)	2.1 to 2.6 fl oz	35 day PHI for harvest. (other names: Annex, Bifenture, Discipline, Empower, Fanfare, Sniper)
	Methyl parathion (1B)	1 pt	28 day PHI for harvest. Do not graze treated fields
	Mustang MAX (3)	4.0 fl oz	7 day PHI for harvest. Do not make applications less than seven days apart
	Proaxis 0.5 CS (3)	3.84 fl oz	30 Day PHI for harvest or grazing
	Warrior with Zeon (3) (lambda cyhalothrin)	3.84 fl oz	30 day PHI for harvest or grazing (other names: Grizzly Z, Lambda Cy, Silencer, Tiaga)
<p>Lygus bug Several species. Generally oval, about 1/4 inch long, brown with some yellow or reddish markings.</p> <p><u>Damage:</u> Feed on developing seeds, flowers, and leaves. Feed on buds. Thresholds are for infestations before or during petal fall.</p> <p><u>Threshold:</u> North Dakota thresholds are 15 per 10 sweeps before petal fall, and 20 per 10 sweeps after petal fall.</p>	Azadirachtin (20B)	Apply per label	No PHI for harvest (Aza-direct, Ecozin)
	Battalion 0.2 EC	5.8 fl oz	7 day PHI for harvest. Do not make applications less than seven days apart
	Brigade 2EC (3) (bifenthrin)	2.1 to 2.6 fl oz	35 day PHI for harvest. (other names: Annex, Bifenture, Discipline, Empower, Fanfare, Sniper)
	Methyl parathion (1B)	1 pt	28 day PHI for harvest. Do not graze treated fields
	Mustang MAX (3)	4.0 fl oz	7 day PHI for harvest. Do not make applications less than seven days apart
	Proaxis 0.5 CS (3)	3.84 fl oz	30 Day PHI for harvest or grazing
	Warrior with Zeon (3) (lambda cyhalothrin)	3.84 fl oz	30 day PHI for harvest or grazing (other names: Grizzly Z, Lambda Cy, Silencer, Tiaga)
<p>White grub Large, "C" shaped grub with a white body and a brown head.</p> <p><u>Damage:</u> Grubs feed on roots of seedling plants. Damage potential is dependent on planting date and speed of growth of the plant.</p> <p><u>Threshold:</u> Seed treatments are registered for protection against early season damage. Treat if field history indicates a problem.</p>	<u>Planting Time</u>		Do not use treated seed for feed, food or oil purposes.
	Helix EXtra (4A)	23 fl oz/cwt seed	30 post-harvest waiting period for planting all crops except winter wheat.
	Prosper FX (4A)	21.3 fl oz/cwt seed	30 post-harvest waiting period for planting all crops except corn.
<p>Wireworm Hard-shelled, smooth, cylindrical, yellowish to brown worms. 2-6 year life cycle.</p> <p><u>Damage:</u> Feed on seed, seedling. Cause stand loss.</p> <p><u>Threshold:</u> Seed treatments are registered for protection against early season damage. Treat if field history indicates a problem.</p>	<u>Planting Time</u>		Do not use treated seed for feed, food or oil purposes.
	Helix EXtra (4A)	23 fl oz/cwt seed	30 post-harvest waiting period for planting all crops except winter wheat.
	Prosper FX (4A)	21.3 fl oz/cwt seed	30 post-harvest waiting period for planting all crops except corn.

MANAGEMENT OF INSECT AND MITE PESTS IN CANOLA (CONT'D)

Pre-harvest Intervals and grazing restrictions

Azadirachtin (neem)	0 day PHI for harvest
<i>Bacillus thuringiensis</i>	0 day PHI for harvest.
Battalion ^r	7 day PHI for harvest
Brigade ^r	35 day PHI for harvest.
Helix ^r EXtra	No PHI listed. Do not graze
Methyl parathion ^r	28 day PHI for harvest. Do not graze treated fields
Mustang ^r MAX	7 day PHI for harvest
Prosper ^r FX	No PHI listed
Proaxis ^r	30 Day PHI for harvest or grazing
Warrior ^r	30 day PHI for harvest or grazing

r = restricted use

*** Group numbers in parentheses (#) after the insecticide name are used to designate the mode of action of the insecticide according to the classification system developed by the Insecticide Resistance Action Committee, (IRAC) in 2005. It is intended to help in the selection of insecticides for preventative resistance management. If you make multiple applications for a specific pest during a growing season, simply select a registered insecticide with a different number for each application. To further delay resistance from developing, integrate other control methods into your pest management programs**

This section was not revised in 2008.

CANOLA WEED CONTROL

Estimated Levels of Weed Control Normally Expected with Winter Canola Herbicides ^a																			
Herbicide	Winter Broadleaves										Winter Grasses						General or Restricted use		
	Bushy wallflower	Carolina geranium	Chickweed	Corn gromwell	Cutlf. eveningprimrose	Flixweed	GF Pepperweed (ALS Res.)	Henbit	Prickly lettuce	Purple deadnettle	Shepherd's purse	Cheat	Downy & Jap. brome	Jointed goatgrass	Rescuegrass	Rye		Ryegrass	Wild oats
<u>Soil appl. (PPI)</u>																			
Sonalan HFP	9	9	9	9	9	9	9	9	9	9	9	8	8	8	8	7	8	9	General use
Treflan	9	9	9	8	9	9	9	9	9	9	9	8	8	8	8	7	8	8	General use
<u>Foliar appl. (POST)</u>																			
Assure II	0	0	0	0	0	0	0	0	0	0	0	9	9	9	9	8	8	9	General use
Poast	0	0	0	0	0	0	0	0	0	0	0	8	8	8	8	7	7	8	General use
Roundup Original Max (RR Varieties)	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	General use
Select 2 EC	0	0	0	0	0	0	0	0	0	0	0	9	9	8	8	7	9	9	General use
Stinger	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	General use
<u>Fallow / Burndown</u>																			
Roundup Original Max	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	General use
a Rating scale: 0 no control; 5 or less poor; 6 poor-fair; 7 fair; 8 fair-good; 9 good. Ratings assumes the herbicides are applied according to the label under optimum growing conditions.																			

This section was not revised in 2008.

CANOLA WEED CONTROL (CON'TD)

Rotational Cropping Restrictions in Months for Canola Herbicides								
Herbicide	Crop							
	Alfalfa	Canola	Corn	Cotton	Peanut	G. Sorghum	Soybean	Wheat
Assure II	4	0	4	0	4	4	0	4
Poast	0	0	4	0	0	4	0	4
Roundup Original Max	0	0	0	0	0	0	0	0
Select 2 EC	1	1	1	1	1	1	1	1
Sonalan HFP	B	0	B	B	0	B	0	B
Stinger	10.5 ^a	0	0	a	a	10.5	18 ^a	0
Treflan	0	0	14	0	0	14	0	14

^a. See label for specific crop rotation information.

^b. Following cropping season.

CANOLA WEED SUGGESTIONS

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Assure II 0.88 lb ai per gallon POST applications: 5 to 12 fl oz/A	Active Ingredients: Quizalofop Similar Products: Matador MOA: 1	POST. Apply after crop and weed emergence but before grasses tiller.	Do not apply Assure II within 60 days of harvest. Do not apply more than 18 oz/A per season. Do not graze livestock in treated areas or feed forage, hay or straw from treated areas to livestock. Do not cultivate within 7 days after application. Optimum timing for cultivation is 7-14 days after application of Assure II. Applications must always include a crop oil concentrate or non-ionic surfactant
Poast 1.5 lb ai per gallon POST applications: 0.5 to 2.5 pt/A	Active Ingredient: Sethoxydim Similar Products: None <u>Rates may vary due to formulation</u> MOA: 1	POST. Apply POST to actively growing grass weeds within size limits on label. Apply to grasses after crop and weed emergence. Annual grasses that emerge after application will not be controlled. Apply to actively growing grasses at recommended weed heights. Will NOT control sedges or broadleaf weeds.	Do not harvest canola for at least 60 days after application. Do not apply more than 2.5 pt/A per application. Do not exceed 5 pt/A in a season. Do not graze or feed forage, hay, or straw.
Roundup Original Max 5.5 lb ai per gallon EPP BURNDOWN application: 11 to 44 fl oz/A POST applications: 11 to 22 fl oz/A	Active Ingredient: Glyphosate Similar Products: Many <u>Rates and required adjuvants may vary due to formulation and manufacturer. See appropriate label.</u> MOA: 9	EPP BURNDOWN. Apply before planting the crop to control existing weeds. Will not control weeds that have not emerged. PRE. Apply after planting but before crop emergence. Will not control weeds that have not emerged. POST. Apply POST only in Roundup Ready Canola varieties. Single Application. One postemergence application of 11 to 16 fl oz/A can be applied no later than the 6 leaf stage. Sequential Applications. Two sequential applications of 11 to 22 fl oz/A, with a 60 day interval between applications, can be applied.	Apply POST only in Roundup Ready Canola varieties. Do not apply more than 44 fl oz/A of glyphosate during a growing season; do not apply more than 44 fl oz/A during EPP burndown or Pre-plant applications and no more than 22 fl oz/A over the top of Roundup Ready canola from emergence to the 6-leaf stage. Applications made during bolting or flowering may result in crop injury and yield loss. No more than two postemergence applications can be made to Roundup Ready canola from emergence to the 6 leaf stage. Allow at least 60 days between last glyphosate application and canola harvest.
Select Max 0.97 lb ai per gallon POST applications: 9 to 12 fl oz/A	Active Ingredient: Clethodim Similar Products: Arrow Envoy Volunteer <u>Rates may vary due to formulation</u> MOA: 1	POST. Apply to grasses after crop and weed emergence. Annual grasses that emerge after application will not be controlled. Apply to actively growing grasses at recommended weed heights. Will NOT control sedges or broadleaf weeds. The recommended rate for control of cheat, ryegrass, rye, wild oats, and other winter annual grasses common in Oklahoma wheat fields is 9 to 12 fl oz/A.	Do not apply more than 12 fl oz/A per application and no more than 12 fl oz/A per season. Do not allow Select to drift onto wheat or other grass crops as severe crop injury will occur. Do not apply after canola has begun bolting. Apply with .25 v/v won-Ionic Surfactant. Including liquid fertilizer with the application is NOT recommended. Do not apply under conditions of drought stress. Do not graze treated fields or feed treated forage or hay. Do not apply within 70 days of harvest. Do not plant any crop for 30 days after application unless registered for use in that crop.
Sonalan HFP 3.0 lb ai per gallon PPI applications by soil texture: 1.5 pt/A - Course Soil 2 pt/A - Medium 2.5 pt/A - Fine Soil	Active Ingredients: Ethalfluralin Similar Products: Sonalan 10G Trust Herbicide MOA: 3	PPI. To soil surface prior to planting and incorporate into the upper 2 to 3 inches of soil. Incorporation should occur within 48 hours of application. For best performance, incorporate with two passes in different directions.	Do not apply to soils that are wet or are subject to prolonged periods of flooding as poor weed control may result. Do not graze or harvest for livestock forage.

CANOLA WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Stinger 3 lb ai per gallon POST applications: 4 to 8 fl oz/A	Active Ingredient: Clopyralid Similar Products: None MOA: 4	POST. Apply postemergence when canola is in the 2 to 6 leaf stage. Apply by ground rig in 10 to 20 gallons of water carrier or by air in a minimum of 10 gallons per acre water carrier.	Do not exceed 0.25 lb ai/A of clopyralid per crop year. Do not move livestock from treated grazing areas onto sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated pasture. Use of a spray adjuvant is not necessary but may increase control of some weeds. Do not apply within 50 days of harvest. Do not make more than 1 application/crop/year.
Treflan HFP 4.0 lb ai per gallon PPI applications by soil texture: 1 pt/A - Course Soil 1.5 pt/A - Medium 2 pt/A - Fine Soil	Active Ingredients: Trifluralin Similar Products: Treflan TR-10 Trifluralin HF Trust 10G Trust 4EC Trust Herbicide MOA: 3	PPI. To soil surface prior to planting and incorporate into the upper 2 to 3 inches of soil. Incorporation should occur within 24 hours of application. For best performance, incorporate with two passes in different directions.	If applying through irrigation system: Apply only through continuously moving center pivot, lateral move end tow, solid set, or hand move irrigation systems. Refer to label for additional chemigation instructions. Do not apply to soils that are wet or are subject to prolonged periods of flooding as poor weed control may result. Do not graze or harvest for livestock forage.

MOA Group Tables start on page 46 of the handbook.

CORN INSECT CONTROL SUGGESTIONS

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre or 1,000 ft-row	Comments
<p>Armyworm 1- 1.5 inches. Dark green or brown caterpillar with 5 stripes along a smooth body. Head with honeycomb-like markings.</p> <p><u>Damage:</u> Armyworms typically move in from maturing wheat fields in March-April. Feed on seedling leaves.</p> <p><u>Threshold:</u> Treat if 25% of seedling corn plants are damaged.</p>	<u>Seed Treatments</u>		
	YieldGard Seed	Transgenic seed	Follow company's guidelines for providing refugia as a resistance management strategy.
	Herculex Seed	Transgenic seed	
	Ambush 25W ^f (3)	6.4 to 12.8 oz	30 day waiting period
	Pounce 3.2 ^f (3)	4 to 8 fl oz	
	Asana XL (3)	5.8 to 9.6 fl oz	21 day waiting period
	<i>Bacillus thuringiensis</i> (Biobit, Condor, Dipel, Lepinox, Javelin, Xentari)	See product label for specific rates	Check label for waiting periods
	Baythroid XL ^f (3)	1.6 to 2.8 fl oz	21 day waiting period for grain or fodder, 0 day for green forage
	Capture 2EC ^f (3)	2.1 to 6.4 fl oz	30 day waiting period. (Other names include Annex, Bifenture, and Empower)
	Cobalt ^f (3)	13 to 26 fl oz	21 day waiting period for harvest, 14 days for grazing or silage
	Delta Gold (3)	1.5-2.4 fl oz	1 day wait for green forage or harvest, 21 day waiting period for fodder
	Intrepid 2F (18)	4 to 8 fl oz	0 day wait for green forage, 21 day waiting period for harvest or fodder
	Lannate LV (1A) SP	0.75 to 1.5 pt 0.25 to 0.5 lb	21 day waiting period
	Chlorpyrifos 4E ^f (1B) (Lorsban, Warhawk)	1 to 2 pt	21 day waiting period
	Mustang MAX ^f (3)	3.2 to 4.0 fl oz	30 day waiting period for grain, 60 day waiting period for silage
	Methyl parathion 4E (1B)	0.5 pt	12 day waiting period
	PennCap-M ^f (1B)	2 to 3 pt	12 day waiting period
	Proaxis 0.5 SC ^f (3)	2.56 to 3.84 fl oz	21 day waiting period
Sevin XLR (1A)	1 to 2 qt	0 day waiting period	
Tracer (5)	1 to 3 fl oz	28 day waiting period	
Warrior w Zeon ^f (3)	2.56 to 3.84 fl oz	21 day waiting period	

CORN INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre or 1,000 ft-row	Comments
<p>Chinch bug Nymphs are bright red with white band across back. Adults ½ inches, black with white “hour glass” shape on back</p> <p><u>Damage:</u> Adults may fly into field, early (March April) or adults and nymphs move in to corn from maturing wheat fields (April-May).</p> <p><u>Threshold:</u> Remove plant juices, cause stunting, wilting, and reddening of leaves.</p>	<p style="text-align: center;"><u>Seed Treatments:</u></p> <p style="text-align: center;">Cruiser 5FS (4A)</p> <p style="text-align: center;">Poncho 600 (4A)</p> <p style="text-align: center;"><u>Planting Time Applications</u></p> <p style="text-align: center;">Force CS^r</p> <p style="text-align: center;">Regent (2B)</p> <p style="text-align: center;"><u>Post-emergence Sprays</u></p> <p style="text-align: center;">Asana XL (3)</p> <p style="text-align: center;">Baythroid XL^r (3)</p> <p style="text-align: center;">Capture 2EC^r (3)</p> <p style="text-align: center;">Cobalt^r (3)</p> <p style="text-align: center;">Chlorpyrifos 4E^r (1B) (Lorsban, Warhawk)</p> <p style="text-align: center;">Delta Gold (3)</p> <p style="text-align: center;">Mustang MAX^r (3)</p> <p style="text-align: center;">Methyl parathion 4E (1B)</p> <p style="text-align: center;">Proaxis 0.5 CS^r (3)</p> <p style="text-align: center;">Sevin XLR (1A)</p> <p style="text-align: center;">Warrior w Zeon^r (3)</p>	<p style="text-align: center;">0.56 to 3.61 fl oz /80,000 seed</p> <p style="text-align: center;">1.13 fl oz/80,000 seed</p> <p style="text-align: center;">0.46-0.57 fl oz/1000 ft row</p> <p style="text-align: center;">0.24 fl oz/1000 ft-row</p> <p style="text-align: center;">5.8 to 9.6 fl oz</p> <p style="text-align: center;">1.6 to 2.8 fl oz</p> <p style="text-align: center;">2.1 to 6.4 fl oz</p> <p style="text-align: center;">19 to 38 fl oz</p> <p style="text-align: center;">1 to 2 pt</p> <p style="text-align: center;">1.5-2.4 fl oz</p> <p style="text-align: center;">3.2 to 4.0 fl oz</p> <p style="text-align: center;">0.5 pt</p> <p style="text-align: center;">3.84 fl oz</p> <p style="text-align: center;">1 to 2 qt</p> <p style="text-align: center;">3.84 fl oz</p>	<p>Do not feed treated seed. Generally must order through a seed dealer.</p> <p>Do not feed treated seed. See label for mixing and handling instructions. Follow all label restrictions.</p> <p>T-band application. Read label carefully for restrictions.</p> <p>90 day waiting period for harvest.</p> <p>Border sprays (30-60 ft) are often effective.</p> <p>21 day waiting period</p> <p>21 day waiting period for grain or fodder, 0 day for green forage</p> <p>30 day waiting period. (Other names include Annex, Bifenture, and Empower).</p> <p>21 day waiting period for harvest, 14 days for grazing or silage</p> <p>21 day waiting period</p> <p>1 day wait for green forage or harvest, 21 day waiting period for fodder</p> <p>30 day waiting period for grain, 60 days for silage</p> <p>12 day waiting period</p> <p>21 day waiting period</p> <p>48 day waiting period for harvest, 14 days for grazing</p> <p>21 day waiting period</p>
<p>Corn Earworm Striped robust caterpillars that range in color from green to pink to brown to black.</p> <p><u>Damage:</u> Caterpillars injure ear tips, feed in whorls. Feeding damage may increase potential for aflatoxins in grain.</p> <p><u>Threshold:</u> Not practical to control in field corn</p>	<p style="text-align: center;">NA</p>	<p style="text-align: center;">NA</p>	

CORN INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre or 1,000 ft-row	Comments
<p>Corn rootworm (adults) Small beetle, with black stripes, 12 spots, or green</p> <p><u>Damage:</u> Feed on silks. Heavy populations may interfere with pollination</p> <p><u>Threshold:</u> Treat if beetles are abundant (over 5 per plant and silks are being severely clipped)</p>	Ambush 25W ^f (3)	6.4 to 12.8 oz	30 day waiting period
	Pounce 3.2 (3)	4 to 8 fl oz	
	Asana (3)	5.8 to 9.6 fl oz	21 day waiting period
	Baythroid XL ^f (3)	1.6 to 2.8 fl oz	21 day waiting period for grain or fodder, 0 day for green forage
	Capture 2EC ^f (3)	2.1 to 6.4 fl oz	Use higher rates (greater than 5.1 fl oz) in areas where spider mites are a problem.
	Cobalt ^f (3)	13 to 26 fl oz	21 day waiting period for harvest, 14 days for grazing or silage
	Delta Gold (3)	1.5-2.4 fl oz	1 day wait for green forage or harvest, 21 day waiting period for fodder
	Dimethoate 4E (1B)	0.66 to 1 pt	14 day waiting period
	Lannate LV (1A) SP	0.75 to 1.5 pt 0.25 to 0.5 lb	21 day waiting period
	Chlorpyrifos 4E ^f (1B) (Lorsban, Warhawk)	1 to 2 pt	21 day waiting period
	Methyl parathion 4E (1B)	0.5 pt	12 day waiting period
	Mustang MAX ^f (3)	2.72 to 4.0 fl oz	30 day waiting period for grain, 60 day waiting period for forage
	PennCap-M ^f (1B)	1 to 2 pt	12 day waiting period
	Proaxis 0.5 CS ^f (3)	2.56 to 3.84 fl oz	21 day waiting period
	Sevin XLR (1A)	1 to 2 qt	48 day waiting period for harvest, 14 day for grazing
Warrior w Zeon ^f (3)	2.56 to 3.84 fl oz	21 day waiting period	

CORN INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre or 1,000 ft-row	Comments
<p>Corn rootworm (larvae) Thin, white worm-like larva that lives in soil. Damage is likely to occur in early part of growing season (before June 15).</p> <p><u>Damage:</u> Feed on roots, causing lodged plants and plants that “gooseneck”. Root tissue and brace roots are often chewed back to the base of the stalk.</p> <p><u>Threshold:</u> Consider a planting-time insecticide, or a seed variety that contains “rootworm” protection, such as ‘YieldGard Rootworm™’ if planting continuous corn.</p>	<p><u>Seed Treatments</u></p>		
	<p>YieldGard Rootworm Seed Herculex Rootworm Seed</p>	<p>Transgenic seed Transgenic seed</p>	<p>Follow company’s guidelines for providing refugia as a resistance management strategy.</p>
	<p>Cruiser 5FS (4A)</p>	<p>5.6 fl oz/80,000 seed</p>	<p>Do not use treated seed for feed, food, or oil processing</p>
	<p>Poncho 600 (4A)</p>	<p>5.64 fl oz/80,000 seed</p>	<p>Do not use treated seed for feed, food, or oil processing</p>
	<p>Force ST^r (3)</p>	<p>3 to 4 oz/cwt seed</p>	<p>Do not apply Force 3G if Force ST was used.</p>
	<p><u>Planting Time</u></p>		
	<p>Aztec 2.1G^r (1B,3)</p>	<p>6.7 fl oz/1000 ft-row</p>	<p>Follow manufactures’ guidelines for rates, application methods grazing and crop rotation restrictions. Rotation of insecticides during successive years is suggested.</p>
	<p>Capture 1.5G^r (3)</p>	<p>3.2 to 8 oz/1000 ft-row</p>	
	<p>Capture LFR^r (3) Capture 2EC^r (3)</p>	<p>0.39-0.49 fl oz/1000 ft-row</p>	<p>Read label carefully for application directions.</p>
	<p>Counter 15G^r (1B)</p>	<p>0.3 fl oz/1000 ft-row</p>	
	<p>Force 3G^r (3) Force^r CS</p>	<p>6 to 8 oz/1000 ft-row 0.46-0.57 fl oz/1000 ft row</p>	
	<p>Fortress 2.5G</p>	<p>4 to 5 oz/1000 ft-row</p>	
	<p>Furadan 4F^r (1A)</p>	<p>6 to 9 oz/1000 ft-row</p>	
	<p>Lorsban 15 G (1B)</p>	<p>2.5 fl oz/1000 ft-row</p>	
	<p>Proaxis 0.5 CS^r (3)</p>	<p>8 oz/1000 ft-row</p>	
	<p>Regent 4SC^r (2B)</p>	<p>0.66 fl oz/1000 ft-row</p>	
	<p>Thimet 20G^r (1B)</p>	<p>0.24 oz/1000 ft-row</p>	
	<p>Warrior w zeon^r (3)</p>	<p>4.5 to 6 oz/1000 ft row 0.66 fl oz/1000 ft-row</p>	<p>Follow label directions for at-cultivation applications. Do not make application if planting time application was made.</p>
	<p><u>Post Seedling-Emergence Application</u></p>		
	<p>Counter 15G^r (1B)</p>	<p>8 oz/1000 ft-row</p>	
	<p>Cobalt^r (3)</p>	<p>38 to 42 fl oz</p>	
	<p>Force 3G^r (3)</p>	<p>4 to 5 oz/1000 ft-row</p>	
	<p>Fortress 2.5G</p>	<p>6.0 to 7.5 oz/1000 ft-row</p>	
<p>Furadan 4F^r (1A)</p>	<p>2.5 fl oz/1000 ft-row</p>		
<p>Lorsban 15G^r (1B)</p>	<p>8 oz/1000 ft-row</p>		
<p>Thimet 20G^r (1B)</p>	<p>4.5 to 6 oz/1000 ft row</p>		

CORN INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre or 1,000 ft-row	Comments
<p>Cutworms (black, granulate, sandhill) Striped or solid colored, robust caterpillars that “roll” up when disturbed, and prefer to live under ground.</p> <p><u>Damage:</u> Cutworms generally feed at night, and live under the soil during the day. Plants will be cut at or slightly above the soil level, causing stand reductions.</p> <p><u>Threshold:</u> Scout fields at seedling emergence. Treat when worms are less than ½ inch long, and skips are noticed.</p>	<u>Seed Treatments</u>		
	YieldGard Seed	Transgenic seed	Follow company’s guidelines for providing refugia as a resistance management strategy.
	Herculex Seed	Transgenic seed	
	Ambush 25W ^f (3)	12.8 oz	30 day waiting period
	Pounce 3.2 ^f (3)	4 to 8 fl oz	
	Asana XL (3)	5.8 to 9.6 fl oz	21 day waiting period
	Baythroid XL ^f (3)	0.8 to 1.6 fl oz	21 day waiting period for grain or fodder, 0 days for green forage
	Capture (3)	2.1 to 6.4 fl oz	30 day waiting period. (Other names include Annex, Bifenture, and Empower)
	Capture LFR ^f (3)	0.2-0.39 fl oz/1000 linear ft-row banded or 3.4-6.8 fl oz/acre as a foliar application	<u>Follow label directions.</u> Do not apply to soil with greater than 30% crop residue, do not apply more than 0.1 lb active per acre per season as an at-plant application.
	Chlorpyrifos 4E ^f (1B) (Lorsban, Warhawk)	1 to 2 pt	21 day waiting period
	Cobalt ^f (3)	13 to 26 fl oz	21 day waiting period for harvest, 14 days for grazing or silage
	Delta Gold (3)	1.0-1.5 fl oz	1 day wait for green forage or harvest, 21 day waiting period for fodder
	Mustang MAX ^f (3)	1.28 to 2.8 fl oz	30 day waiting period for grain and silage, 60 day for grazing
Proaxis 0.5 CS ^f (3)	1.92 to 3.2 fl oz	21 day waiting period	
Warrior w Zeon ^f (3)	1.92 to 3.2 fl oz	21 day waiting period	
			Always follow label directions, as methods and timing of applications may vary.

CORN INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre or 1,000 ft-row	Comments
<p>Fall armyworm Large, striped, non-bristled worm up to 1.5 inches. Has a light colored, inverted "Y" on head. June-August</p> <p><u>Damage:</u> Larvae cut holes in leaves at whorl stage, heaviest damage occurs on late corn when caterpillars tunnel into ear or ear shank.</p> <p><u>Threshold:</u> No detailed threshold is suggested.</p>	<p><u>Seed Treatments</u></p>	<p>YieldGard Seed Transgenic seed Herculex Seed Transgenic seed</p> <p>Ambush 25W^f (3) 6.4 to 12.8 oz Pounce 3.2^f (3) 4 to 8 fl oz</p> <p>Baythroid XL^f (3) 2.8 fl oz</p> <p>Capture 2EC^f (3) 2.1 to 6.4 fl oz</p> <p>Cobalt^f (3) 13 to 26 fl oz</p> <p>Lannate LV (1A) 0.75 to 1.5 pt SP 0.25 to 0.5 lb</p> <p>Chlorpyrifos 4E^f (1B) 1 to 2 pt (Lorsban, Warhawk)</p> <p>Delta Gold (3) 1.5-2.4 fl oz</p> <p>Methyl parathion 4E (1B) 0.5 pt</p> <p>Mustang MAX^f (3) 3.2 to 4.0 fl oz</p> <p>Proaxis 0.5 CS^f (3) 2.56 to 3.84 fl oz</p> <p>Sevin XLR (1A) 1 to 2 qt</p> <p>Tracer (5) 1 to 3 fl oz</p> <p>Warrior w Zeon^f (3) 2.56 to 3.84 fl oz</p>	<p>Follow company's guidelines for providing refugia as a resistance management strategy.</p> <p>30 day waiting period</p> <p>(1st and 2nd instars) 21 day waiting period for grain or fodder</p> <p>30 day waiting period. (Other names include Annex, Bifenture, and Empower)</p> <p>21 day waiting period for harvest, 14 days for grazing or silage</p> <p>21 day waiting period for silage, 3 days for grazing</p> <p>35 day waiting period</p> <p>1 day wait for green forage or harvest, 21 day waiting period for fodder</p> <p>12 day waiting period</p> <p>30 day waiting period for grain and silage, 60 day for grazing</p> <p>21 day waiting period</p> <p>48 day harvest: 14 day grazing.</p> <p>28 day waiting period.</p> <p>21 day waiting period</p>

CORN INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre or 1,000 ft-row	Comments
<p>Flea beetles Shiny, black beetle about 1/16 inches that jumps when disturbed.</p> <p><u>Damage:</u> Early spring-summer. Plant tissue is scraped from leaf, giving it a drought stress appearance. Can cause delayed development in cool growing conditions</p> <p><u>Threshold:</u> Apply to small plants when beetles first appear and some plants are being killed.</p>	Ambush 25W ^f (3)	6.4 to 12.8 oz	30 day waiting period
	Pounce 3.2 ^f (3)	4 to 8 fl oz	
	Asana XL (3)	5.8 to 9.6 fl oz	21 day waiting period
	Baythroid XL ^f (3)	0.8 to 1.6 fl oz	21 day waiting period for grain or fodder, 0 day for green forage
	Capture 2EC ^f (3)	2.1 to 6.4 fl oz	30 day waiting period. (Other names include Annex, Bifenture, and Empower)
	Cobalt ^f (3)	13 to 26 fl oz	21 day waiting period for harvest. Follow label directions for application.
	Delta Gold (3)	1.0-1.5 fl oz	1 day wait for green forage or harvest, 21 day waiting period for fodder
	Lannate LV (1A) SP	0.75 to 1.5 pt 0.25 to 0.5 lb	21 day waiting period for silage, 3 day for grazing
	Chlorpyrifos 4E ^f (1B) (Lorsban, Warhawk)	1 to 2 pt	35 day waiting period
	Mustang MAX ^f (3)	2.72 to 4.0 fl oz	30 day waiting period for grain and silage, 60 day for grazing
	PennCap-M ^f (1B)	2 to 3 pt	12 day waiting period
	Pounce 3.2 EC ^f (3)	4 to 8 fl oz	30 day waiting period
	Proaxis 0.5 CS ^f (3)	2.56 to 3.84 fl oz	21 day waiting period
Sevin XLR (1A)	1 to 2 qt	48 day harvest: 14 day grazing.	
Warrior w Zeon ^f (3)	2.56 to 3.84 fl oz	21 day waiting period	
<p>Grasshopper 1-2 inches, outer wings leathery, inner wings clear or colored. Enlarged hind legs designed for jumping.</p> <p><u>Damage:</u> Chew leaves, leaving ragged edges, or completely chewing leaf blade. Damage emerging seed heads, causing yield loss.</p> <p><u>Threshold:</u> Consider treating if numbers reach 8-14 in the field, or 20-40 in field margins.</p> <p>See F-7196, Grasshopper Management in Rangeland, Pastures, and Crops for more information.</p>	Asana XL (3)	5.8 to 9.6 fl oz	21 day waiting period
	Baythroid XL ^f (3)	2.1 to 2.8 fl oz	21 day waiting period for grain or fodder, 0 day for green forage
	Capture 2EC ^f (3)	2.1 to 6.4 fl oz	30 day waiting period. (Other names include Annex, Bifenture, and Empower)
	Cobalt ^f (3)	7 to 13 fl oz	21 day waiting period for harvest, 14 days for grazing or silage
	Chlorpyrifos 4E ^f (1B) (Lorsban, Warhawk)	1 to 2 pt	35 day waiting period
	Delta Gold (3)	1.0-1.5 fl oz	1 day wait for green forage or harvest, 21 day waiting period for fodder
	Methyl parathion 4E (1B)	1 pt	12 day waiting period
	Mustang MAX ^f (3)	2.72 to 4.0 fl oz	30 day waiting period for grain and silage, 60 day for grazing
	PennCap-M ^f (1B)	2 to 3 pt	12 day waiting period
	Proaxis 0.5 CS ^f (3)	1.92 to 3.2 fl oz	21 day waiting period
	Sevin XLR (1A)	0.5 to 1.5 qt	48 day harvest: 14 day grazing.
Warrior w Zeon ^f (3)	1.92 to 3.2 fl oz	21 day waiting period	

CORN INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre or 1,000 ft-row	Comments
<p>Mites Small, less than 1/100 inches. Cause brown stippling of leaves. Banks grass and two spotted spidermites are most common pests.</p> <p><u>Damage:</u> Causes stippling of leaves, severe infestations can kill leaves. Infestations generally start at lower leaves and move upward.</p> <p><u>Threshold:</u> Treat when there is visible damage on the lower third of the plant and small colonies are visible on the middle third of the plant, and the corn has not yet reached the hard dough stage.</p>	<p style="text-align: center;">Capture 2EC^r (3)</p> <p style="text-align: center;">Comite II (20)</p> <p style="text-align: center;">Dimethoate 4E (1B)</p> <p style="text-align: center;">Oberon</p>	<p style="text-align: center;">5.12 to 6.4 fl oz</p> <p style="text-align: center;">2.25 to 3.32 pt</p> <p style="text-align: center;">0.66 to 1 pt</p> <p style="text-align: center;">5.7 to 8.5 fl oz</p>	<p>30 day waiting period</p> <p>30 day waiting period. Apply when mite colonies first form, before leaves are killed.</p> <p>14 day waiting period.</p> <p>30 day wait for harvest, 5 days for forage or silage.</p> <p>NOTE: Treatments at hard-dough stage or later are not cost effective. When heavy infestations occur, erratic control will usually be the rule. Thorough coverage is important, higher volumes (2-3 gallons or more per acre) when applied by aircraft increase the effectiveness of the spray.</p>
<p>Seedcorn maggot, Seed corn beetle Maggots are yellowish-white, tapered larvae about 1/4 inches. Beetles are about 3/8 inches, with two black stripes on brown wing covers.</p> <p><u>Damage:</u> Damage occurs in spring, especially if soils are cool and moist and seeds are not germinating rapidly. Damage is noticed as skips in plant stands. Seed will be hollowed out.</p> <p><u>Threshold:</u> Replanting is the only recourse if damage has already occurred. Use a planting-time treatment if fields have a history. No-till fields may be more vulnerable to attack.</p>	<p style="text-align: center;">Seed Treatments</p> <p style="text-align: center;">Kickstart</p> <p style="text-align: center;">At Planting</p> <p style="text-align: center;">Aztec 2.1G^r (1B,3)</p> <p style="text-align: center;">Capture 1.5G^r (3)</p> <p style="text-align: center;">Counter 15G^r (1B)</p> <p style="text-align: center;">Lorsban 15G^r (1B)</p> <p style="text-align: center;">Force 3G^r (3)</p> <p style="text-align: center;">Fortress 2.5G</p>	<p style="text-align: center;">1.5 oz/42 lb seed</p> <p style="text-align: center;">6.7 fl oz/1000 ft-row</p> <p style="text-align: center;">3 to 8 oz/1000 ft row</p> <p style="text-align: center;">6 to 8 oz/1000 ft-row</p> <p style="text-align: center;">8 to 12 oz/1000 ft-row</p> <p style="text-align: center;">4 to 5 oz/1000 ft-row</p> <p style="text-align: center;">6 to 7.5 fl oz/1000 ft-row</p>	<p>Registration for lindane has been canceled effective July 1, 2007 and all existing stocks must be used by October 1, 2009</p> <p>Follow manufactures' guidelines for rates, application methods grazing and crop rotation restrictions. Rotation of insecticides during successive years is suggested.</p>

CORN INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre or 1,000 ft-row	Comments
<p>Southwestern corn borer Full grown caterpillars are white with prominent dark spots on body. Eggs are laid in masses of 12-30. They overlap like egg scales. Eggs are white when first laid, then red bands appear before they hatch.</p> <p><u>Damage:</u> First generation causes "dead heart" in plants. Second generation tunnels throughout stalk. May girdle mature stalks causing lodging.</p> <p><u>Threshold:</u> Threshold based on egg masses. Treat if 25% of plants have egg masses or newly hatched larvae. A repeat application may be needed in 7-10 days.</p>	<u>Seed Treatments</u>		Follow company's guidelines for providing refugia as a resistance management strategy.
	YieldGard Seed	Transgenic seed	
	Herculex Seed	Transgenic seed	
	<u>Post-emergence Sprays</u>		
	Capture 2EC ^f (3)	2.1 to 6.4 fl oz	30 day waiting period (Other names include Annex, Bifenture, and Empower)
	Cobalt ^f (3)	19 to 38 fl oz	21 day waiting period for harvest, 14 days for grazing or silage
	Furadan 4F ^f (1A)	1 to 2 pt (foliar applic)	30 day waiting period
	Intrepid (18)	4 to 8 fl oz	21 day waiting period
	Chlorpyrifos 4E ^f (1B) (Lorsban, Warhawk)	1.5 to 2 pt	12 day waiting period; follow directions for spray volume recommendations
	Delta Gold (3)	1.5-2.4 fl oz	1 day wait for green forage or harvest, 21 day waiting period for fodder
	Mustang MAX ^f (3)	2.72 to 4.0 fl oz	30 day waiting period for grain and silage
	Proaxis 0.5 CS ^f (3)	2.56 to 3.84 fl oz	21 day waiting period
	Tracer (5)	2 to 3 fl oz	28 day waiting period
Warrior w Zeon ^f (3)	2.56 to 3.84 fl oz	21 day waiting period	

CORN INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre or 1,000 ft-row	Comments
<p>Western bean cutworm Larvae are dark brown with faint diamond-shaped markings on their backs. Measure 1.5 inches. Eggs are deposited in masses of 4-200 on upper surface of leaves.</p> <p><u>Damage:</u> Larvae feed on developing tassel, or silk. They feed on developing kernels once the ear has formed.</p> <p><u>Threshold:</u> Treat of eight percent or more of the plants have egg masses or small larvae in the tassels and the crop is 95% tasseled.</p>	<p><u>Seed Treatments</u></p> <p>YieldGard Seed Transgenic seed Herculex Seed Transgenic seed</p> <p>Ambush 25W^f (3) 3.2 to 6.4 oz Pounce 3.2^f (3) 2 to 4 fl oz</p> <p>Asana XL (3) 2.9 to 5.8 fl oz</p> <p>Baythroid XL^f (3) 1.6 to 2.8 fl oz</p> <p>Capture 2EC^f (3) 2.1 to 6.4 fl oz</p> <p>Cobalt^f (3) 13 to 26 fl oz</p> <p>Intrepid (18) 4 to 8 fl oz</p> <p>Chlorpyrifos 4E^f (1B) 1 to 2 pt (Lorsban, Warhawk)</p> <p>Methyl parathion 4 E (1B) 0.5 pt</p> <p>Mustang MAX^f (3) 1.76 to 4.0 fl oz</p> <p>Penncap-M^f (1B) 2 to 4 pt</p> <p>Proaxis 0.5 CS^f (3) 1.92 to 3.2 fl oz</p> <p>Sevin XLR (1A) 2 qt</p> <p>Tracer (5) 2 to 3 fl oz</p> <p>Warrior w Zeon^f (3) 1.92 to 3.2 fl oz</p>		<p>Follow company's guidelines for providing refugia as a resistance management strategy.</p> <p>30 day waiting period</p> <p>21 day waiting period</p> <p>21 day waiting period for grain or fodder, 0 day for green forage</p> <p>30 day waiting period. (Other names include Annex, Bifenture, and Empower)</p> <p>21 day waiting period for harvest, 14 days for grazing or silage</p> <p>21 day waiting period</p> <p>35 day waiting period</p> <p>12 day waiting period</p> <p>30 day waiting period for grain and silage, 60 day for grazing</p> <p>12 day waiting period</p> <p>21 day waiting period</p> <p>48 day harvest: 14 day grazing.</p> <p>28 day waiting period.</p> <p>21 day waiting period</p>

CORN INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre or 1,000 ft-row	Comments
<p>White grub Large, "C" shaped grub with a white body and a brown head.</p> <p><u>Damage:</u> Feed on developing roots, cause slow growth, stunting, and stand loss.</p> <p><u>Threshold:</u> No reliable thresholds are available. Consider using an at-planting treatment for "suppression" if field has a history of grub problems.</p>	<p><u>Seed Treatments</u></p> <p>Cruiser 5FS (4A)</p> <p>Poncho 600 (4A)</p> <p>Force ST^f (3)</p> <p><u>Planting Time</u></p> <p>Aztec 2.1G^f (1B,3)</p> <p>Capture 1.5G^f (3)</p> <p>Capture LFR^f</p> <p>Counter 15G^f (1B)</p> <p>Lorsban 15G^f (1B)</p> <p>Force 3G^f (3)</p> <p>Force CS^f (3)</p> <p>Fortress 2.5G</p> <p>Proaxis 0.5 CS^f (3)</p> <p>Regent 4SC^f (2B)</p> <p>Warrior w Zeon^f (3)</p>	<p>0.56 to 3.61 fl oz /80,000 seed</p> <p>1.13 fl oz/80,000 seed</p> <p>3 to 4 oz/cwt seed</p> <p>6.7 fl oz/1000 ft-row</p> <p>3.2 to 8 oz/1000 ft row</p> <p>0.2-0.39 fl oz/1000 ft-row in-furrow or band</p> <p>6 to 8 oz/1000 ft-row</p> <p>8 to 12 oz/1000 ft-row</p> <p>4 to 5 oz/1000 ft-row</p> <p>0.46-0.57 fl zo/1000 ft row</p> <p>6.0 to 7.5 oz/1000 ft-row</p> <p>0.66 fl oz/1000 ft-row</p> <p>0.24 oz/1000 ft-row</p> <p>0.66 fl oz/1000 ft-row</p>	<p>Do not use treated seed for feed, food, or oil processing</p> <p>Do not use treated seed for feed, food, or oil processing</p> <p>Do not use Force 3G if Force ST was used</p> <p>Follow manufactures' guidelines for rates, application methods grazing and crop rotation restrictions. Rotation of insecticides during successive years is suggested.</p>

CORN INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre or 1,000 ft-row	Comments
<p>Wireworm Hard-shelled, smooth, cylindrical, yellowish to brown worms. 2-6 year life cycle. More common in corn planted into a sod or grass pasture.</p> <p><u>Damage:</u> Feed on seed, seedling. Cause stunting and stand loss.</p> <p><u>Threshold:</u> No reliable thresholds are available. Treat if field has a history of problems. Wireworms may be more of a problem in no-till or minimum till fields.</p>	<u>Seed Treatments</u>		
	Cruiser 5FS (4A)	0.56 to 3.61 fl oz /80,000 seed	Do not use treated seed for feed, food, or oil processing.
	Poncho 600 (4A)	1.13 fl oz/80,000 seed	Do not use treated seed for feed, food, or oil processing Registration for lindane has been canceled effective July 1, 2007 and all existing stocks must be used by October 1, 2009.
	Kickstart (2A)	1.5 oz/42 lbs seed	Do not use Force 3G if Force ST was used
	Force ST ^r (3)	3 to 4 oz/cwt seed	Follow manufactures' guidelines for rates, application methods grazing and crop rotation restrictions. Rotation of insecticides during successive years is suggested.
	<u>Planting Time</u>		
	Aztec 2.1G ^r (1B,3)	6.7 fl oz/1000 ft-row	(Other names include Annex, Bifenture, and Empower)
	Capture 1.5G ^r (3)	3.2 to 8 oz/1000 ft-row	
	Capture LFR ^r (3)	0.2-0.39 fl oz/1000 ft-row in-furrow or band	
	Capture 2EC ^r (3)	0.3 fl oz/1000 ft-row	
	Counter 15G ^r (1B)	6 to 8 oz/1000 ft-row	
	Force 3G ^r (3) Force CS ^r	4 to 5 oz/1000 ft-row 0.46-0.57 fl oz/1000 ft-row	
	Fortress 2.5G	6.0 to 7.5 oz/1000 ft-row	
	Lorsban 15G ^r (1B)	8 oz/1000 ft-row	
	Proaxis 0.5 CS ^r (3)	0.66 fl oz/1000 ft-row	
Regent 4SC ^r (2B)	0.24 oz/1000 ft-row		
Warrior w Zeon ^r (3)	0.66 fl oz/1000 ft-row		

^r = Restricted Use

MOA Group Tables start on page 46 of the handbook.

CORN INSECT CONTROL SUGGESTIONS (CONT'D)

Pre-harvest Intervals and grazing restrictions

Ambush	Apply prior to brown silk stage. 30 day PHI for grazing or harvest
Asana XL	21 day PHI for harvest or grazing
Aztec 2.1G	Do not exceed 7.3 lb per acre per crop season
Baythroid XL	21 day waiting period for grain or fodder, 0 days for green forage.
Capture 2EC, 1.5 G, LFR	30 day PHI for harvest or grazing
Cobalt	21 day waiting period for harvest, 14 days for grazing or silage
Comite II	Apply in a minimum of 20 gal of water/acre ground, 5 gal by air
Counter 15G	Check label for precautions regarding application of Counter 15G and its interaction with ALS inhibiting herbicides.
Cruiser 5FS	no grazing restriction
Delta Gold	1 day PHI for green forage, 21 day for harvest or fodder
Dimethoate	Apply by aircraft. 14 day PHI for harvest or grazing
Force 3G, CS	30 day crop rotation restriction
Fortress 2.5 G	30 day crop rotation restriction
Furadan 4F	30 day PHI for harvest or grazing
Intrepid	0 day for green forage, 21 day PHI for harvest or fodder
Lorsban 4E	35 day PHI for harvest, do not graze or use for silage
Malathion	5 day PHI for harvest or grazing
Methyl parathion	12 day PHI for harvest or grazing
Methomyl	3 days for forage, 21 day PHI for harvest or grazing
Mustang Max	30 day PHI for harvest, 60 days for grazing
Poncho	45 day PHI for harvest or grazing
Pounce 3.2	Use prior to ear formation only. 30 day PHI for harvest or grazing
Proaxis	21 day PHI for harvest or grazing
Regent	90 day PHI for harvest or grazing
Sevin XLR	14 day PHI for grazing, 48 days for harvest
Tracer	Do not apply more than 6 fl oz per acre per year.
Warrior	21 day PHI for harvest or grazing

* Numbers in parentheses (#) that follow the insecticide name are used to designate the mode of action of the insecticide according to the classification system developed by the Insecticide Resistance Action Committee, (IRAC) in 2005. It is intended to help in the selection of insecticides for preventative resistance management. If you make multiple applications for a specific pest during a growing season, simply select a registered insecticide with a different number for each application. To further delay resistance from developing, integrate other control methods into your pest management programs.

This section was not revised in 2008.

CORN WEED CONTROL

Estimated Levels of Weed Control Normally Expected with Corn Herbicides ^a

Herbicide	Winter Annuals					Summer Broadleaves										Summer Grasses										General or Restricted Use
	Brome grass	Carolina geranium	Chickweed	Henbit	Italian ryegrass	black nightshade	cocklebur	common ragweed	giant ragweed	jimsonweed	lambsquarters	morningglory	pigweed	smartweed	velvetleaf	barnyardgrass	fall panicum	giant foxtail	johnsongrass seedling	johnsongrass rhizome	large crabgrass	yellow foxtail	shattercane	yellow nutsedge		
<i>Burndown (POST)</i>																										
2,4-D	0	5	7	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.
Field Master	9	7	9	8	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Res.
Gramoxone Max	6	6	9	7	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Res.
Roundup Original Max	9	6	9	8	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.
RT Master	9	7	9	8	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Res.
Surefire	6	6	9	7	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Res.
<i>Soil-applied (EPP,PPI, PRE)</i>																										
Atrazine	-	-	-	-	-	9	9	9	8	9	9	9	9	9	8	8	3	7	0	0	5	7	0	7	Res.	
Axiom DF	-	-	-	-	-	7	3	7	3	6	9	3	9	6	7	9	8	9	8	0	9	9	5	5	Gen.	
Balance Pro	-	-	-	-	-	9	2	9	6	9	9	4	9	8	9	8	8	8	-	-	6	8	5	-	Res.	
Bicep II Magnum, Cinch ATZ	-	-	-	-	-	9	9	9	7	8	9	9	9	8	8	9	9	9	6	5	9	9	6	8	Res.	
Broadstrike+Dual	-	-	-	-	-	9	7	8	5	7	9	5	9	9	8	9	9	9	6	5	9	9	6	9		
Bullet	-	-	-	-	-	9	9	9	8	9	9	9	9	9	8	9	9	9	5	5	9	9	6	8	Res.	
Callisto	-	-	-	-	-	9	5	7	6	-	9	6	9	9	9	3	3	3	0	0	6	3	0	0	Gen.	
Camix	-	-	-	-	-	9	5	7	6	6	9	6	9	9	9	9	9	9	6	5	9	9	6	8	Gen.	
Define	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0	9	8	9	8	0	9	9	5	-	Gen.	
Degree Xtra	-	-	-	-	-	9	9	9	8	9	9	9	9	9	8	9	6	8	3	3	6	8	3	8	Res.	
Dual II Magnum, Cinch	-	-	-	-	-	8	0	5	5	5	6	0	9	5	0	9	9	9	6	5	9	9	6	8	Gen.	
Epic	-	-	-	-	-	9	3	9	6	9	9	4	9	8	9	9	8	8	8	-	9	8	5	-	Res.	
Expert	-	-	-	-	-	9	9	9	9	9	9	9	9	8	8	9	9	9	6	5	9	9	6	8	Res.	
Field Master	-	-	-	-	-	9	9	9	9	9	9	8	9	9	8	9	9	9	9	9	9	9	9	7	Res.	
Guardsman Max	-	-	-	-	-	9	8	8	6	8	8	8	9	8	6	9	9	9	6	5	9	9	5	8	Res.	
Harness/Surpass/TopNotch/Degree	-	-	-	-	-	8	5	7	5	5	8	5	9	5	6	9	9	9	5	5	9	9	6	8	Res.	
Harness Xtra/Fultime	-	-	-	-	-	9	9	9	8	9	9	9	9	9	8	9	9	9	5	5	9	9	6	8	Res.	
Hornet WDG	-	-	-	-	-	9	8	8	7	8	9	6	9	9	8	0	0	0	0	0	0	0	0	4	Gen.	
Lumax	-	-	-	-	-	9	9	9	8	9	9	9	9	9	9	9	9	9	6	5	9	9	6	8	Res.	
Micro-Tech	-	-	-	-	-	9	0	5	5	5	7	0	9	5	0	9	9	9	5	5	9	9	6	8	Res.	
Outlook	-	-	-	-	-	9	0	6	5	5	7	5	9	5	0	9	9	9	6	5	9	9	5	8	Gen.	
Princep	-	-	-	-	-	9	8	9	9	9	9	8	9	9	7	7	8	8	0	0	7	8	6	4	Gen.	
Prowl (PRE only)	-	-	-	-	-	5	5	5	5	5	9	5	9	5	6	9	9	9	8	4	9	9	8	3	Gen.	
Pursuit (Clearfield corn)	-	-	-	-	-	9	8	7	6	7	8	6	9	9	8	7	6	7	7	5	6	6	6	5	Gen.	
Python	-	-	-	-	-	8	7	8	5	8	9	6	9	9	8	0	0	0	0	0	0	0	0	0	Gen.	
Shotgun	-	-	-	-	-	9	9	9	8	9	9	9	9	9	8	8	3	7	0	0	5	7	0	7	Res.	
<i>Foliar-applied (POST)</i>																										
2,4-D	-	-	-	-	-	8	9	9	9	7	9	9	9	7	8	0	0	0	0	0	0	0	0	0	Gen.	
Accent	-	-	-	-	-	5	6	5	5	8	5	8	8	8	6	8	8	8	9	9	4	8	9	5	Gen.	
Accent Gold	-	-	-	-	-	6	8	8	8	8	6	8	8	8	8	5	5	5	6	6	3	5	6	3	Gen.	
Aim	-	-	-	-	-	8	7	6	2	6	8	8	8	5	9	0	0	0	0	0	0	0	0	0	Gen.	
Atrazine+oil	-	-	-	-	-	9	9	9	8	9	9	9	9	9	8	8	5	7	0	0	6	7	0	7	Res.	
Banvel, Clarity, Distinct	-	-	-	-	-	9	9	9	9	8	9	9	9	9	9	0	0	0	0	0	0	0	0	0	Gen.	
Basagran	-	-	-	-	-	5	9	7	8	9	5	7	5	9	9	0	0	0	0	0	0	0	0	8	Gen.	
Basis	-	-	-	-	-	0	7	5	3	4	8	4	8	9	8	7	8	8	4	0	6	8	8	4	Gen.	
Basis Gold	-	-	-	-	-	7	8	8	7	8	8	7	9	9	7	8	8	9	7	6	7	8	8	5	Res.	
Beacon	-	-	-	-	-	7	7	9	9	7	5	5	7	7	7	7	8	7	8	7	5	5	9	5	Gen.	

This section was not revised in 2008.

CORN WEED CONTROL

Estimated Levels of Weed Control Normally Expected with Corn Herbicides ^a

Herbicide	Winter Annuals					Summer Broadleaves										Summer Grasses										General or Restricted Use	
	Brome grass	Carolina geranium	Chickweed	Henbit	Italian ryegrass	black nightshade	cocklebur	common ragweed	giant ragweed	jimsonweed	lambsquarters	morningglory	pigweed	smartweed	velvetleaf	barnyardgrass	fall panicum	giant foxtail	johnsongrass seedling	johnsongrass rhizome	large crabgrass	yellow foxtail	shattercane	yellow nutsedge			
Buctril, Moxy	-	-	-	-	-	9	9	9	7	9	9	8	7	9	8	0	0	0	0	0	0	0	0	0	0	Gen.	
Buctril + Atrazine	-	-	-	-	-	9	9	9	8	9	9	9	8	9	8	5	3	4	0	0	3	4	0	4	4	Res.	
Callisto	-	-	-	-	-	9	-	8	9	-	9	7	8	9	9	0	0	0	0	0	9	0	0	5	5	Gen.	
Celebrity Plus	-	-	-	-	-	9	9	9	9	8	9	9	9	9	9	5	5	5	6	6	3	5	6	3	3	Gen.	
Equip Corn	-	-	-	-	-	9	8	8	8	8	8	6	9	8	8	8	7	9	9	8	7	7	9	3	3	Gen.	
Exceed	-	-	-	-	-	8	9	9	9	8	7	9	9	9	9	0	7	5	8	5	0	5	9	6	6	Gen.	
Expert (RR Corn)	-	-	-	-	-	9	9	9	9	9	9	8	9	9	8	9	9	9	9	9	9	9	9	8	8	Res.	
Guardsman Max	-	-	-	-	-	9	9	9	8	9	9	9	9	9	8	8	5	7	0	0	6	7	0	7	7	Res.	
Landmaster BW (RR Corn)	-	-	-	-	-	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	7	7	Gen.	
Liberty (Liberty Link Corn)	-	-	-	-	-	8	9	9	9	9	7	8	8	9	8	7	7	8	8	7	8	7	8	4	4	Gen.	
Liberty AZT (Liberty Link Corn)	-	-	-	-	-	9	9	9	9	9	8	9	8	9	8	8	7	8	8	7	8	7	8	5	5	Res.	
Lighting (Clearfield Corn)	-	-	-	-	-	9	9	7	7	8	8	7	9	9	9	8	8	9	9	7	7	8	9	6	6	Gen.	
Lumax	-	-	-	-	-	9	9	9	9	9	9	9	9	9	9	8	5	7	0	0	9	0	0	7	7	Res.	
Marksman	-	-	-	-	-	9	9	9	9	8	9	9	9	9	9	8	5	7	0	0	6	7	0	7	7	Res.	
Northstar	-	-	-	-	-	9	9	9	9	8	9	9	9	9	9	5	6	6	7	6	4	4	7	4	4	Gen.	
Option	-	-	-	-	-	8	7	7	5	8	7	5	8	6	8	8	8	9	9	8	7	7	9	3	3	Gen.	
Permit	-	-	-	-	-	4	9	8	8	7	4	6	9	7	8	0	0	0	0	0	0	0	0	9	9	Gen.	
Ready Master ATZ (RR Corn)	-	-	-	-	-	9	9	9	9	9	9	9	9	9	8	9	9	9	9	9	9	9	9	7	7	Gen.	
Resource	-	-	-	-	-	4	7	7	5	7	7	5	7	4	9	0	0	0	0	0	0	0	0	0	0	0	Gen.
Roundup Original Max (RR Corn)	-	-	-	-	-	9	9	9	9	9	9	8	9	9	8	9	9	9	9	9	9	9	9	7	7	Gen.	
Shotgun	-	-	-	-	-	9	9	9	9	9	9	9	9	9	8	8	5	7	0	0	6	7	0	7	7	Res.	
Spirit	-	-	-	-	-	7	8	8	8	8	7	6	8	8	8	0	7	5	8	5	0	5	9	6	6	Gen.	
Steadfast	-	-	-	-	-	5	6	5	5	8	5	8	8	8	6	8	8	8	9	9	7	8	9	5	5	Gen.	
Steadfast ATZ	-	-	-	-	-	9	9	9	8	9	8	9	9	9	8	8	8	8	9	9	6	8	9	7	7	Res.	
Stinger	-	-	-	-	-	9	9	9	9	9	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	Gen.
Yukon	-	-	-	-	-	9	9	9	9	8	9	9	9	9	9	0	0	0	0	0	0	0	0	9	9	Gen.	

^a Rating scale: 0 no control; 5 or less poor; 6 poor-fair; 7 fair; 8 fair-good; 9 good. Ratings assumes the herbicides are applied in the manner suggested in the guidelines and according to the label under optimum growing conditions. This information was compiled from weed control ratings from trials conducted within Oklahoma and from universities across the US.

This section was not revised in 2008.

CORN WEED CONTROL (CONT'D)

Rotational Cropping Restrictions in Months for Corn Herbicides

Herbicide	Crop							
	Alfalfa	Canola	Corn	Cotton	Peanut	G. Sorghum	Soybean	Wheat
<i>Burndown (POST)</i>								
2,4-D	1	1	0	1	1	1	1	1
Field Master	a	a	0	a	a	0	a	a
Gramoxone Max	0	0	0	0	0	0	0	0
Roundup Original Max	0	0	0	0	0	0	0	0
RT Master	1	1	0	1	1	1	0	1
Surefire	b	b	b	b	b	b	b	b
<i>Soil-applied (EPP,PPI, PRE)</i>								
Atrazine	a	a	0	a	a	0	a	a
Axiom DF	1	1	0	1	1	1	0	1
Balance Pro	10 ^c	18 ^c	0	18 ^c	18 ^c	6	6	4
Bicep II Magnum, Cinch ATZ	b	b	0	c	c	c	c	24
Broadstrike+Dual	b	b	b	b	b	b	b	b
Bullet	b	b	b	b	b	b	b	b
Callisto	18	c	0	c	18	c	c	4
Camix	d	d	0	c	d	c	c	4.5
Define	12	12	0	4	12	12	0	12
Degree Xtra	b	b	0	b	b	0	0	0
Dual II Magnum, Cinch	4	b	0	0	0	0	0	4.5
Epic	12	b	0	6	b	12	6	12
Expert	b	b	0	c	c	c	c	24
Field Master	a	a	0	a	a	0	a	a
Guardman Max	d	d	0	c	c	0	c	d
Harness/Surpass/TopNotch/De	b	b	0	b	b	0	c	4
Harness Xtra/Fultime	d	d	c	d	d	c	c	15
Hornet WDG	18 ^b	26	0	18	18	12	10.5 ^b	4
Lumax	18	18	0	c	c	c	c	4.5
Micro-Tech	b	b	b	b	b	b	b	b
Outlook	b	b	0	0	0	0	0	4
Princep	b	b	b	b	b	b	b	b
Prowl	c	c	0	0	0	c	0	4
Pursuit	4	e	18.5 ^f	18.5	0	18.5	0	4
Python	4	26 ^g	0	18	4	12	0	4
Shotgun	a	a	0	a	a	0	a	a
<i>Foliar-applied (POST)</i>								
2,4-D	1	1	0	1	1	1	1	1
Accent	12	h	0	10	h	i	0.5	4
Accent Gold	10.5 ^j	26 ^g	0	26 ^g	26 ^g	12	10.5	4
Aim	12	12	0	0	12	0	0	0
Atrazine+oil	a	a	0	a	a	0	a	a
Banvel, Clarity, Distinct	b	b	b	b	b	b	b	b
Basagran	b	b	b	b	b	b	b	b
Basis	10/18 ^k	18/18 ^k	0/0 ^k	18/18 ^k	18/18 ^k	10/18 ^k	0.5/10 ^k	4/4 ^k

This section was not revised in 2008.

CORN WEED CONTROL (CONT'D)

Rotational Cropping Restrictions in Months for Corn Herbicides

Herbicide	Crop							
	Alfalfa	Canola	Corn	Cotton	Peanut	G. Sorghum	Soybean	Wheat
Basis Gold	18	18	0	10	18	10	10	10
Beacon	8	18	0.5 ^f	8	8	8	8	3
Buctril, Moxy	1	1	1	1	1	1	1	1
Buctril + Atrazine	c	c	1	c	c	1	1	c
Callisto	18	c	0	c	18	c	c	4
Celebrity Plus	b	b	b	b	b	b	b	b
Equip Corn	18	18	0.5	9	18	9	9	2
Exceed	18m	10m	1 ^f	10m	b	10m	10m	3m
Expert	b	b	0	c	c	c	c	24
Guardman Max	d	d	0	c	c	0	c	d
Landmaster BW	0	0	0	0	0	0	0	0
Liberty	4	4 ⁱ	4 ⁱ	4 ⁱ	4	2.5	4	2.5
Liberty AZT	a	a	0	a	a	0	a	a
Lighting	9.5	40	8.5 ^f	18	9.5	18	9.5	4
Lumax	18	18	0	c	c	c	c	4.5
Marksman	a	a	0	a	a	0	a	a
Northstar	8	18	0.5 ^f	8	8	8	8	3
Option	2	2	0.25	2	2	2	0.5	2
Permit	9	15	1 ^f	4	6	2	9	2
Ready Master ATZ	a	a	0	a	a	0	a	a
Resource	b	b	1	b	b	b	1	4
Roundup Original Max	0	0	0	0	0	0	0	0
Shotgun	a	a	0	a	a	0	a	a
Spirit	18 ^m	10 ^m	1 ^{fm}	10 ^m	18 ^m	10 ^m	10 ^m	3 ^m
Steadfast	10 ⁿ	10 ⁿ	0	10	10 to 18 ^b	10 to 18 ^b	0.5	4
Steadfast ATZ	18	18	0	10	18	10	10	10
Stinger	10.5 ^b	0	0	b	b	10.5	18 ^b	0
Yukon	9	15	1 ^f	4	6	2	9	2

^a If planted the following year, there is a possibility for crop injury.

^b See label for specific crop rotation restrictions.

^c May be planted the following cropping season.

^d May be planted after two complete growing seasons.

^e Only Clearfield or Sumner Canola varieties can be planted the year following a Pursuit application.

^f Clearfield corn hybrids can be planted anytime.

^g Must conduct a successful bioassay before planting.

^h Ten months for pH less than or equal to 6.5 and 18 months for pH greater than 6.5.

ⁱ Ten months for pH less than or equal to 7.5 and 18 months for pH greater than 7.5.

^j Unless soil pH is greater than 8.0, then 12 months.

^k First listed interval is for 1/3 oz/A rate, second interval is for 1/3-1 oz/A rate.

^l Unless planting Liberty varieties, then 0 months.

^m Based on soil pH below 7.8, if soil pH is greater than 7.8 see label.

ⁿ Unless less than 15 inches of rainfall have been received after application then restriction is 18 months.

This section was not revised in 2008.

CORN WEED SUGGESTIONS

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
<p>2,4-D Amine 4 3.8 lb ai per gallon</p> <p>EPP applications: 1 to 2 pt/A</p> <p>POST applications: 1 to 1.5 pt/A</p>	<p>Active Ingredient: 2,4-D</p> <p>Similar Products: Many</p> <p><u>Rates may vary due to formulation</u></p> <p>MOA: 4</p>	<p>EPP. Apply 7 to 14 days before planting to control existing weeds. Must wait at least 7 days after application before planting.</p> <p>POST. Apply POST to actively growing weeds when corn is no more than 8 inches in height, otherwise use drop nozzles and keep spray off corn foliage.</p>	<p>Do not graze or harvest for forage or fodder within 7 days of application. Do not use on light, sandy soils or where soil moisture is low. Do not apply near sensitive species, such as soybeans, or where herbicide spray can drift onto sensitive crops.</p> <p>POST applications. Do not spray corn in the tassel to dough stage. Corn treated with 2,4-D POST may become temporarily brittle and subject to stalk breakage by wind and/or cultivation.</p>
<p>Accent 75% WDG</p> <p>POST applications: 0.67 to 1.33 oz/A</p>	<p>Active Ingredient: Nicosulfuron</p> <p>Similar Products: None</p> <p>MOA: 2</p>	<p>POST. Apply POST to weeds and to corn that has 6 or fewer collars but not taller than 20 inches in height. If 20 inches or taller see label.</p>	<p>See label for compatibility with soil insecticides. Must use a 1% crop oil concentrate or 0.25% to 0.5% nonionic surfactant. Before tank mixing with other products or applying within 7 days of other chemical applications, consult the label.</p>
<p>Accent Gold 83.8% WDG</p> <p>POST applications: 2.9 oz product/A</p>	<p>Active Ingredient: Clopyralid Flumetsulam Nicosulfuron Rimsulfuron</p> <p>Similar Products: Accent Gold WDG</p> <p><u>Rates may vary due to formulation.</u></p> <p>MOA: 2 & 4</p>	<p>POST. Apply postemergence to weeds when corn is no more than 12 inches tall and before it exhibits 6 leaf collars.</p>	<p>Do not make more than one application of Accent Gold per season. Do not apply to corn hybrids with a Relative Maturity rating less than 88 days. Do not apply to corn grown for seed, popcorn, or sweet corn. Do not use less than 2.9 oz of product per acre. Do not use on fields previously treated with Broadstrike+Dual, Hornet, Scorpion III, or Stinger in the same season. Do not tank mix with Basagran, Laddox, products containing 2,4-D, or foliar-applied organophosphate insecticides. Do not graze corn or harvest for grain, forage, hay, or straw within 85 days of application. See label for compatibility with soil insecticides. Must be applied with COC and ammonium nitrogen fertilizer. Do not apply through any type of irrigation system.</p>
<p>Aim 2 EW or 2 EC</p> <p>POST applications: 0.5 fl. Oz</p>	<p>Active Ingredient: Carfentrazone</p> <p>Similar Products: Avalanche Bulk Pak</p> <p>MOA: 14</p>	<p>EPP. Aim may be tankmixed with other burndown herbicides like glyphosate, 2,4-D to enhance burndown performance prior to planting.</p> <p>POST. Apply POST to most weeds 1 to 4 inches tall (velvetleaf to 36") and to corn up to the 8 leaf collar growth stage. May be applied in all tillage systems from 30 days before planting up to 8 leaf collar growth stage.</p>	<p>Apply with 0.25% NIS with at least 80% active ingredient strength, or COC at 1% v/v. Crop oil concentrate is recommended for improved performance under dry, stressed weed conditions. Consult label for recommended tank mix partners and directions. Do not apply more than 1.9 fl. Oz/season.</p>

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Atrazine^F 4 lb ai per gallon SOIL applications: See table. POST applications: up to 4 pt /A of Atrazine 4L	Active Ingredient: Atrazine Similar Products: AAtrax 4L, AAtrax Nine-O and Many Others <u>Rates may vary due to formulation.</u> MOA: 5	PPI. Apply up to 14 days prior to planting and incorporate 1 to 2 inches. PRE. Apply after planting but before crop and weeds emerge. POST. Apply before weeds exceed 1.5 inches and before crop reaches 12 inches.	POST. Apply with emulsifiable oil or oil concentrate. Any Application Timing. Do not apply more than 2.5 lb atrazine/A in a calendar year. Do not apply more than 1.6 lb atrazine/A/application on highly erodible soils with less than 30% residue cover. Do not apply more than 2 lb atrazine/A/application on non-highly erodible soils or on highly erodible soils with at least 30% residue cover.

EPP, PPI, & PRE Applications	AAtrax 4L Use Rates (pt/A)		
	Soil Erodibility	Ground Cover at Planting	
		at least 30%	less than 30%
Non-highly Erodible	4 pt	4 pt	
Highly Erodible	4 pt	3.2 pt	

Trade Name, Formulation, and Application Rate	Active Ingredients, Similar Products and MOA	Application Timing(s)	Special Instructions and Remarks
Axiom DF^F 68% DF SOIL applications: See table.	Active Ingredients: Flufenacet Metribuzin Similar Products: None MOA: 5 & 15	EPP. Apply up to 45 days before planting. PPI. Apply up to 14 days before planting and incorporate in the top 1 to 2 inches of soil. PRE. Apply before weeds emerge or tank mix with a non-selective herbicide.	Do not apply more than 23 oz/A per season. Do not plant corn less than 1 to 1.5 inches deep. Do not apply aerially. Do not apply to popcorn, or sweet corn. See label for recommended sequential applications.

EPP, PPI, & PRE Applications	Axiom (68% DF) Use Rates (oz/A) in <u>Conventional Tillage Applications Made Within Two Weeks Prior to Planting^a</u>				
	Soil Textural Group ^b	Soil Organic Matter Content			
		< 0.5%	0.5 to 1%	1 to 1.5%	1.5 to 3%
Coarse	8 oz	8 to 10 oz	10 to 12 oz	13 oz	15 oz
Medium	10 to 15 oz		15 to 18 oz		17 to 20 oz
Fine	20 to 22 oz				20 to 23 oz
a. Use next higher rate under heavy surface residue, heavy weed pressures, or when soil OM is at the upper end of range. If soil pH is >7.4, use the lower rate of the rate range shown.					
b. For more information refer to the "Rate Selection/Soil Texture" section of the label.					

EPP, PPI, & PRE Applications	Axiom (68% DF) Use Rates (oz/A) in <u>Conservation, Minimum, and No-till Systems; or Conventional Tillage System Applications Made Greater Than Two Weeks Prior to Planting^a</u>				
	Soil Textural Group ^b	Soil Organic Matter Content			
		< 0.5%	0.5 to 1%	1 to 1.5%	1.5 to 3%
Coarse	9 oz	9 to 11 oz	11 to 13 oz	14 oz	16 oz
Medium	11 to 18 oz		18 to 20 oz		19 to 22 oz
Fine	20 to 23 oz				
a. Use next higher rate under heavy surface residue, heavy weed pressures, or when soil OM is at the upper end of range. If soil pH is >7.4, use the lower rate of the rate range shown.					
b. For more information refer to the "Rate Selection/Soil Texture" section of the label.					

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Balance Pro 4 lb ai per gallon SOIL applications: See table. For tank mix rates see label.	Active Ingredient: Isoxaflutole Similar Products: Balance WDG MOA: 28	EPP. When followed by planned POST herbicide, apply up to 30 days before planting else, apply 21 days before planting. Consult label for burn down of existing weeds. PPI. When following with a planned POST herbicide, apply up to 30 days prior to planting else, apply 21 days prior to planting and incorporate no more than 2" deep. PRE. Apply after planting but before crop emergence.	Read and observe all environmental precautions in label. Do not irrigate Balance into coarse soils at planting when soils are saturated. Do not apply after corn emergence. Do not incorporate with a drag harrow after planting. Do not plant corn less than 1.5 inches deep. Do not apply more than 4.5 fl oz of Balance/A/season. Not recommended for soils with less than 1.5% OM and pH greater than 7.5. Completely cover corn seed and close seed furrow. Do not apply through any type of irrigation system.

EPP, PPI, & PRE Applications	Balance Pro Use Rates (fl oz/A) When Applied Alone as Part of a Planned Sequential Weed Control Program^a						
	Application Timing	Soil Texture					
		Coarse Soils ^b		Medium Soils ^c		Fine Soils	
		<1.5% OM	>1.5% OM	<1.5% OM	>1.5% OM	<1.5% OM	>1.5% OM
	8-30 days before planting	Not recommended	2.25 to 3.0	3.0 to 3.75	3.0 to 3.75	3.75 to 4.5	3.75 to 4.5
	0-7 days before planting or PRE	Not recommended	1.5 to 1.88	1.88 to 2.6	2.25 to 3.0	2.25 to 3.0	2.25 to 3.75
a. Within rate ranges, use lower rate on soils that are relatively coarse textured or low in OM, and use higher rate on soils that are relatively fine-textured or high in organic matter or when preplant application is made further from planting.							
b. Not recommended for coarse soils with less than 1.5% OM or pH greater than 7.5.							
c. When applied preemergence to medium soils with pH greater than 7.5, reduce the rate by 0.25 fl oz/A.							

EPP, PPI, & PRE Applications	Balance Pro Use Rates (fl oz/A)^a When Applied in a Tank Mix with Other Soil-applied Herbicides						
	Application Timing ^c	Soil Texture					
		Coarse Soils ^b		Medium Soils ^b		Fine Soils	
		<1.5% OM ^d	>1.5% OM	<1.5% OM	>1.5% OM	<1.5% OM	>1.5% OM
	EPP or PPI; applied 8 to 21 days before planting	Not recommended	1.5 to 3.0	2.25 to 3.75	3.0 to 3.75	3.75 to 4.5	3.75 to 4.5
	EPP, PPI, or PRE; applied 0-7 days before planting	Not recommended	1.5 to 1.88	1.88 to 2.76	2.25 to 3.0	2.25 to 3.0	2.25 to 3.0
a. Potential tank mix partners include, but not limited to: Dual, Dual II, Dual II Magnum, Frontier, Harness, Lasso, Surpass, and Topnotch.							
b. When applied preemergence to medium soils with pH greater than 7.5, reduce the rate by 0.25 fl oz/A.							
c. Balance Pro may be applied up to 30 days before planting when used in a planned sequential application program.							
d. Not recommended for coarse soils with less than 1.5% OM or pH greater than 7.5.							

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Basagran 4 lb ai per gallon POST applications: 1 to 3 pt/A	Active Ingredients: Bentazon Similar Products: None MOA: 6	POST. Apply POST to actively growing weeds within the size limits on the label.	Do not apply more than 4 pt Basagran/A/season or more than 2 lb bentazon/A/season. Do not apply Basagran to corn that is stressed due to environmental and/or previous herbicide applications. Do not graze treated fields for at least 12 days after treatment. Include 1.25% oil concentrate and/or 2.5 to 5% UAN in the application.
Basis 75% WDG EPP & PRE applications: 0.33 to 1.0 oz/A POST applications: 0.33 oz/A	Active Ingredients: Rimsulfuron, Thifensulfuron methyl Similar Products: None MOA: 2	EPP. Apply up to 30 days before planting but before corn emerges. PRE. Apply after planting but before corn emerges. POST. Apply POST to 1 to 2 inch weeds and to corn from spike through the 4-leaf (2-collar) stage.	Do not apply to popcorn, sweet corn, or field corn grown for seed. Do not apply more than 1 oz/A in a 12 month period. If using over 0.62 oz/A Basis, do not follow with POST application of Accent Gold or Basis Gold. Do not use liquid fertilizer as the total carrier solution. See label for compatibility with soil insecticides. Do not tank mix with Basagran, Laddok, Beacon, or any ALS inhibiting herbicides (unless listed on the label), or apply these materials within 7 days before or 3 days after a Basis application. Application must include 1% to 2% crop oil concentrate or 0.25% to 0.5% nonionic surfactant and an ammonium nitrogen fertilizer for burndown of emerged weeds.
Basis Gold 89.46% WDG POST applications: 14 oz/A	Active Ingredients: Nicosulfuron, Rimsulfuron, Atrazine Similar Products: None MOA: 2 & 5	POST. Apply POST to weeds and to corn that has 6 or fewer collars but not taller than 12 inches in height.	Do not apply to corn hybrids with a relative maturity rating less than 88 days. Do not apply to popcorn, sweet corn, or corn grown for seed. Do not use liquid fertilizer as the total carrier solution. See label for compatibility with soil insecticides. Do not tank mix with Basagran, Laddok, 2,4-D, or any foliar-applied organophosphate insecticide, or apply these materials within 7 days before or 3 days after a Basis application. Application must include 1% to 2% crop oil concentrate and the addition of 1 to 2 qt/A ammonium nitrogen fertilizer. Do not apply more than 2.5 lb atrazine/A in a calendar year. Do not apply more than 1.6 lb atrazine/A/application on highly erodible soils with less than 30% residue cover. Do not apply more than 2 lb atrazine/A/application on non-highly erodible soils or on highly erodible soils with at least 30% residue cover.
Beacon 75% WDG POST applications: 0.76 oz/A	Active Ingredients: Primisulfuron Similar Products: None MOA: 2	POST. Apply POST to actively growing weeds when the corn is 4 to 20 inches tall. Use drop nozzles from 20 inches until tassel emergence.	Do not use on sweet corn or ornamental corn. Do not apply with tank mixtures of Poast or Poast Plus. Do not graze or feed forage within 30 days after application. Do not harvest for silage within 45 days after application. Do not harvest for grain within 60 days after application. Do not apply after tassel emergence. See label for restrictions concerning organophosphate insecticides. Apply with a crop oil concentrate or nonionic surfactant.

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Bicep II Magnum^f 5.5 lb ai per gallon SOIL applications: See tables. POST applications: See table. POST-directed applications: See table.	Active Ingredients: Metolachlor Atrazine Similar Products: Bicep Lite II Magnum Bicep II Magnum FC Cinch ATZ <u>Rates may vary due to formulation.</u> MOA: 5 & 15	EPP. Apply up to 45 days before planting. PPI. Apply up to 14 days before planting and incorporate in the top 2 inches of soil. PRE. Apply to the soil surface after planting but before crop or weeds emerge. POST. Apply before weeds exceed 2 leaf stage and before corn exceeds 5 inches tall. POST-directed. Apply POST before corn reaches 12 inches in height and before weeds exceed the 2 leaf stage. Minimize herbicide contact with corn leaves.	Do not apply Bicep II to course textured soils more than 2 weeks prior to planting. Do not apply more than 2.5 lb atrazine/A in a calendar year. Do not apply more than 1.6 lb atrazine/A/application on highly erodible soils with less than 30% residue cover. Do not apply more than 2 lb atrazine/A/application on non-highly erodible soils or on highly erodible soils with at least 30% residue cover. Do not exceed 1.9 lb ai metolachlor/A on fine textured soils with more than 3% OM. Do not exceed 1.6 lb ai metolachlor/A on medium, or fine textured soils with less than 3% OM. Do not apply POST or POST-directed in liquid fertilizer, or severe crop injury may occur. Do not graze or feed forage from treated areas for 30 days following application. Do not exceed 3.25 qt/A on a crop.

EPP Applications	Bicep II Magnum^f Use Rates (qt/A)			
	Soil Texture	Single Application	Split Application ^a	
			30 – 45 Days Before Planting	At Planting
	Coarse – sand, loamy sand, and sandy loam	2.1	Do Not Apply	
	Medium – loam, silt loam, and silt	2.1 ^b	1.4	0.7
		2.1 to 2.6 ^c	1.4 to 1.75	0.7 to 0.9
	Fine – sandy clay loam, silty clay loam, clay loam, sandy clay, silty clay, clay	2.1 ^b	1.4	0.7
		2.6 ^c	1.75	
a. Split applications can be made less than 30 days before planting if desired.				
b. Do not exceed this rate on highly erodible land with less than 30% plant residue cover. Control or certain weeds may be reduced, and a tank-mix partner or an application of a postemergence herbicide may be needed.				
c. Use these rates for all other applications.				

PPI & PRE Applications	Bicep II Magnum^f Use Rates (qt/A)		
	Soil Texture	Less Than 3% OM	3% OM or More
	Coarse – sand, loamy sand, and sandy loam	1.3	1.6
	Medium – loam, silt loam, and silt	1.6	2.1
	Fine – sandy clay loam, silty clay loam, clay loam, sandy clay, silty clay, clay	2.1	2.1 ^a
			2.1 to 2.6 ^{bc}
	Muck or Peat soils (more than 20% OM)	Do Not Use	
a. Do not exceed this rate on highly erodible land (HEL) with less than 30% plant residue cover.			
b. Use these rates for all other applications.			
c. For cocklebur, yellow nutsedge, and velvetleaf control on fine-textured soils above 3% OM, apply 3.0 qt/A Bicep II.			

POST Applications	Bicep II Magnum^f Use Rates (qt/A)	
	Soil Texture	Broadcast Rate Per Acre
	Coarse – sand, loamy sand, and sandy loam	1.6
	Medium – loam, silt loam, and silt	2.1
	Fine – sandy clay loam, silty clay loam, clay loam, sandy clay, silty clay, clay	2.1 to 2.6 ^a
a. For cocklebur, yellow nutsedge, and velvetleaf control on fine-textured soils above 3% OM, apply 2.6 qt/A.		

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

POST-directed Applications	Bicep II Magnum ^r Use Rates (qt/A)	
	Soil Texture	Broadcast Rate Per Acre
	Coarse – sand, loamy sand, and sandy loam	1.3
	Medium – loam, silt loam, and silt	2.1
	Fine – sandy clay loam, silty clay loam, clay loam, sandy clay, silty clay, clay	2.1 to 2.6 ^a
a. For cocklebur, yellow nutsedge, and velvetleaf control on fine-textured soils above 3% OM, apply 2.6 qt/A.		

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Buctril 2 lb ai per gallon POST applications: 1 to 2 pt/A	Active Ingredients: Bromoxynil Similar Products: Buctril 4 EC Connect 20 WSP Moxy 2 EC <u>Rates may vary due to formulation</u> MOA: 6	POST. Apply to actively growing weeds, after corn emergence, but prior to tassel emergence.	Do not apply to seed corn inbreds before the 3 leaf stages as excessive leaf burn may occur. Do not harvest for feed or fodder, or graze within 45 days after application. Do not exceed 2 pt/A/season. Use of an adjuvant or liquid fertilizer may cause leaf burn.
Buctril+atrazine 3 lb ai per gallon POST applications: 1.5 to 3 pts/A. Rate is based on weed pressure and weed size. See label for specific weeds.	Active Ingredients: Bromoxynil Atrazine Similar Products: None MOA: 6 & 5	POST. Apply to actively growing weeds, after corn emergence, but prior to corn reaching 12 inches in height.	Do not apply with liquid fertilizer or spray additives if leaf burn is a major concern. Do not rely on this herbicide for control of grasses. Do not cut crop for feed or graze within 45 days after application. Do not exceed 4 pints/A per season. Do not apply prior to the 3 leaf stage to seed corn inbreds or popcorn. Do not apply more than 2.5 lb atrazine/A in a calendar year. Do not apply more than 1.6 lb atrazine/A/application on highly erodible soils with less than 30% residue cover. Do not apply more than 2 lb atrazine/A/application on non-highly erodible soils or on highly erodible soils with at least 30% residue cover. If application is to be made to a seed corn hybrid, consult the seed corn company regarding tolerance to this herbicide.
Bullet^r 4 lb ai per gallon SOIL applications: See table. POST applications: See table.	Active Ingredient: Alachlor Atrazine Similar Products: Lariat MOA: 15 & 5	EPP. Apply up to 45 days before planting. Split applications may be made 30 to 45 days before planting. If applied in split application, apply 60% of recommended rate initially, and 40% at planting. PPI. Apply and incorporate 1 to 2 inches within 7 days before planting. PRE. Apply after planting but before crop and weeds emerge and within 5 days of last tillage operation or burn down application. POST. Apply before weeds reach 2 leaf stage and before the corn is 5 inches tall.	Do not make more than 2 applications of Bullet per year or exceed 6.4 qt/A/year. Do not apply more than 2.5 lb atrazine/A in a calendar year. Do not apply more than 1.6 lb atrazine/A/application on highly erodible soils with less than 30% residue cover. Do not apply more than 2 lb atrazine/A/application on non-highly erodible soils or on highly erodible soils with at least 30% residue cover. Do not graze treated area or feed treated forage to livestock for 21 days following application. Do not apply POST using liquid fertilizer as the carrier. Do not apply through any type of irrigation system.

PPI, PRE & POST Applications	Bullet ^r Broadcast Rate (qt/A) ^a		
	Soil texture	Less than 3% OM	3% or more OM
	Coarse	2.5	3
	Medium	3	3.75
	Fine	3.75	3.75 to 4.5
a. In areas of heavy infestations use 4 to 5 qt/A, but do not exceed 4.25 qt/A on highly erodible soils with less than 30% plant residue.			

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Callisto 3.8 lb ai per gallon PRE applications: 6.0-7.7 fl oz /A POST applications: 3.0 fl oz /A	Active Ingredient: Mesotrione Similar Products: None MOA: ?	PRE. Do not cultivate within 7 days before or after application. POST. May be applied to 30 inch tall corn or up to the 8-leaf stage of growth of corn.	Do not apply to popcorn, sweet corn, or ornamental corn. Do not apply more than a total of 10.7 fl oz/A/season. Do not make more than 2 applications per season. Do not make the second application within 14 days of the first application. Do not use Methylated Seed Oil (MSO) or MSO blend adjuvants. Do not harvest forage, grain, or stover within 45 days after application.
Camix 3.8 lb ai per gallon PRE applications: 2.0 to 2.4 qt /A	Active Ingredient: Metolachlor Mesotrione Similar Products: None MOA: 15 & ?	PRE. If soil organic matter content is less than 3% use 2.0 qts /A. If soil organic matter content is greater than 3% use 2.4 qts /A. May also be applied early POST for broadleaf control in field corn.	Do not apply more than 2.4 qts /A per growing season. Do not apply POST if area has been treated with Counter or Lorsban insecticide. Do not apply to sweet corn, popcorn, or ornamental corn. Do not allow product to contaminate feed or food. When used in reduced and no-till systems, apply as close to planting as possible.
Celebrity Plus 70% WDG POST applications: 4.7 oz/A	Active Ingredient: Dicamba, Diflufenzopyr Nicosulfuron Similar Products: None MOA: 4, 4, & 2	POST. Apply POST to actively growing weeds when the corn is between 4 and 24 inches tall.	Do not cultivate within 10 days before or 7 days after application. Do not tank mix with foliar organophosphate insecticide. Do not apply more than 1.0 oz ai/A nicosulfuron in a season. Do not apply more than 0.75 lb ai/A dicamba in a season. Do not apply more than 0.125 lb ai/A diflufenzopyr in a season. Do not apply sequential applications of Banvel, Clarity, Distinct, or Marksman within 15 days of application of Celebrity Plus. Do not apply more than 2 times in a year. Do not apply within 32 days of forage harvest. Do not apply within 72 days of grain harvest. Do not apply more than 9.4 oz/A per season.
Clarity 4 lb ai per gallon EPP applications: up to 8 fl oz/A POST applications: 8 to 16 fl oz/A LATE POST applications: 8 fl oz/A	Active Ingredient: Dicamba Similar Products: Banvel Sterling Diablo Distinct Rates may vary due to formulation MOA: 4	EPP. Apply 7 to 14 days before planting to control existing weeds in no-till corn . POST. Apply after corn emergence and through the 5-leaf growth stage or 8 inch tall corn, whichever comes first. LATE POST. Apply to corn that is 8 to 36 inches tall but not within 15 days of tassel emergence. Apply as a POST-directed application with drop nozzles when corn leaves prevent proper spray coverage.	Do not exceed 2 applications of Clarity in one growing season or 1.5 pt/A/growing season. Do not harvest for silage or graze treated corn for feed until it has reached the ensilage (milk) stage. Do not apply to corn larger than 36 inches or 15 days prior to tassel emergence, whichever comes first. Do not apply if soybeans are nearby and corn is more than 24 inches tall, soybeans are more than 10 inches tall, or soybeans have begun to bloom. Do not apply multiple Clarity applications within a 2 week time span.

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Define 60% DF SOIL applications: See table.	Active Ingredient: Flufenacet Similar Products: None MOA: 15	EPP. Apply up to 45 days before planting and before weeds emerge. Will not control emerged weeds. PPI. Apply and incorporate in the upper 2 inches of soil within 14 days of planting. PRE. Apply after planting but before crop and weed emergence.	Do not use on popcorn or sweet corn. Do not apply aerially. Do not apply more than 21 oz/A per season. Plant corn at least 1 to 1.5 inches deep. Do not apply through any type of irrigation system.

EPP, PPI & PRE Applications	Define Use Rates (oz/A) for Conventional Tillage Systems when Applied within 2 Weeks of Planting^a		
	Soil Textural Group	Less than 3% OM	3% or more OM
	Coarse	12	14
	Medium	14 to 16	16 to 18
	Fine	18 to 20	18 to 21
a. Use higher rate within recommended rate range for heavy weed pressures, heavy surface plant residues, and/or when soil OM is at upper end of range.			

EPP, PPI & PRE Applications	Define Use Rates (oz/A) for Conservation, Minimum, and No-till Systems and Conventional Tillage Systems When Applied Greater than 2 Weeks before Planting^a		
	Soil Textural Group	Less than 3% OM	3% or more OM
	Coarse	13	15
	Medium	16 to 18	18 to 20
	Fine	20 to 21	20 to 21
a. Use higher rate within recommended rate range for heavy weed pressures, heavy surface plant residues, and/or when soil OM is at upper end of range.			

Dual II Magnum 7.64 lb ai per gallon PPI & PRE appl.: See table. POST applications: 1 to 2 pt/A	Active Ingredient: Metolachlor Similar Products: Dual II Magnum SI Dual IIG Magnum Dual Magnum Cinch <u>Rates may vary due to formulation</u> MOA: 15	PPI. Apply before planting and incorporated 1 to 2 inches. PRE. Apply after planting but before weeds emerge. POST. Apply POST to corn up to 40 inches tall but before weeds emerge as it will not control emerged weeds.	See label for soil type restrictions and for split application restrictions. No more than 3.9 pt/A can be applied during any one season, depending on soil texture. Do not graze or feed treated forage for 30 days after applications.
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PPI, & PRE Applications	Dual II Magnum Use Rates (pt/A)^a		
	Soil Textural Group	Less than 3% OM	3% or more OM
	Coarse	1.0 to 1.33	1.33
	Medium	1.33 to 1.67	1.33 to 1.67
	Fine	1.33 to 1.67	1.67 to 2.0

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Epic DF 58% DF SOIL applications: See table.	Active Ingredient: Flufenacet Isoxaflutole Similar Products: None MOA: 15 & 28	EPP. May be applied up to 21 days before planting. PPI. May be applied up to 21 days before planting and incorporated in the to 1 to 2 inches of soil. PRE. May be applied after planting but before crop and weed emergence.	Do not make more than 1 application of Epic in a season. Do not use on popcorn, sweet corn, or corn grown for seed. Do not plant corn less than 1-1.5 inches deep. Do not use on coarse textured soil with soil pH greater than 7.5. Do not use on medium textured soil with soil pH greater than 7.5 and OM content less than 2.5%. Do not use on coarse or medium textured soils with less than 1.5% OM. Do not use on sandy loam, loamy sand, or sand surface soil and loamy sand or sand subsoil if the water table is <25 feet below ground and the OM is <2%. Do not apply aerially.

EPP, PPI, & PRE Applications	Epic Use Rates (oz/A) for <u>Coarse Textured Soils</u> Conventional tillage, Conservation tillage, and No-till Systems^a				
	Application Timing	Soil Organic Matter (% by Weight)			
Preemergence (PRE)	<1.5%	1.5 to 2	2 to 3%	>3%	
Preplant (surface or incorporated) 0 to 7 days before planting	DO NOT USE	6 to 8 oz	8 to 9 oz	8 to 10 oz	
Preplant (surface or incorporated) 8 to 21 days before planting		7 to 9 oz	9 to 10 oz	9 to 11 oz	
a. Use the higher rate of Epic within the applicable rate range under any of the following conditions: high soil OM, heavy surface plant residues, heavy weed pressure, or when applying no-till or EPP. Use the lower rate of Epic within the applicable rate range under any of the following conditions: low soil OM, increased tillage and/or incorporation of surface plant residues, or preplant applications made near the minimum interval prior to planting.					

EPP, PPI, & PRE Applications	Epic Use Rates (oz/A) for <u>Medium Textured Soils</u> Conventional tillage, Conservation tillage, and No-till Systems^a			
	Application Timing	Soil Organic Matter (% by Weight)		
Preemergence (PRE)	<1.5%	1.5 to 2	>2%	
Preplant (surface or incorporated) 0 to 7 days before planting	DO NOT USE	7 to 10 oz	9 to 13 oz	
Preplant (surface or incorporated) 8 to 21 days before planting		9 to 11 oz	11 to 15 oz	
a. Use the higher rate of Epic within the applicable rate range under any of the following conditions: high soil OM, heavy surface plant residues, heavy weed pressure, or when applying no-till or EPP. Use the lower rate of Epic within the applicable rate range under any of the following conditions: low soil OM, increased tillage and/or incorporation of surface plant residues, or preplant applications made near the minimum interval prior to planting.				

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

EPP, PPI, & PRE Applications	Epic Use Rates (oz/A) ^a for Fine Textured Soils Conventional tillage, Conservation tillage, and No-till Systems		
		Soil Organic Matter (% by Weight)	
	Application Timing	<1.5%	>1.5
	Preemergence (PRE)	10 to 11 oz	11 to 15 oz
	Preplant (surface or incorporated) 0 to 7 days before planting		
	Preplant (surface or incorporated) 8 to 21 days before planting	11 to 13 oz	12 to 17 oz
<p>a. Use the higher rate of Epic within the applicable rate range under any of the following conditions: high soil OM, heavy surface plant residues, heavy weed pressure, or when applying no-till or EPP. Use the lower rate of Epic within the applicable rate range under any of the following conditions: low soil OM, increased tillage and/or incorporation of surface plant residues, or preplant applications made near the minimum interval prior to planting.</p>			

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Equip Corn 32% WDG POST applications: 1.5 oz /A	Active Ingredient: Foramsulfuron Iodosulfuron Similar Products: None MOA: 2	POST. Apply by broadcast when corn is 0-12 inches in height or when it is in the emergence through V4 growth stage, whichever is more restrictive. Drop nozzles must be used when corn is greater than V4 and less than V8 stage of growth or 12-36 inches in height. Minimize spray contact in the corn whorl.	Do not use on sweet corn or popcorn or corn grown for seed. Must use an external adjuvant and nitrogen fertilizer. Do not apply through aerial applications. Do not make more than one application per year. Do not apply to soils with pH≥8.5. Do not harvest for grain within 70 days of application. Do not graze or harvest for forage within 45 days of application. Do not use nitrogen solutions as spray carriers.
Exceed 57% WDG POST applications: 0.8 to 1 oz/A	Active Ingredient: Prosulfuron Primisulfuron Similar Products: None MOA: 2	POST. Apply POST to corn between 4 and 20 inches in height. Use drop nozzles to apply if corn is taller than 20 inches, but prior to corn reaching 30 inches, 6 collar growth stage, or tassel emergence.	Do not graze or feed forage within 30 days of treatment. Do not harvest for silage until 40 days after treatment. Do not harvest for grain until 60 days after application. Do not apply more than one application of Exceed in a season. Do not apply if corn exceeds 30 inches tall or after tassel emergence. Do not apply after June 30 if rotating to a sensitive crop. Do not apply to sensitive hybrids. Do not apply to sweet or ornamental corn. Do not apply with Poast or Poast Plus. Do not apply with nozzles directly over the crop row. Do not use liquid fertilizer as carrier. See label for usage with foliar or soil insecticides. Apply with nonionic surfactant, crop oil concentrate, or liquid fertilizer.
Expert' 4.88 lb ai per gallon All applications: PRE and POST See table	Active Ingredient: Atrazine Metolachlor Glyphosate Similar Products: None MOA: 5, 15, & 9	Non-Roundup Ready. May be applied up to 30 days before planting corn and prior to crop emergence if corn is NOT specifically designated Roundup Ready. Roundup Ready. May be applied broadcast, over-the-top of Roundup Ready corn up to a maximum plant height of 12 inches.	Do not apply this product by aerial equipment. Do not apply through any type of irrigation system. Do not graze or feed forage from treated areas for 60 days following application. Do not graze or feed forage from treated sweet corn for 45 days following application. Do not apply POST unless the seed is specifically designated as Roundup Ready. Do not exceed 3 qts /A when applying to highly erodible land with less than 30% plant residue cover.

Expert Application Rates		
Soil Texture	Rate Per Treated Acre	
	Less than 3% Organic Matter	3% Organic Matter or Greater
Coarse	2.5-3.75 qts	3-3.75 qts
Medium	3-3.75 qts	3-3.75 qts
Fine	3-3.75 qts	3-3.75 qts

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Field Master^f 4.25 lb ai per gallon PRE applications: See table POST applications: 2 to 4 quarts/A	Active Ingredient: Acetochlor Atrazine Glyphosate Similar Products: None MOA: 15, 5, & 9	PRE. Apply after planting but before crop emergence. POST. Apply 2 to 4 quarts up to 11 inch corn ONLY if the corn contains the Roundup Ready gene.	Use only in minimum or no-till systems prior to crop emergence. Do not apply more than 2.5 lb atrazine/A in a calendar year. Do not apply more than 1.6 lb atrazine/A/application on highly erodible soils with less than 30% residue cover. Do not apply more than 2 lb atrazine/A/application on non-highly erodible soils or on highly erodible soils with at least 30% residue cover. Do not apply to the following soils where depth to ground water is 30 ft or less: sands with less than 3% OM, loamy sands with less than 2% OM, or sandy loams with less than 1% OM. Do not apply to emerged corn. Do not feed forage or graze treated areas within 8 weeks after application. POST Appl: tank-mix with additional glyphosate to improve weed control, but apply only to Roundup Ready corn.

PRE Applications	Field Master ^f Use Rates (qt/A)	
	Soil Textural Group	qt/A
	Coarse	3.5 to 5
	Medium	4 to 5
	Fine	4 to 5

FulTime 4 lb ai per gallon SOIL applications: See table. POST applications: See table.	Active Ingredient: Atrazine Acetochlor Similar Products: Degree Xtra Rates may vary due to formulation MOA: 5 & 15	EPP. On medium and fine textured soils, apply up to 40 days before planting. PPI. Apply and incorporate within 14 days of planting. PRE. Apply after planting but before crop and weed emergence. POST. Apply POST before corn reaches 11 inches tall and before weeds emerge.	Do not apply to the following soils if ground water depth is 30 feet or less: sands with less than 3% OM; loamy sands with less than 2% OM; or sandy loams with less than 1% OM. Do not apply aerially. Do not apply after June 10 unless corn will be planted the following year. Do not apply more than 2.5 lb atrazine/A in a calendar year. Do not apply more than 1.6 lb atrazine/A/application on highly erodible soils with less than 30% residue cover. Do not apply more than 2 lb atrazine/A/application on non-highly erodible soils or on highly erodible soils with at least 30% residue cover. POST applications. Do not apply POST with liquid fertilizer as the carrier. Do not mix with surfactants, crop oil, or other additives.
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EPP, PPI, & PRE Applications	FulTime Use Rates (qt/A) in Conventional Tillage Systems When Applied within 14 Days Before Planting		
	Soil Textural Group	Less than 3% OM	3% OM or Greater
	Coarse	2.5 to 2.7	2.7 to 3
	Medium	2.7 to 3.3	3 to 3.3
	Fine	3 to 3.5	3 to 5

EPP, PPI, PRE & POST Applications	FulTime Use Rates (qt/A) in Reduced or No-till System or Conventional Systems When Applied More than 14 Days Before Planting			
	Soil Textural Group	Time from Application to Planting		
		Greater than 10 Days Before Planting	Less than 10 Days Before or After Planting	After Planting and/or Emergence
	Coarse	Do not apply more than 14 days before planting	2.5 to 3	2.5 to 3
	Medium	2.7 to 4	2.7 to 3.3	2.7 to 3.3
	Fine	3.3 to 5	3 to 5	3 to 4

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Gramoxone Max^r 3 lb ai per gallon EPP BURNDOWN applications: 0.75 to 1.75 pt/A for 1 to 3 inch weeds 1.75 to 2 pt/A for 3 to 6 inch weeds 2 to 2.7 pt/A for 6 inch weeds.	Active Ingredients: Paraquat Similar Products: Gramoxone Extra ^r Cyclone Max ^r <u>Rates may vary due to formulation</u> MOA: 22	EPP BURNDOWN. Apply before planting for control of existing vegetation. PRE BURNDOWN. Apply after planting but before corn emergence for control of existing vegetation.	Do not exceed 4 pt/A/season. Do not apply after crop emergence. Do not use around home gardens, schools, recreational parks, or playgrounds. Always add NIS or COC to the spray mix. Weeds emerging after application will not be controlled.
Guardsman Max^r 5 lb ai per gallon EPP applications: 4.75 to 5 pts/A PPI, PRE, & POST applications: See table.	Active Ingredient: Dimethenamid-P Atrazine Similar Products: None <u>Rates may vary due to formulation</u> MOA: 15 & 5	EPP. May be applied up to 45 days before planting in minimum and no-till production systems. Not recommended for coarse textured soils. PPI. Apply up to 14 days before planting and incorporate 1-2 inches. PRE. Apply after planting but before crop or weed emergence. POST. Apply after crop emergence but before corn exceeds 12 inches in height. Apply before weeds exceed 1.5 inches in height.	Early preplant applications are not recommended for use on coarse-textured soils or in areas where average annual rainfall exceeds 40 inches. Do not apply more than 4.6 pt/A/season. Do not apply more than 2.5 lb atrazine/A in a calendar year. Do not apply more than 1.6 lb atrazine/A/application on highly erodible soils with less than 30% residue cover. Do not apply more than 2 lb atrazine/A/application on non-highly erodible soils or on highly erodible soils with at least 30% residue cover. Do not graze or feed treated plants to livestock within 40 days of treatment. Do not harvest sweet corn within 50 days of application.

PPI, PRE, & POST Applications	Guardsman Max^r Use Rate as determined by Soil Texture and Organic Matter Content	
	OM Less than 3%	OM 3% or More
Coarse	2.5 – 3.0 pints	3.0 – 4.0 pints
Medium or Fine	3.0 – 4.0 pints	4.0 – 4.6 pints
a. Reduced rates may be used when a POST herbicide application or cultivation is planned. For reduced rates, use 1.5-2.02.0-2.5 and 2.5-3.0pt/A on coarse, medium, and fine soil, respectively.		
b. For EPP applications use 3.8-4.6pt/A. Do not exceed 3.8 pt/A on highly erodible soils with less than 30% plant residue cover prior to crop emergence.		

Harness 7 lb ai per gallon SOIL applications: See table POST applications: Max 3.4 pts /A	Active Ingredient: Acetochlor Other Names: Harness 20G, Surpass TopNotch, Degree <u>Rates may vary due to formulation</u> MOA: 15	EPP. Apply in no-till or conservation tillage up to 45 days prior to planting. PPI. Apply up to 14 days prior to planting and incorporate 1-2 inches. PRE. Apply after planting and within 5 days after last preplant tillage. POST. May be applied postemergence until corn reaches 11 inches in height. Will not control emerged weeds.	Do not apply POST with liquid fertilizer. Do not apply to following soils if depth to ground water is 30 feet or less, sands with <3% OM, loamy sands with <2% OM, sandy loam with <1% OM. Do not apply through irrigation system. Do not apply aerially. Do not apply >3.4 pt/A per season. Will not control emerged weeds.
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EPP, PPI, & PRE Applications	Harness^r Broadcast Rate (pt/A)^a	
	Organic Matter Content	
Soil texture	Less than 3% OM	3% or more OM ^b
Coarse	1.25 to 1.75 pt	1.75 pt
Medium	1.75 to 2.25 pt	1.75 to 2.25 pt
Fine	1.75 to 2.25 pt	2.25 to 2.75 pt
a. Use higher rate in recommended range in areas of high weed infestations.		

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Hornet WDG 78.5% WDG PPI & PRE applications: See table POST applications: 2 to 5 oz/A based on weed pressure and weed size. See label for specific weeds.	Active Ingredient: Flumetsulam Clopyralid Similar Products: None MOA: 2 & 4	PPI. Apply 0 to 30 days prior to planting and incorporate 2 to 3 inches. PRE. Apply after planting but before crop or weed emergence. POST. Apply from corn spike stage up to 20 inch tall or V6 corn, which ever occurs first. Apply to weeds less than 8 inches tall.	Do not apply more than 0.07 lb flumetsulam/year. Do not exceed 0.25 lb/A clopyralid/year. Do not apply within 85 days of harvest. Do not apply to sweet corn or popcorn. Do not plant less than 1.5 inches deep. Do not use on soils with pH >7.8. Do not apply to soils with >5% OM and <5.9 pH. Do not graze or feed treated forage, hay, or straw to livestock. Do not apply during expected near freezing temperatures. Do not apply when Counter or Thimet are to be used unless IR corn hybrid is planted. Do not use crop residues as compost or mulch where susceptible crops may be grown the following season. Using on soils with less than 1.5% OM is not recommended. Corn insecticides should be applied in a T-band or band. Not recommended for inbred corn grown for hybrid seed production; check with the seed corn agronomist before applying. POST. Apply with water as the carrier. Always use NIS, COC, or MSO as an adjuvant. Under dry conditions add UAN or AMS. Do not tank mix with Laddok, Lightning, or due to risk of crop injury.

PPI & PRE Applications	Hornet WDG Use Rates (oz./A) ^a		
	Soil Textural Group	Less Than 3% OM	Greater Than 3% OM
	Coarse	4	4 to 5
Medium or Fine	4 to 5	5 to 6	
a. Use higher rate in range on soils with >3% OM and/or when applications are made 14 to 30 days before planting.			

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Landmaster BW 2.4 lbs ai per gallon POST applications: 27 to 54 fl oz /A	Active Ingredient: Glyphosate 2,4-D Similar Products: None MOA: 9 & 4	POST. Apply to vigorously growing weeds when they have reached optimum size. Refer to label for list of optimum weed size and application rate. For best results, apply after most weed seeds have germinated but before seedhead formation in grasses, or flower bud formation in broadleaves.	Do not feed or forage vegetation from treated areas for 8 weeks following application. Application of spot treatment must be made before silking.
Liberty 1.67 lb ai per gallon POST applications: 16 to 34 oz/A	Active Ingredient: Glufosinate Similar Products: None MOA: 10	POST. Apply POST to actively growing weeds. Can be applied broadcast over-the-top or with drop nozzles from corn emergence until corn reaches 24 inches tall or has 7 developed collars. Use drop nozzles for 24 to 36 inch corn.	Use only on Liberty Link® hybrids. Do not use more than two applications per growing season. Do not exceed 62 oz/A/growing season. Do not harvest for forage within 60 days of application. Do not harvest for grain or fodder within 70 days of application. Do not add any surfactants or crop oils. Do not use nitrogen solutions as carrier. Must include 3 lb/A ammonium sulfate fertilizer (AMS).
Liberty ATZ^f 4.3 lb ai per gallon POST applications: 32 to 48 oz/A	Active Ingredient: Glufosinate Atrazine Similar Products: None MOA: 10 & 5	POST. Apply POST to actively growing weeds after corn emergence and until corn reaches 12 inches tall.	Use only on Liberty Link® hybrids. Do not use more than 1 application per corn crop. Do not apply more than 2.5 lb atrazine/A in a calendar year. Do not apply more than 1.6 lb atrazine/A/application on highly erodible soils with less than 30% residue cover. Do not apply more than 2 lb atrazine/A/application on non-highly erodible soils or on highly erodible soils with at least 30% residue cover. Do not add any surfactants or crop oils. Do not harvest for forage within 60 days of application. Do not harvest for grain or fodder within 70 days of application. Do not use nitrogen solutions as carrier. Do not rotate to any crop other than corn or sorghum until the following year. Do not rotate to any crop other than corn or sorghum if applied after June 10 the previous year. Must include 3 lb/A ammonium sulfate fertilizer (AMS).
Lightning 70% WDG POST applications: 1.28 oz/A	Active Ingredient: Imazethapyr Imazapyr Similar Products: None MOA: 2	POST. Apply POST to actively growing weeds within the size restrictions on the label and to corn less than 18 inches in height.	For use on Clearfield® Corn only. Do not use liquid fertilizer as the carrier. Do not apply more than one application per growing season. Do not harvest for grain, forage, fodder, or silage or graze within 45 days after application. Do not use Counter 15G insecticide when Lightning will be applied. A COC or MSO (1.0% v/v) and liquid fertilizer (1 to 2 qt/A) must be included.
Lumax^f 3.95 lb ai/gallon All applications: 2.5 to 3 qt/A	Active Ingredient: Metolachlor, Atrazine, & Mesotrione Similar Products: Lexar MOA: 15, 5, ?	EPP. Apply up to 14 days prior to planting. PRE. Apply after planting and prior to crop emergence. POST. Apply POST to actively growing weeds and before corn reached 5 inches in height.	Do not apply more than 3 qt/A/growing season. Do not apply other mesotrione containing products to ground that has been treated with Lumax in the same season. Do not apply Lumax POST to corn that has received an at-plant application of Counter insecticide, or severe crop injury will result. Do not apply Lumax POST within 7 days of an OP insecticide application. A nonionic surfactant (0.25% v/v) is recommended for POST applications. Do not harvest for grain or feed, or graze treated areas for 45 days following application.

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Marksman^f 3.2 lb ai per gallon POST applications: 3.5 pt/A or 2 pt/A for coarse textured soils	Active Ingredient: Atrazine Dicamba Similar Products: Banvel-K+Atrazine <u>Rates may vary due to formulation</u> MOA: 5 & 4	POST. Apply POST to actively growing weeds and from corn emergence through the 5-leaf growth stage but before corn exceeds 8 inches tall.	Do not use on sweet corn. Do not harvest treated plants or graze for feed before the ensilage stage. Do not make more than 2 applications before the 5- leaf stage or before the corn is 8 inches tall, whichever comes first. Do not apply a second application within 2 weeks of the first application. Do not exceed 5.25 pt/A per year. Do not apply within 2 weeks of another dicamba application. Do not apply more than 2.5 lb atrazine/A in a calendar year. Do not apply more than 1.6 lb atrazine/A/application on highly erodible soils with less than 30% residue cover. Do not apply more than 2 lb atrazine/A/application on non-highly erodible soils or on highly erodible soils with at least 30% residue cover. Check varietal restrictions before applying to seed corn or popcorn.
Micro-Tech^f 4 lb ai per gallon PPI, PRE & POST applications: See table	Active Ingredient: Alachlor Similar Products: None <u>Rates may vary due to formulation</u> MOA: 15	PPI. Apply up to 7 days before planting and incorporate 1-2 inches. PRE. May be applied up to 5 days after planting, and before crop and weed emergence. POST. Apply up to 5 inch tall corn. Will not control emerged weeds.	Do not make more than 2 applications in a year. Do not exceed total of 6 qt/A/year. See label for split applications.

PPI Applications	Micro-Tech^f Use Rates (qt/A)^a		
	Soil Textural Group	Less Than 3% OM	Greater Than 3% OM
	Coarse	2.5	2.5
	Medium	2.5 to 3	2.5 to 3
	Fine	2.5 to 3	3 to 3.5
a. Use higher rate in the recommended range in areas of heavy weed infestations. Use a minimum of 3 qt/A on coarse-textured soils for control of yellow nutsedge or red rice. Rates may be increased to a maximum of 4 qt/A on any soil type when heavy infestations of yellow nutsedge are present.			

PRE Applications	Micro-Tech^f Use Rates (qt/A)^a		
	Soil Textural Group	Less Than 3% OM	Greater Than 3% OM
	Coarse	2 to 2.25	2 to 2.25
	Medium	2 to 2.75	2 to 2.75
	Fine	2 to 2.75	2.5 to 3.25
a. Use higher rate in the recommended range in areas of heavy weed infestations. Use a minimum of 2.5 qt/A on coarse-textured soils and 3 to 4 qt/A on medium or fine textured soils to control black or hairy nightshade.			

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
NorthStar 51.4% WDG POST applications: 5 oz/A	Active Ingredient: Primisulfuron Dicamba Similar Products: None MOA: 2 & 4	POST. Apply POST over-the-top, semi-directed, or directed to actively growing weeds and when corn is 4 to 20 inches tall (V2-V6). POST-directed. Apply only as a POST directed spray when corn is between 20 to 36 inches tall.	Do not apply to corn less than 4 inches tall. Do not apply if corn is under environmental stress. Do not make a foliar application of an OP insecticide 10 days before or 7 days after a NorthStar application. Do not apply to sweet corn. Do not apply as tank mixes with Poast or Poast Plus. Do not apply as a banded application directly over the corn rows. See label concerning interactions with soil applied OP insecticides. Some field corn hybrids are not tolerant to NorthStar.
Option 35% WDG POST applications: 1.5 oz /A	Active Ingredient: Foramsulfuron Similar Products: None MOA: 2	POST. Apply to young actively growing weeds, when corn is 0-16 inches in height or when it is in the emergence through V5 growth stage, whichever is more restrictive. Drop nozzles must be used for applications when corn is 16-36 inches in height.	Do not use on sweet corn or popcorn. Do not apply through aerial applications. Do not exceed a maximum of two applications or 3.5 oz /A per use season. Do not apply within 70 days of harvesting for grain, or 45 days of harvesting for forage. Do not graze within 45 days following application. Do not use nitrogen solutions as spray carriers.
Outlook 6 lb ai per gallon SOIL applications: See table	Active Ingredient: Dimethenamid-p Similar Products: Frontier 6.0 MOA: 15	EPP. May be applied up to 45 days before planting. PPI. May be applied up to 2 weeks before planting and incorporated 1 to 2 inches. PRE. After planting but before weeds emerge.	Do not apply more than 21oz/A in one crop year. Do not apply to coarse soil classified as sand with less than 3% OM and where depth to ground water is 30 feet or less, or where annual irrigation + rainfall exceeds 40 inches. Do not graze or feed forage, hay, or straw to livestock until 40 days after application. Do not apply to sweet corn.

EPP, PPI, & PRE Applications	Outlook Use Rates (fl oz/A)		
	Soil Texture	Organic Matter Content	
		Less than 3%	3% or more
	Coarse	12 to 14	14 to 18
	Medium/Fine	14 to 18	18 to 21

Permit 75% WDG POST applications: 0.67 to 1.33 oz/A	Active Ingredient: Halosulfuron Similar Products: Sempra Rates may vary due to formulation MOA: 2	POST. Apply POST to actively growing weeds from the spike through the lay by stage of corn.	Do not use liquid fertilizer as the carrier. Do not exceed 2 applications per season. Do not exceed 2.66 oz/A/season. Do not harvest for forage or silage or graze within 30 days of application. A nonionic surfactant (0.25 to 0.5% v/v) or crop oil concentrate (1% v/v) must be used.
Princep 4L 4 lb ai per gallon SOIL applications: See table	Active Ingredient: Simazine Similar Products: Princep Caliber 90 Simazine 4L Simazine 90 DF Rates may vary due to formulation MOA: 5	EPP. Apply up to 14 days prior to planting and before weeds emerge. PPI. Apply up to 14 days prior to planting and incorporate 2 to 3 inches. PRE. Apply after planting but before weeds emerge.	Do not apply after corn emerges when applying in nitrogen solution. Do not apply more than 8 pt/A per year. Do not graze treated areas.

EPP, PPI, & PRE Applications	Princep 4L Use Rates (pt/A)	
	Soil Texture	pt/A
	Sand, silt, and loam that is low in organic matter	4
Soil containing moderate amounts of clay and organic matter	4.8	

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Prowl 3.3EC 3.3 lb ai per gallon PRE applications: See table	Active Ingredient: Pendimethalin Similar Products: Pendimax Prowl H ₂ O <u>Rates may vary due to formulation</u> MOA: 3	PRE. After planting but before weeds and crop emerge. POST – Apply postemergence until corn is 30" tall or has 8 visible leaf collars.	Do not apply preplant or preplant incorporated. Do not apply if soil surface is cloddy or covered with residue unless no-till or minimum tillage systems are used. Do not use on peat or muck soils. Corn seed must be planted at least 1.5 inches deep and completely covered with soil. If corn is replanted, seeding depth must be below treated soil.

PRE Applications	Prowl Use Rates (pt/A)			
	Soil Texture	Soil Organic Matter Content ^a		
		Less than 1.5%	1.5% to 3%	More than 3%
	Coarse	1.8 to 2.4 pts	2.4 to 3.6 pts	3.6 pts
	Medium	2.4 to 3.6 pts	3.6 pts	3.6 to 4.8 pts
	Fine	2.4 to 3.6 pts	3.6 to 4.8 pts	3.6 to 4.8 pts
a. Use the high rate for each soil classification when using Prowl 3.3 EC alone.				

Pursuit DG 70% DG EPP, PPI, PRE & POST applications: 1.44 oz/A	Active Ingredient: Imazethapyr Similar Products: Pursuit DG Pursuit W Pursuit W DG <u>Rates may vary due to formulation</u> MOA: 2	EPP. Apply up to 45 days before planting. PPI. Apply before planting and incorporate the top 1 to 2 inches of soil. PRE. Apply after planting and before weeds and crop emergence. POST. Apply after crop emergence and before or after weeds emerge.	Use with Clearfield Corn Hybrids Only. Do not make more than one application a year. Do not apply within 45 days of harvest. Do not apply to sweet corn or popcorn. Check label for application restrictions concerning soil insecticides and Pursuit herbicide. PPI applications are more consistent for grass, velvetleaf, jimsonweed, and common lambsquarters control. When heavy grass pressure is anticipated, use with a grass herbicide underlay.
Pursuit Plus EC 2.9 lbs ai per gallon POST applications: 2.5 pts /A	Active Ingredient: Imazethapyr Pendimethalin Similar Products: None MOA: 2 & 3	PRE. Apply preemergence after planting. Do not incorporate, as crop injury will occur. POST. Apply when crop and weeds are actively growing. Apply before weeds exceed a height of 3". Apply to Clearfield corn varieties only.	For use on Clearfield corn varieties only. Do not make more than one application per year. Do not apply in a liquid fertilizer as a carrier.

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Python WDG 80% WDG SOIL applications: See table	Active Ingredient: Flumetsulam Similar Products: None MOA: 2	EPP. Apply alone or tank mixed with other labeled herbicides as a preplant burndown up to 30 days prior to planting. Plant seed at least 1.5 inches deep. PPI. Apply alone or in a tank mixed with other labeled herbicides as a preplant burndown up to 30 days prior to planting and incorporate. Plant seed at least 1.5 inches deep. PRE. Apply after planting but before weeds emerge. May be applied up to spike stage of corn with water as the carrier.	Do not make more than one application a year. Do not apply more than 0.07 lb of flumetsulam in a single year. Do not apply within 85 days of harvest. Do not apply to sweet corn or popcorn. Do not use on soils with pH greater than 7.8. Do not apply to soils with >5% OM and <5.9 pH. Do not graze or feed treated forage, hay, or straw to livestock. Do not apply during expected near freezing temperatures. Do not apply when Counter or Thimet are to be used unless IR corn hybrid is planted. Using on soils with less than 1.5% OM is not recommended. Corn insecticides should be applied in a T-band or band. Not recommended for hybrid seed production; consult your seed corn agronomist before applying.

EPP, PPI & PRE Applications	Python WDG Use Rates (oz/A)	
	Soil Textural Group	Ounces per acre
	Coarse	0.80 to 1.0 oz.
	Medium or Fine	0.89 to 1.33 oz
a. See Python label for use rates for specific weed species and specific soil organic matter content.		

Ready Master ATZ' 4 lb ai per gallon POST applications: 1.5 to 2 qt/A	Active Ingredient: Glyphosate Atrazine Similar Products: None MOA: 9 & 5	POST. Apply POST to actively growing weeds from crop emergence and until corn reaches 12 inches in height.	For use only with Roundup Ready corn hybrids. Do not apply more than 2.5 lb atrazine/A in a calendar year. Do not apply more than 1.6 lb atrazine/A/appl. on HES with <30% residue cover. Do not apply > 2 lb atrazine/A/appl. on non-HES or on HES with at least 30% residue cover.
Resource 0.86 lb ai per gallon POST applications: 4 to 8 fl oz/A. See label for rates concerning specific species.	Active Ingredient: Flumiclorac Similar Products: None MOA: 14	POST. Apply POST to actively growing weeds within the size restrictions on the label.	Do not apply to popcorn or sweet corn. Do not apply to corn before the 2-leaf stage or after the 10-leaf stage. Do not apply more than 6 fl oz/A in a single broadcast application, or more than a total of 8 fl oz/A to field corn during a single season. Do not apply more than a total of 8 fl oz/A to field corn in a single season as a directed spray application. Do not graze animals on green forage or use as feed less than 28 days after application. See label for specific use rates and additive rates

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
<p>Roundup Original Max 5.5 lb ai per gallon</p> <p>EPP, PRE, & POST applications: 22 to 44 fl oz/A</p>	<p>Active Ingredient: glyphosate</p> <p>Similar Products: Many</p> <p>Rates and required adjutants may vary due to formulation and manufacturer. See appropriate label.</p> <p>MOA: 9</p>	<p>EPP. Apply before planting the crop.</p> <p>PRE. Apply after planting but before crop emergence.</p> <p>POST. Apply POST only in Roundup Ready corn and Roundup Ready Corn 2 hybrids or with a hooded sprayer. See special instructions and remarks.</p>	<p>Apply POST only in Roundup Ready Corn Hybrids or with a hooded sprayer.</p> <p>For Hooded Sprayer Applications. Do not graze, harvest, or feed treated vegetation. Do not apply more than 26 fl oz/A in a single application or apply more than 2.4 qt/A per year with a hooded sprayer. Do not apply to corn less than 12 inches tall. Do not treat within 4 inches of drill row. Do not spray faster than 5 mph. Do not apply if wind speed is greater than 10 mph. Do not use any other nozzles than low-drift nozzles.</p> <p>For Applications in Roundup Ready Corn Hybrids. Apply POST to Roundup Ready Corn Hybrid from emergence through the V8 stage (8 leaves with collars) or until corn reaches 30 inches in height. Do not apply more than 26 fl oz/A in a single application. Sequential in-crop POST applications must not exceed 1.6 qt/A/year. Do not apply within 50 days of harvesting crop for forage or within 7 days of harvesting crop for grain.</p> <p>For Applications in Roundup Ready Corn 2 Hybrids: Apply POST from emergence through 48 inch corn. Use drop nozzles between 30 and 48 inch corn height. Do not apply more than 32 fl oz/A in a single application. Sequential in-crop POST applications must not exceed 2 qt/A/year. Do not apply within 50 days of harvesting from grain or 7 days within harvesting for grain.</p>
<p>RT Master 4.4 lbs ai per gallon</p> <p>EPP & PRE applications: 2 qt /A</p> <p>POST applications: 3 qt /A</p>	<p>Active Ingredient: Glyphosate 2,4-D</p> <p>Similar Products: None</p> <p>MOA: 9 & 4</p>	<p>EPP & PRE. May be applied before, during, or after planting but before crop emergence.</p> <p>Spot Treatments. Apply prior to silking of corn.</p> <p>POST. May be applied as preharvest application. Make application at 35% grain moisture or less. Ensure that maximum kernel fill is complete and the corn is physiologically mature. For ground applications, apply up to 3 qt/A. For aerial applications use up to 1 qt/A.</p> <p>Postharvest applications. May be applied after harvest of corn. Higher rates needed for control of large weeds.</p>	<p>EPP & PRE applications: Do not apply after emergence of crop. Spot treatments: Do not graze or feed treated forage for 7 days after treatment. Do not harvest sweet corn ears within 45 days of application. POST(Roundup Ready hybrids only). Allow a minimum of 7 days between application and harvest of grain or fodder. Do not apply preharvest to sweet corn. Do not treat corn grown for seed. Postharvest applications: Do not graze, harvest, or feed treated vegetation for 7 days following application. Labeled Counties: Alfalfa, Beaver, Blaine, Canadian, Cimarron, Custer, Dewey, Ellis, Garfield, Grant, Harper, Kay, Kingfisher, Logan, Major, Noble, Pawnee, Payne, Roger Mills, Texas, Woods, & Woodward</p>

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Shotgun^f 3.25 lb ai per gallon POST applications: See table	Active Ingredient: Atrazine 2,4-D Similar Products: None MOA: 5 & 4	EPP. Apply 7 to 14 days before planting. PRE. Apply after planting but before crop and weed emergence. Cover seed with at least 1.5 inches of soil. Do not apply PRE if EPP application of this product has been made. POST. Apply POST to corn from the spike to 5 leaf growth stages but before corn reaches 12 inches in height.	Do not apply within 7 days before or within 3 days after an Accent SP application. Do not apply more than 2.5 lb atrazine/A in a calendar year. Do not apply more than 1.6 lb atrazine/A/application on highly erodible soils with less than 30% residue cover. Do not apply more than 2 lb atrazine/A/appl. on non-highly erodible soils or on highly erodible soils with at least 30% residue cover. POST application. Do not apply this product POST within 3 weeks of its application EPP. Avoid spraying just after corn leaves unfold. Crop may become brittle within 2 weeks following application and is subject to breaking by wind or cultivation.

POST Applications	Shotgun ^f Use Rates (pt/A) by Crop Stage		
	Crop Stage	Rate pt/A	
Spike to 4-leaf or up to 8 inches tall	All soil textures	2 pt	Over the top broadcast spray for small, easy to control weeds
	Fine or medium soils (silt and clay loams) with 2% or more OM	up to 3 pt	Over the top broadcast spray. Do not apply to coarse soils (sand, sandy loam, loamy sand).
5-leaf or 8 to 12 inches tall	Fine or medium soils (silt and clay loams).	up to 3 pt	Directed spray. For all soil textures, use drop nozzles to keep spray off corn leaves. Especially whorl. Ground application only.
	Coarse soils (sand, sandy loam, loamy sand).	2 pt	

Spirit 57% WDG POST applications: 1 oz/A	Active Ingredient: Prosulfuron Primisulfuron Similar Products: None MOA: 2 & 2	POST. Apply POST to actively growing weeds and when corn is 4 to 24 inches tall corn.	Do not graze or feed forage from Spirit-treated crops to livestock until 30 days after application. Do not harvest silage until 40 days after application. Do not harvest grain until 60 days after application. Do not apply more than one application of Spirit in a cropping season. Do not apply to corn smaller than 4 inches or larger than 24 inches. Do not apply to seed corn larger than 20 inches. Do not apply any organophosphate insecticide within 10 days before or 7 days after a Spirit application.
Steadfast 75% WDG POST applications: 0.75 oz /A	Active Ingredient: Nicosulfuron Rimsulfuron Similar Products: DPX-79406 MOA: 2 & 2	POST. Apply to corn that is up to 20 inches tall. Apply to field corn hybrids with a relative maturity (RM) rating of 88 days or more. Consult with seed supplier before application. Apply to grasses that are young and actively growing, but before they exceed the sizes listed in label.	Do not apply to field corn grown for seed, to popcorn or to sweet corn. Do not use less than 3/4 oz /A. Applications must include either a crop oil concentrate or a nonionic surfactant. In addition, an ammonium nitrogen fertilizer must be used. Do not graze or feed forage, hay, or straw from treated areas to livestock within 30 days of application.
Steadfast ATZ 89.3% WDG POST applications: 14 oz /A	Active Ingredient: Nicosulfuron Rimsulfuron Atrazine Similar Products: None MOA: 2, 2, & 5	POST. Apply to corn that is up to 12 inches tall. Do not apply to corn taller than 12 inches or exhibiting 7 or more leaf collars, whichever is more restrictive. Apply to field corn hybrids with a relative maturity (RM) rating of 77 days or more. Consult with seed supplier before application.	Do not apply to field corn grown for seed, to popcorn or to sweet corn. Do not make more than one application per season and do not apply both Steadfast and Steadfast ATZ to the same field in the same cropping season. Applications must include either a crop oil concentrate or a nonionic surfactant. In addition, an ammonium nitrogen fertilizer must be used. Do not graze or feed forage, hay, or straw from treated areas to livestock within 30 days of application.

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Stinger 3 lb ai per gallon POST applications: 0.25 to 0.66 pt/A	Active Ingredient: Clopyralid Similar Products: None MOA: 4	POST. Apply POST to actively growing weeds from corn emergence through 24 inch tall corn.	Do not apply by aircraft. Do not move livestock from treated grazing areas onto sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated pasture. Use of a spray adjuvant is not necessary but may increase control of some weeds.
Surefire 3.0 lbs ai per gallon PRE BURNDOWN applications: 1 to 2 qt /A	Active Ingredient: Paraquat Diuron Similar Products: None MOA: 22 & 7	PRE BURNDOWN. Apply 1 to 2 qt. per sprayed acre as a band treatment over the crop row, or as a broadcast treatment, prior to, during, or after planting – but before emergence or the crop.	Always use a nonionic surfactant which contains at least 75% surface active ingredient Do not use around home gardens, schools, recreational parks, golf courses, or playgrounds. Do not use dirty or muddy water for dilution because product will be inactivated. Do not apply after corn has emerged or after soil cracking.
Surpass EC^r 6.4 lb ai per gallon SOIL applications: See table	Active Ingredient: Acetochlor Other Names: Surpass 20-G MOA: 15	EPP. Apply in no-till or conservation tillage systems up to 30 days prior to planting. Will not control emerged weeds. PPI. Apply up to 14 days prior to planting and incorporate 1-2 inches. PRE. Apply after planting but before weed emergence. Will not control emerged weeds. POST. Apply after corn emergence but before corn exceeds 11 inches in height. Will not control emerged weeds.	Do not apply to following soils if depth to ground water is 30 feet or less; sands with <3% OM, loamy sands with <2% OM, sandy loam with <1% OM. Do not apply through irrigation system. Do not apply aerially. Do not apply more than 3.75 pt/A per season. Will not control emerged weeds.

SOIL & POST Applications	Surpass EC^r Use Rates (pt/A) in Conventional Tillage Systems When Applied within 14 Days Before Planting^a		
	Soil Textural Group	Less than 3% OM	3% OM or Greater
	Coarse	1.5 to 2.25	1.5 to 2.5
	Medium	1.5 to 2.5	1.5 to 2.5
	Fine	1.5 to 2.75	2 to 3
a. Use higher end of rate range if OM content is at higher end of rate range or under anticipated heavy weed infestations.			

SOIL and POST Applications	Surpass EC Use Rates (pt/A) in Reduced or No-till System or Conventional Systems When Applied More than 14 Days Before Planting		
	Soil Organic Matter Content		
	Soil Textural Group	Less than 3% OM	3% OM or Greater
	Coarse	2	2
	Medium	2 to 2.5	2.5
	Fine	3	3

This section was not revised in 2008.

CORN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
TopNotch 3.2 lb ai per gallon SOIL applications: See table. POST applications: See table.	Active Ingredient: microencapsulated acetochlor Similar Products: Degree <u>Rates may vary due to formulation</u> MOA: 15	EPP. Apply in no-till and conservation tillage systems before weeds emerge and up to 45 days before planting. PPI. Apply and incorporate within 10 days of planting. PRE. Apply after planting but before crop and weed emergence. POST. Apply POST before corn reaches 11" tall. Will not control emerged weeds.	Do not apply to the following soils if ground water depth is 30 feet or less; sands with less than 3% OM; loamy sands with less than 2% OM; or sandy loams with less than 1% OM. Do not apply aerially. Do not exceed 6.25 pt/A in a season. POST applications. Do not apply POST with liquid fertilizer as the carrier.

EPP, PPI, PRE & POST Applications	TopNotch Use Rates (qt/A)				
	Soil Textural Group	Time from Application to Planting			After planting &/or Emergence
		Less than 10 Days	10 to 30 Days	30 to 40 Days	
Coarse	2	2 to 2.5 ^a	2.5 ^a	2	
Medium	2 to 2.5	2.5	2.5 to 3	2 to 2.5	
Fine	2.5 to 3	2.5 to 3	3 to 3.75	2.5 to 3	
a. On coarse textured soils with less than 3% OM the maximum use rate is 2.25 qt/A.					

Yukon 77.5% WDG POST applications: 4 to 8 oz /A	Active Ingredient: Halosulfuron Dicamba Similar Products: None MOA: 2 & 4	POST. Apply over-the-top or with drop nozzles from the spike through 36 inch field corn. Up to 2 applications may be applied with a total application not to exceed 8 oz /A. Allow at least 2 weeks between applications.	Do not graze or harvest for feed for at least 30 days after foliar application. Use higher rates for heavy weed infestations or weeds close to the maximum height for control listed in the label.
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^r Restricted Use Pesticide

MOA Group Tables start on page 46 of the handbook.

COTTON INSECT CONTROL SUGGESTIONS

MAJOR PESTS

ECONOMIC THRESHOLDS	INSECTICIDE (COMPANY)	LBS/GAL TECH.	MOA GROUP NUMBER	RATE/ACRE LB/A.I.	ACRES TREATED PER GAL/LB	TOXICITY RAT ORAL	RABBIT DERMAL	COMMENTS
BOLLWORM/TOBACCO BUDWORM								
Treat when 10 small worms are found per 100 plants during the first week of bloom (before 7/10); or 5 small worms per 100 plants from 7/10 through 9/15. After 9/15 treat field if worms exceed 10 worms per 100 plants.	Denim (Syngenta)	0.16	—	0.01-0.015	10.6-16.0	2950	>2000	Curacron and Lannate may be phytotoxic to cotton under stress and may redden cotton.
	Curacron ^r E (Syngenta)	8.0	1B	0.75-1.0	16.0-8.0	662	192	
	Lannate ^r LV (DuPont)	2.4	1A	0.45-0.67	5.3-3.6	49	≥2000	Pyrethroid Management: To reduce chance of increasing pyrethroid resistance, all applications before 7/10 should be an alternative chemistry (OP, Carbamate, Bt or Naturalyte). After 9/15, alternative control; different classes of insecticides should be used instead of a pyrethroid to reduce the level of pyrethroid resistance in the population. The pyrethroids are occasionally used in combination with other insecticides. Check label for tank mix directions and restrictions.
	Larvin AF (Bayer Crop Science)	3.2	1A	0.6-0.9	5.3-3.6	66	2000	
	Orthene S Amvac)	0.9 0.75	1B	0.45-0.9 0.45-0.9	2.0-1.0 1.5-0.75	700	2000	
	Brigadier (FMC Bifenthrin + Imidacloprid	2.0	3B-4A	0.08-0.12	25-16	175	>5000	
	Asana ^r XL E (DuPont)	0.66	3B	0.03-0.05	22.0-13.2	458	≥2000	
	Baythroid ^r XL (Bayer Crop Science)	1.0	3B	.013-.021 0.04-0.1	80-49	590	5000	
	Brigade EC-Bifenthrin(FMC)	2.0	3B	0.05-0.10	50.0-20.0	275	2000	
	Hero (FMC)	1.24	3B		25-12	550	>5000	
	Danitol ^r EC (Zeta-Cypermethrin + Bifenthrin) (Valent)	2.4 1.5	3B 3B	0.02-0.03 0.019-0.03	12.0 – 8.0 79.0-50.0	164 431	≥2000 2000	
	Decis ^r EC (Bayer Crop Science)	1.5	3B	0.033-0.045	45.0-33.0	403	7200	
	Mustang ^r Max Zeta-Cypermethrin (FMC) Generic Cypermethrin EC (Helena, UAP, Estes)	2.5	3B	0.4-0.1	62.5-25.0	251	2000	Consult area or state entomologists concerning tank mixtures.
Karate ^r (Syngenta)	2.08	3B	0.025-0.04	80.0-50.0	245	≥7200		

Growers should not use excessively alkaline water to make spray mixtures. In areas where water pH exceeds 9.0, deterioration of insecticides may be expected. Insecticide mixture should be used within three to six hours after preparation and/or a buffering agent added.

COTTON INSECT CONTROL SUGGESTIONS

MAJOR PESTS (CONT'D)

ECONOMIC THRESHOLDS	INSECTICIDE (COMPANY)	LBS/GAL TECH.	MOA GROUP NUMBER	RATE/ACRE LB/A.I.	ACRES TREATED PER GAL/LB	TOXICITY RAT	RABBIT ORAL	DERMAL	COMMENTS
BOLLWORM/TOBACCO BUDWORM (cont'd)									
	Steward (DuPont)	1.25	22B	0.09*-0.11 *Transgenic Bt Cotton rate only.	13.9-11.3	751	≥5000		<p>NOTE: Many of the pyrethroids have received federal and state [24(c)] labels for ULV application, 1 qt/A with refined vegetable oil.</p> <p>For irrigated cotton B.t. treatment is only suggested for early season infestation (when eggs are observed) and then only when used as part of an IPM program with frequent scouting. A good consideration for dryland cotton because of mild effects on beneficials.</p>
	Tracer SC (Dow Agro Sciences)	4.0	5	0.045-0.089	90.0-45.0	75,000	75,000		
	Leverage ^r (Bayer Crop Sciences)	2.7	3B	0.079	34.1	200	5000		
	Bacillus thuringiensis (e.g., Biobit, Bactospeine, Bactur, Design, Dipel ES, Javelin, or Lepinox)	See label for rates.	11 B1						
COTTON FLEAHOPPER									
Treat when 40 or more fleahoppers are found per 100 terminals, the first three weeks of squaring.	Bidrin ^r MW (Amvac)	8.0	1B	0.1-0.5	80.0-16.0	22	225		After 7/25, control of fleahoppers generally is not economical due to Oklahoma's short growing season. In most cases, low yields coupled with the chance of unleashing bollworms offsets the advantages of protecting the early squares by a late-season infestation.
	Floricamid Carbine (FMC)	50DF	9C	0.054-0.089	9.4-5.7	>2000	>2000		
	Dimethoate EC (Helena, UAP, Estes)	2.67	1B	0.12-0.25	21.3-10.6	320	650		
	Centric (Syngenta)	0.40	4A	0.047	8.0	≥5000 ≥2000			
	Brugadier (FMC)	2.0	3B+4A	0.06-0.12	33-16.5	175	>5000		
	Cygon EC (Wilber- Ellis)	4.0	1B	0.12-0.25	32.0-16.0	320	650		
	Intruder (Dupont)	2.0	4A	0.025-0.05	28.0 - 14.0	1064	≥2000		
	Lorsban E (Dow Agro Sci)	4.0	1B	0.18-0.5	22.2-8.0	163	2000		
	Orthene S (Amvac)	0.97 0.9 0.75	1B	0.25 0.25 0.25	5.3 5.0 4.1	700	2000		
	Provado (Bayer Crop Sci)	1.6	4A	0.13-.062	51.2-25.6	450	5000		
	Hero EC (FMC)	1.24	3B	0.05-0.1	25-12	550	>5000		
	Zeta-Cypermethrid + Bifenthrin								

COTTON INSECT CONTROL SUGGESTIONS MAJOR PESTS (CONT'D) AND MINOR PESTS

ECONOMIC THRESHOLDS	INSECTICIDE (COMPANY)	LBS/GAL TECH.	MOA GROUP NUMBER	RATE/ACRE LB/A.I.	ACRES TREATED PER GAL/LB	TOXICITY RAT RABBIT ORAL DERMAL		COMMENTS
COTTON FLEAHOPPER (cont'd)								
	Steward (Dupont)	1.25	22B	0.09-0.11	13.9-11.3	751	≥5000	Single applications will provide control of light to moderate infestations only.
	(FMC) Trimax Pro (Bayer Crop Science)	4.0	4A	.028-.056	142-71	4350	5000	
	Vydate [†] C-LV (DuPont)	3.77	1A	0.125-0.5	30.1 – 7.5	8.7	≥5000	
MINOR PESTS								
COTTON APHID								
Treat when 50% of the plant terminals are infested with aphids and numbers exceed 50 per leaf.	Bidrin [†] MW (Amvac) Floricamid	8.0	1B	0.1-0.5	80.0-16.0	22	225	Control difficulties could result with use of any of these products. Application of high rates reduces the chance of control failure. Two applications maximum per season. Closely observe re-entry requirements.
	Carbine (FMC)	50DF	9C	0.044-0.089	11.4-5.7	>2000	>2000	
	Dimethoate EC (Helena, UAP Estes)	2.67	1B	0.12-0.25	21.3-10.6	320	650	
	Brigadier Bifenthrin + Imidacloprid	2.0	3B+4A	0.06-0.12	33-16.5	175	>5000	
	Centric (Syngenta)	0.40	4A	0.031-0.05	12.8 – 8.0	5000	2000	
	Cygon EC (Wilber-Ellis)	4.0	1B	0.12-0.25	32.0-16.0	320	650	
	Curacron [†] E (Syngenta)	8.0	1B	0.5	16.0	662	192	
	Di-Syston [†] E (Bayer Crop Science)	8.0	1B	0.56-.047	42.7-14.3	6	20	
	Intruder (Dupont)	0.7	4B	.025-.045	28.0 – 14.0	1064	≥2000	
	Lannate LV [†] (DuPont)	2.4	1A	0.25	9.6	49	≥2000	
Leverage [†] (Bayer Crop Science)	2.7	3B	0.063	42.7	200	5000		
Lorsban E (Dow Agro Sciences)	4.0	1B	0.5-1.0	8.0-4.0	272	2000		

Be sure to read and follow directions provided on the label of pesticide containers since certain restrictions on post-treatment harvest, feeding of gin trash, and grazing limitations exist (also see limitations/restrictions below).

COTTON INSECT CONTROL SUGGESTIONS MINOR PESTS (CONT'D)

ECONOMIC THRESHOLDS	INSECTICIDE (COMPANY)	LBS/GAL TECH.	MOA GROUP NUMBER	RATE/ACRE LB/A.I.	ACRES TREATED PER GAL/LB	TOXICITY RAT ORAL	RABBIT DERMAL	COMMENTS
COTTON APHID (cont'd)								
	Provado (Bayer Crop Science)	1.6	4A	0.13-.062	51.2-25.6	450	5000	
	Trimax Pro (Bayer Crop Science)	4.0	4A	.031-.047	128.0-85.0	4350	>5050	
BEE T ARMYWORM/FALL ARMYWORM								
Treat when worms are small for best control.	Confirm F (Dow AgroSciences)	2.0	18B	0.06-0.25	32.0-8.0	≥5000	≥5000	
Treatment should begin when 10% of the plants are infested or when the field average is 1 beet armyworm/row ft.	Curacron E (Syngenta)	8.0	1B	1.0	16.0-8.0	662	192	
	Denim (Syngenta)	0.16	6C	0.0075 - 0.015	21.0 – 10.6	2950	>2000	
	Diamond (Crompton)	0.83	—	0.06-0.12	21.0-11.0	3914	8000	
	Intrepid (Dow Agro Sciences)	2.0	18B	0.6-0.16	32.0-12.8	5000	2000	
	Lannate LV (DuPont)	2.4	1A	0.45	5.3	49	≥2000	
	Larvin AF (Bayer Crop Science)	3.2	1A	0.6-0.9	5.3-3.6	66	2000	
	Lorsban E (Dow Agro Sciences)	4.0	1B	0.75-1.0	5.3-4.0	272	2000	
	Steward (DuPont)	1.25	22B	0.09-0.11	13.9-11.3	49	≥5000	
	Tracer SC (Dow Agro Sciences)	4.0	5	0.067-0.089	60.0-45.0	75000	75000	
EGG MASSES								
Treat when 3 or more egg masses are found per 100 plants	Dimilin 2F (Uniroyal)	2.0	15B	0.063-0.125	32.0-16.0	4640	10,000	Repeat application when fresh egg masses are found.
	Dimilin 25W (Uniroyal)	0.25	15B	0.063-0.125	4.0-2.0	>40	>20	

COTTON INSECT CONTROL SUGGESTIONS MINOR PESTS (CONT'D)

ECONOMIC THRESHOLDS	INSECTICIDE (COMPANY)	LBS/GAL TECH.	MOA GROUP NUMBER	RATE/ACRE LB/A.I.	ACRES TREATED PER GAL/LB	TOXICITY RAT ORAL	RABBIT DERMAL	COMMENTS
CABBAGE LOOPER								
Treat when loopers are present and 25% - 30% defoliation and bolls are still developing.	Denim (Syngenta)	0.16	6C	0.08-0.12	16.0-11.0	2950	>2000	Economic damage rarely occurs. In rank, lush cotton; leaf feeding may allow increased air flow reducing the chance of boll rot.
	Diamond (Crompton)	0.83	_____	0.06-0.12	0.06-0.12	3914	8000	
	Intrepid (Dow Agro Sciences)	2.0	18B	0.06-0.16	32.0-12.8	≥5000	≥2000	
	Larvin AF (Bayer Crop Science)	3.2	1A	0.6-0.9	5.3-3.6	17	5000	
	Orthene S (Amvac)	0.97 0.9 0.75	1B	0.9 0.9	1.0 1.0 0.75	700	2000	
	Steward (DuPont)	1.25	22B	0.065-0.09	19.1-13.9	751	≥5000	
	Tracer SC (Dow Agro Sciences)	4.0	4	0.067-0.089	60.0-45.0	75,000	75,000	
<i>Bacillus thuringiensis</i> (e.g., Biobit, Bactospeine, Bactur, DiPel ES, Design, Javelin, or Lepinox)	See label for rate	11 B1						
GRASSHOPPER								
Treat when grasshopper damage is noticed and grasshoppers are present.	Lorsban E (Dow Agro Sciences)	4.0	1B	0.25-0.5	16.0-8.0	163	2000	Border treatment or application of properly labeled baits around field margins as soon as nymphs are first noticed will often prevent economic damage later.
	Hero EC (FMC) Zeta-Cypermethrin + Bifenthrin	1.24	3B	0.035-0.1	35-12	550	>5000	
	Mustang Max (FMC) Zeta-Cypermethrin	0.8	3B	0.019-0.025	42-32	810	>5000	
	Malathion (American Cyanamid)	5.0	1B	0.58	8.5	2800	4000	Pyrethroid Management: To lessen the chance of pyrethroid resistance developing select an alternating chemistry (op or carbamate) for grasshopper control.

Workers should observe the following reentry intervals for each of the respective insecticides: Confirm and Intrepid - 4 hours after application; Zephyr - 12 hours after application. Many other cotton insecticide labels state "Do not enter treated fields before spray is dry."

COTTON INSECT CONTROL SUGGESTIONS MINOR PESTS (CONT'D)

ECONOMIC THRESHOLDS	INSECTICIDE (COMPANY)	LBS/GAL TECH.	MOA GROUP NUMBER	RATE/ACR E LB/A.I.	ACRES TREATED PER GAL/LB	TOXICITY		COMMENTS
						RAT ORAL	RABBIT DERMAL	
THRIPS								
Economic damage may occur when plants avg. 3 or more thrips per plant before the 4-leaf stage.	Othene S (Amvac)	0.9	1B	0.14-0.9	6.4-1.0	700	2000	Di-Syston and Orthene are labeled for hopperbox and in-furrow application. Consult label for proper rates and application instructions.
	Carbofuran-Furadan F (FMC)	4.0	1A	2.5oz/1000ft	4.0	11	10200	
	Temik ^r G (Bayer Crop Science)	0.15	1A	0.3-0.75	0.5-0.2	1	20	
	Thimet ^r 20-G	0.2	1B	0.5-0.75	0.4-0.27	2	6	
	Thimet ^r 15-G (American Cyanamid)	0.15	1B	0.5-0.75	0.3-0.2			
	Foliar							
	Bidrin ^r MW (Amvac)	8.0	1B	0.1-0.5	80.0-16.0	22	225	
	Dimethoate EC (Helena, UAP Estes)	2.67	1B	0.12-0.25	21.3-10.6	320	650	
	Centric (Syngenta)	0.4	4B	0.05	64.0	≥5000	≥2000	
	Cygon EC (Wilber-Ellis)	4.0	1B	0.12-0.25	32.0-16.0	320	650	
Orthene S (Valent)	0.97 0.9 0.75	1B	0.18 0.18 0.18	5.1 5.0 4.0	700	2000		

Publications to help cotton producers are: EPP 7153, 7154, and 7161; CR 7172, 7173, and 7181; and L233.

COTTON INSECT CONTROL SUGGESTIONS MINOR PESTS (CONT'D)

ECONOMIC THRESHOLDS	INSECTICIDE (COMPANY)	LBS/GAL TECH.	MOA GROUP NUMBER	RATE/ACRE LB/A.I.	ACRES TREATED PER GAL/LB	TOXICITY RAT RABBIT ORAL DERMAL	COMMENTS
	<u>Seed Treatment</u>						
	Cruiser 5FS (Syngenta)		4A	0.476	7.75 FL OZ/ 100 lbs seed	>5000 ≥2000	Control will vary depending on thrips species encountered.
	Guacho 480 (Bayer Crop Science)	4.0	4A		6-8 FL OZ/ 100 lbs seed	4350 ≥2000	Poor control may result in production regions where the western flower thrips is the predominate species.
	Guacho 600 (Bayer Crop Science)	5.0	4A		12.8fl oz/cwt	4360 ≥2000	
STINK BUGS							
Treat stink bugs when 20% of 12 16-day-old bolls have internal injury. Stink bug populations are normally clumped in fields, thus numerous samples may be required to assess infestation.	Acephate 90 (TenKoz)	0.90	1B	0.72	1.25	700 2000	
	Bidrin MF (Amvac)	8.0	1B	0.25-0.5	32-16	22 225	
	Orthene 97 (Amvac)	0.97	1B	0.72	1.29	700 2000	
	Vydate C-LV (Dupont)	3.77	1A	0.33-0.5	11.4-7.5	8.7 >5000	
	Hero EC (FMC) Zeta-Cypermethrin + Bifenthrin	1.24	3B	0.05-0.10	25-12	550 >5000	
	Mustang Max Zeta-Cypermethrin	0.8	3B	0.017-0.23	48-35	810 >5000	
WESTERN FLOWER THRIPS							
Control measures should begin when western flower thrips exceed 15/bloom.)						Control difficulties may occur due to the resurgence of this pest. Late season infestation reduces the immature fruit normally shed when harvest aids are applied to condition cotton for harvest.

COTTON INSECT CONTROL SUGGESTIONS MINOR PESTS (CONT'D)

ECONOMIC THRESHOLDS	INSECTICIDE (COMPANY)	LBS/GAL TECH.	MOA GROUP NUMBER	RATE/ACRE LB/A.I.	ACRES TREATED PER GAL/LB	TOXICITY RAT RABBIT ORAL DERMAL	COMMENTS
MITES							
Consider treatment when leaves first start to look silvery on under-sides and discoloration appears on upper surface; and mites are present.	Bidrin ^r MW (Amvac)	8.0	1B	0.25-0.50	32.0-16.0	22 225	Applications should begin after plants have hardened, usually when plants reach 10-12 inches tall. Rate depends on size of plant and density of foliage. Begin applications when mites are first noticed and repeat if necessary. REI=12 hrs. 3-10 g/a solution apply when population is low and early in development.
	Brigade EC (FMC)	2.0	3B	0.04-0.1	49.2-20.0	275 2000	
	Comite EC (Uniroyal)	6.0	2A	0.8-1.6	7.5-3.7	2000 10,000	
	Dimethoate EC (Helena, UAP Estes)	2.67	1B	0.25	10.6	320 650	
	Cygon EC (Wilber-Ellis)	4.0	1B	0.25	16.0	320 650	
	Curacron ^r E (Syngenta)	8.0	1B	0.5-1.0	16.0-8.0	662 192	
	Kelthane MF (Dow Agro Science)	4.0	20B	1.0-1.5	4.0-2.7	809 1870	
	Zephyr ^r (Syngenta)	0.15	6C	.00468-0.01875	16.0-8.0	300 1800	
	Zeal (Valent)	7.0 estimated	10B	0.59-0.9	30-20	>5000 (Rat)	
	Hero EC	1.24	3B	0.10	12.4	550 >5000	

^r Restricted Use Pesticide

MOA Group Tables start on page 46 of the handbook.

COTTON INSECT CONTROL SUGGESTIONS

LIMITATIONS/RESTRICTIONS ON COTTON INSECTICIDES:

Asana[®] XL Wait 21 days to harvest. Do not graze livestock on treated fields or feed treated trash. Do not plant root crops other than those listed on the Asana XL label within 12 months after last application. Root crops on the label and all other rotation crops may be planted immediately after last application. Do not apply more than .05 lbs (A.I.) to a crop in a growing season.

Baythroid XL –

Brigade Do not apply more than 0.5 lb active per acre per season. Do not apply within 14 days of harvest. Do not graze or

Brigadier Do not apply more than 39.6 oz/season. Do not apply within 14 days of harvest. Do not graze or feed to livestock.

Centric Do not exceed total of 6 oz (2 applications) per acre per crop. Allow 14 days between applications. Wait 21 days to harvest.

Comite Apply only before bolls open. Do not feed treated foliage or cotton trash.

Confirm Do not apply any more than 16 fl. oz per application and do not exceed 64 fl oz per application. Allow at least 14 days to elapse between final application and harvest.

Carbine Do not apply more than 28 oz per application. Max of 8.4 oz/season.

Curacron[®] Wait 14 days to harvest. Do not apply more than 3 qts of Curacron 8E per acre per season. Do not graze treated cotton or feed gin waste.

Danitol[®] Do not exceed 0.8lb AI/acre. Do not apply within 21 days of harvest and do not feed gin trash.

Denim Do not apply through any type of irrigation system. Do not apply more than a total of 48 oz/A per crop season. Do not apply within 21 days of harvest. Do not allow livestock to graze in treated areas.

Diamond Do not apply more than 4 applications against armyworm or other foliage feeding caterpillars per season. Do not apply more than 42 oz. per acre per season. Do not apply within 30 days of harvest.

Dimethoate (Cygon) Wait 14 days to harvest. Do not apply more than once every 14 days and do not pasture fields or feed gin waste.

Dimilin Do not exceed six applications per season or 24 oz A.I. per season. Do not graze or plant crops within six months after treatment.

Di-Syston[®] Soil application: Do not apply more than twice per season (then a minimum of 21 days between applications). Foliar: A single application (1-2 pt) may be applied up to first bloom or a single application (1pt) can be applied up to 28 days before harvest. Do not apply more than twice per season.

Generic Cypermethrin[®] A maximum of 0.6 lb (A.I.) may be applied per season. Do not graze or feed cotton for forage. Do not apply within 21 days of harvest and do not plant rotational crops within 30 days after last application.

Hero Do not apply more than 0.45 lb (46 oz) per season. Do not graze treated areas. – PHI = 14 days.

Intrepid Do not apply more than 60 oz per acre per season. Allow at least 14 days to elapse between final application and harvest.

Intruder Do not make more than 4 applications per season; closer than 7 days apart nor exceed 0.4 lbs AI per acre. Pre harvest restriction is 28 days.

Kelthane Do not apply within 14 days of harvest. Do not feed cotton stalks or trash to cattle.

Lannate[®] Wait 15 days to harvest. Do not allow livestock to graze in treated areas. Do not feed gin trash or treated foliage to livestock.

Lorsban Wait 14 days to harvest. Do not allow livestock to graze in treated areas. Do not feed gin trash or treated foliage to livestock.

Malathion No restrictions up to 4 lb tech/A as dilute spray or 1.2 lb tech/A as ULV spray.

Mustang Max Max. of 0.15 lb (24 oz) per season. Do not graze or feed cotton for forage. – PHI = 14 days.

Orthene Wait 21 days to harvest. Do not graze treated fields and do not feed gin trash.

Provado Do not apply more than .5 lb A.I./acre per season or apply more than six applications. Do not graze treated fields.

Sevin No restrictions.

Steward - 12 hrs. REI. Do not apply more than 45 fl oz (.44 lb A.I./A) per crop. Wait 14 days to harvest.

Tracer Do not apply more than .45 lb A.I (14.4 oz) per acre per season. Do not apply within 28 days of harvest. Do not apply through any type of irrigation equipment.

Trimax Pro - Maximum rate for application 1.5 ox (0.047 lb A.I.); maximum rate per crop season 7.5ox (0.235 lb A.I.); Do not graze treated cotton fields.

Vydate[®] C-LV Do not graze or feed treated cotton to livestock. Wait 14 days to harvest.

Warrior[®] Do not apply within 21 days of harvest. Do not graze livestock in treated fields. Do not apply more than 1.6pts per season.

Zephyr - Do not apply more than two applications per acre per growing season. Do not apply within 20 days of harvest. Do not graze or feed foliage. Do not apply through any type of irrigation system.

COTTON WEED SUGGESTIONS

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
2,4-D LV6 5.6 lb ai per gallon All applications: 2/3 – 2 2/3 pt /A	Active Ingredients: 2,4-Dichlorophenoxyacetic Acid MOA: 4	PRE-PLANT BURNDOWN. Apply at least 30 days prior to planting cotton for control of existing broadleaf weeds. Tank-mix with glyphosate for additional control of grass species.	Coverage is essential for good control. Do not apply this product through any type of irrigation system. In order to maximize control of horseweed, apply before horseweed reaches 6 inches in height. A minimum of 1.0 lb ai/acre is recommended for optimum control of horseweed.
Assure II 0.88 lb ai per gallon POST applications: 5-12 fl oz. /A	Active Ingredients: Quizalofop Similar Products: None MOA: 1	POST. Apply to young, actively growing grasses according to the rate chart listed in the label. If field is to be irrigated, apply product after irrigation. Do not apply more than 18 fl oz /A per season.	Do not apply this product through any type of irrigation system. Do not apply within 80 days of harvest. Do not feed forage or hay from treated areas.
Caparol 4 lb ai per gallon PRE applications: 2.4 pt /A	Active Ingredients: Prometryn Similar Products: None MOA: 5	PRE. Apply only in loam soil types. Apply at planting or shortly after planting at the rate of 2.4 pt /A. Labeled for use only in the Blacklands region.	Do not feed treated forage to livestock, or graze treated areas, or illegal residues may result. Do not use on glandless cotton varieties, or crop injury will occur. Do not make more than one application per year.
Clarity 4 lbs. ai per gallon EPP applications: 8 fl oz /A	Active Ingredients: Dicamba Similar Products: Banvel Rates may vary due to formulation. MOA: 4	EPP BURNDOWN. For best performance, apply when weeds are in the 2-4 leaf stage and rosettes are less than 2" in diameter. Following application and a minimum 1" of rainfall or overhead irrigation, a waiting interval of 21 days is required per 8 fluid ounces per acre or less. These intervals must be observed prior to planting cotton.	Do not apply through any type of irrigation equipment. Do not cultivate within 7 days after application. For optimum control of horseweed apply a minimum of 8 oz/A to 2-4 leaf weeds or rosettes less than 2 inches across. Consult label for cotton plant-back interval following application. Tank-mix with glyphosate for additional control of grass species.

COTTON WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Dual II Magnum 7.64 lb ai per gallon All applications: 1 to 1.33 pt /A	Active Ingredients: Metolachlor Similar Products: Dual Magnum Cinch MOA: 15	PPI. Apply and incorporate into top 1 inch immediately before planting, at planting, or after planting, but before crop or weeds emerge. PRE. Apply to soil surface at planting or after planting, but before weeds or crop emerges. POST. Apply after cotton emergence but prior to weed emergence. Will not control weeds that have already emerged prior to application. All applications. Apply at a rate of 1.0 pt/A on sandy loams, 1.0-1.33 pts/A on medium soil, or 1.33 pts/A on fine soils.	Do not use on sands and loamy sand. Do not feed forage from treated areas to livestock. PPI. PPI application is recommended if furrow irrigation is used or when a period of dry weather after application is expected. Crop should be planted below the level of incorporation; i.e., at least 1 inch on fine soils and 1.5 inches on coarse and medium soils. PRE. Do not apply on areas where water is likely to pond over the bed. Do not make broadcast applications to crops planted in furrows more than 2 inches deep.
Fusilade DX 2 lb ai per gallon POST applications: 48 fl oz /A	Active Ingredients: Fluazifop Similar Products: None MOA: 1	POST. Refer to label for weed specific application rates and timing. Thorough coverage of all plant grass foliage is important for good activity. Optimum control is achieved when young actively growing grasses are treated that are not under stress from moisture, temperature, low soil fertility, mechanical, or chemical stress. Always add either a crop oil, nonionic surfactant, or other adjuvant.	Do not apply to crop after boll set. Do not harvest within 90 days of application. Do not graze fields or harvest for forage or hay. If applied through irrigation system, apply only through sprinkler systems including center pivot, lateral move, end tow, side (wheel) roller, big gun, solid set, or hand move. Do not apply through any other type of irrigation system.
Fusion 2.56 lb ai per gallon POST applications: 6-12 fl oz /A	Active Ingredients: Fluazifop Fenoxaprop Similar Products: None MOA: 1 & 1	POST. Best control of susceptible grasses is obtained when applied to actively growing grasses before they exceed the recommended growth stages listed, refer to label for list of grasses and application rates for specific weeds and areas.	Do not apply this product through any type of irrigation system. Do not apply if rainfall is expected within 1 hour. Do not apply more than 24 fluid ounces per acre per season. Do not apply after boll set. Do not harvest within 90 days of application. Do not graze fields or feed treated forage or hay to livestock.
Roundup Power Max 5.5 lb ai per gallon All applications: 22 to 32 oz /A	Active Ingredients: Glyphosate Similar Products: Many Rates may vary due to formulation. MOA: 9	PPS or PRE. May be applied before, during or after planting crop. Applications must be made prior to emergence of the crop. POST (conventional cotton). May be applied through hooded sprayers, recirculating sprayers, shielded applicators or wiper applicators. Allow at least 7 days between application and harvest. POST (Roundup Ready Cotton). Apply from ground cracking up to the four leaf stage of growth. May be applied through layby with directed or hooded sprayers. Contact with leaves should be avoided. Post (Roundup Ready Flex Cotton). Apply anytime from preemergence to 7 days prior to harvest. Late season applications may require directed applications to ensure proper coverage.	Do not apply through any type of irrigation system. Do not apply more than 5.3 qt per acre per year. Refer to label for application rates for specific weed types. Do not apply postemergence to any crops other than those listed as Roundup Ready or Roundup Ready Flex. Do not apply to Roundup Ready or Roundup Ready Flex crops within 7 days of harvest. For optimal horseweed control apply a tank-mix of 22 oz/A Roundup Original Max + a minimum of 1.0 lb ai /A 2,4-D or 8 oz/A of Banvel. Consult product labels for optimum horseweed size at application.

COTTON WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Gramoxone Inteon^f 2 lb ai per gallon PRE Burndown applications: 2.5 to 4 pt /A	Active Ingredients: Paraquat Similar Products: Firestorm (3 lb) MOA: 22	PRE BURNDOWN. Apply prior to, during, or after planting, but before crop emergence. For fallow bed treatment, beds should be performed to permit maximum broadleaf weed and grass emergence prior to treatment. Seeding should be done with minimum soil disturbance.	Do not apply this product through any type of irrigation system. Always add nonionic surfactant. Complete coverage is essential for good control.
Ignite 280 2.34 lb ai per gallon POST applications: 22 to 29 fl oz /A	Active Ingredients: Glufosinate-ammonium Similar Products: None MOA: N	PREPLANT BURNDOWN. Apply to actively growing weeds up to 120 prior to planting cotton. POST over-the-top. Apply POST, over LibertyLink Cotton varieties only, to actively growing weeds when the cotton has emerged and up to the cotton early bloom stage.	Do not apply more than 29 fl oz/A in a single application. Do not apply more than 58 fl oz/A in a growing season. Do not apply within 70 days prior to harvest. Herbicide should be applied broadcast in a minimum of 15 gallons of water per acre. Use a spray volume of 20 to 40 gallons per acre for dense weed/crop canopies so that thorough spray coverage will be obtained.
Karmex DF 80% DF EPP applications: See table PRE applications: See table POST applications: 1 to 1.5 lb /A	Active Ingredients: Diuron Similar Products: Direx 4L Direx 80 DF Diuron 4L Diuron 80 DF Diuron 80 WDG MOA: 7	PPS. Apply from 15 to 45 days prior to planting. PRE. Use only where crop is planted on flat or raised seedbeds. POST-directed applications. Apply 1 to 1.5 lb/A when crop is at least 12" high. In irrigated crops, best control is obtained if the field is irrigated within 3-4 days after application. Apply to soil beneath crop and between rows immediately after last cultivation.	Do not spray over the top of crop plants. Do not apply to sand or loamy sand soils. Do not use on soils with less than 1% organic matter as crop injury may result. Do not use in preplant or preemergence applications where soil-applied organophosphate insecticides are used due to potential for severe crop injury and possible stand loss. Do not allow livestock to graze treated cotton. EPP & PRE. If less than the maximum rate is used, a second PRE application can be made, but total can not exceed maximum use rates listed. Do not apply PRE if maximum application rate was used in preplant application.

Karmex DF Application Rates		
Soil Texture	Rate/Acre	Rate/Acre/Season
Sandy loam, Loam, Silt loam, Silt	1 lb /A	1 lb /A
Sandy clay loam, Clay loam, Silty clay loam, Sandy clay	1.25 lb /A	1.25 lb /A
Silty clay, Clay	2 lb /A	2.75 lb /A

COTTON WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
MSMA 6.6 6.6 lb ai per gallon All applications: 0.5 to 2.5 pt /A	Active Ingredients: MSMA Similar Products: MSMA 6 Plus 120 Herbicide 912 Herbicide MOA: 17	PRE. Apply preplant or postplant up to cracking of soil before cotton emergence using ground or aircraft equipment. Apply at a rate of 2.5 pt/A of product with a suitable surfactant. POST (Over the Top). Apply over the top when crop is 3 to 6 inches tall or up to early first square stage, apply at a rate of 1 to 1.25 pts/A with a suitable surfactant. Will cause significant leaf burn of the crop. POST (Directed Spray). Applicable as a directed spray with ground equipment when crop is 3 inches tall to first bloom, apply at a rate of 2.5 pt/A with a suitable surfactant.	Apply over the top of crop only as a salvage operation; apply only to healthy, rapidly growing crops, 3 inches high but no later than 6 inches high. POST (Directed Spray). Do not apply as a directed spray after the first bloom. A second or repeat application, if needed, should be timed about 1 to 3 weeks after first application.
Poast Plus 1 lb ai per gallon POST applications: 1.5 to 3.75 pt /A	Active Ingredients: Sethoxydim Similar Products: Poast <u>Rates may vary due to formulation.</u> MOA: 1	POST. Applications can be made to actively growing weeds as aerial, broadcast, band, or spot spray applications. Most effective control is achieved if applied when weeds are small and actively growing.	Do not apply this product through any type of irrigation system. Do not apply within 40 days of harvest. To achieve consistent weed control, always use either seed oil or crop oil concentrate. Do not cultivate within 5 days before or 7 days after application. Processed meal may be fed to animals.

COTTON WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Prowl 3.3 EC 3.3 lb ai per gallon All applications: See table.	Active Ingredients: Pendimethalin Similar Products: Pendimax 3.3 MOA: 3	PPS. Apply up to 15 days prior to planting. PPI. Apply up to 60 days prior to planting and incorporate within 7 days of application; however, immediate incorporation is best. PRE. Apply overlay application at planting or up to 2 days after planting. Total amount applied per acre cannot exceed the highest labeled rate for a given soil type. POST/LAYBY. Apply directly to the soil between rows as a directed spray following the last normal cultivation (layby). Fall Application. May be applied for weed control in cotton in the fall, after Oct. 15 (up to 140 days prior to planting). Apply at a broadcast rate of 1.8 pt /A on coarse soils, 2.4 pt /A on medium soils and 3.6 pt /A on fine soils.	If applied through irrigation system, use only center pivot, lateral move, end tow, side (wheel) roll, traveler, big gun, solid set, or hand move irrigation systems. Do not apply this product through any other type of irrigation system for layby applications. Do not apply as a broadcast spray over the top of crop. Do not feed forage or graze livestock in treated fields. Product is most effective when adequate rainfall or overhead irrigation is received within 7 days after application. Use higher rates listed for no-tillage applications for control of rhizome johnsongrass in specified soil textures. This use is not recommended for soils with more than 3% organic matter. There must be an interval of at least 60 days between the last application and harvest.

PPS, PPI &/or PRE	Prowl 3.3 EC Broadcast Rates pts/A		
Soil Texture	Conventional or Minimum Tillage	No-Tillage	
Coarse	1.2 to 2.4 pts /A	1.8 to 2.4 pts /A	
Medium	1.8 to 2.4 pts /A	2.4 to 3.6 pts /A	
Fine	2.4 to 3.6 pts /A	3.6 to 4.8 pts /A	
For heavy clay soils, apply at a broadcast rate of 3.6 pts /A.			
Total amount applied per acre cannot exceed the highest labeled rate for a given soil type.			

POST/LAYBY	Prowl 3.3 EC Layby Application Use Rates	
Soil Texture	Use Rate pts /A	
Coarse	1.2 to 1.8 pts /A	
Medium	1.8 to 2.4 pts /A	
Fine	2.4 to 3.6 pts /A	

COTTON WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Select 2 EC 2 lb ai per gallon POST applications: 6 to 16 fl oz /A	Active Ingredients: Clethodim Similar Products: Prism MOA: 1	POST. Apply to actively growing grasses, refer to label for specific rates for weed type. In arid regions, application should be made as soon as possible after irrigation (within 7 days). A second application will generally provide more effective perennial grass control in arid conditions than a single application. Make second application to actively growing grass 2 to 3 weeks after emergence of new growth.	Do not apply within 60 days of harvest. Do not graze treated fields or feed treated forage or hay to livestock. Do not apply through any type of irrigation system. Do not apply if rainfall is expected within one hour of application. Always use a crop oil concentrate at 1.0 qt /A by ground or 1% v/v in the finished spray volume by air. Refer to label for application rates for specific grass species controlled.
Sequence 5.25 lb ai per gallon All applications: 2.5 to 4 pt/A	Active Ingredients: Metolachlor & Glyphosate Similar Products: None MOA: 15 & 9	EPP. Apply prior to planting for control of emerged actively growing weeds and soil residual activity. Do not incorporate if applied EPP or crop injury will result. PRE. Apply after planting in no-till production system for control of emerged actively growing weeds and soil residual activity. POST only on Roundup Ready Cotton Varieties. Apply after crop and weeds have emerged for control of emerged actively growing weeds and soil residual activity.	Do not apply POST to non-Roundup Ready cotton varieties. Do not graze or feed forage or fodder from Sequence treated cotton to livestock. Do not apply EPP or PRE on sand or loamy sand soils. POST applications on Roundup Ready Cotton Varieties: apply to cotton that is 3 inch tall up to 4-lf stage of growth. Do not exceed 2.5 pt/A in a single application. Do not exceed 3.5 pt/A/season. Do not harvest cotton within 100 days of POST application. Do not use AMS or other adjuvants when POST applications are made.
Staple LX 3.2 lb ai per gallon PRE applications: 1.3 to 2.1 oz /A POST applications: 2.6 to 3.8 oz /A	Active Ingredients: Pyriithiobac Similar Products: None MOA: 2	PRE. May be applied preemergence to aid in the control of many problematic weeds. Applications require rainfall or sprinkler irrigation to activate the herbicide. Use the higher application rate for difficult to control weeds or in fields where high infestation of weeds occur. POST. Application should be made over-the-top or as a post-directed spray to cotton (begin at cotyledon stage) and actively growing weeds.	PRE. Do not apply through any type of irrigation system. Do not use on coarse soils such as sands or loamy sands. Do not use on soils with less than 0.5% organic matter. Do not use on crops planted in furrows. POST. Use a minimum of 10 gallons of water per acre by ground or 3 gallons of water per acre by air. All rates are broadcast. Use proportionately less for banded applications. All applications. Do not apply more than 5.1 oz/A per year. Add a non-ionic surfactant at the rate of 0.25-0.5% v/v or a crop oil concentrate at the rate of 1-2% v/v with all postemergence applications. Under arid conditions, a crop oil concentrate is recommended. Weed size at application is critical for optimal control, consult label for appropriate weed sizes.

COTTON WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Treflan HFP 4.0 lb ai per gallon PPI applications: See table.	Active Ingredients: Trifluralin Similar Products: Treflan TR-10 Trifluralin HF Trust 10G Trust 4EC Trust Herbicide MOA: 3	Fall applications. Apply to flat ground and incorporate once within 24 hours. Spring applications. Application and incorporation may occur before planting or after planting prior to crop emergence. Use the lower application rates when sequential applications are anticipated. Layby applications. Application may be made in established crops from the 4 true leaf stage of growth up to layby, but no less than 90 days before harvest.	If applying through irrigation system: Apply only through continuously moving center pivot, lateral move end tow, solid set, or hand move irrigation systems. Refer to label for additional chemigation instructions. Do not apply to soils that are wet or are subject to prolonged periods of flooding as poor weed control may result.

Treflan HFP Application Rates					
Soil Texture	Spring Application	Fall Application	Chemigation Application	Conservation Tillage	Layby Application
Coarse	1 pt /A	2 pt /A	1-3 pt /A	1-2 pt /A	1 pt /A
Medium	1.25-1.5 pt /A	2 pt /A	1.5-4 pt /A	1.5-2 pt /A	1.5 pt /A
Fine	1.5-2 pt /A	2.5 pt /A	2-4 pt/A	2-4 pt /A	2 pt /A

Valor SX 51% WP Preplant Burndown applications: 1 to 2 oz/A POST-Directed/Hooded applications: 2.0 oz/A	Active Ingredient: Flumioxazin Similar Products: Valor <u>Rates may vary due to formulation</u> MOA: 14	Preplant Burndown Applications. A minimum of 14 to 30 days must pass prior to planting cotton after application depending on tillage system and rate applied, consult label. POST-Directed/Hooded Applications. Precautions should be taken to avoid contacting the green foliage of cotton plants or severe crop injury may result. Cotton should be at least 6 inches in height at the time of application. Direct the spray onto the bottom 2 inches of the cotton stem-bark layer. Do not allow spray to contact green cotton stems. Layby Application Layby application of VALOR SX tank mixes may be made once cotton has developed a minimum of 4 inches of bark and has reached a minimum of 18 inches in height. Cotton that is smaller than 18 inches in height and/or has less than 4 inches of bark may be injured by VALOR SX applications. VALOR SX application must be directed to the lower 2 inches of bark to avoid crop injury. Severe crop injury may result if application is made to green or unbarked stem.	Do not graze treated fields or feed treated forage or hay to livestock. Do not incorporate into the soil after application. Do not apply more than 2 oz/A in a single application or 4 oz/A during a single growing season. Do not make a sequential Valor WP application within 30 days of the previous Valor application. Do not apply within 60 days of harvest. Do not use on crops grown for seed. Only apply with nonionic surfactant, do not apply with crop oil concentrate, methylated seed oil or other types of adjuvants as crop injury may result. Valor should be tank mixed with glyphosate or MSMA to provide grass control. Consult label for rotation intervals to other crops. Spray equipment used to apply VALOR SX should not be used to apply other materials to any crop foliage
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MOA Group Tables start on page 46 of the handbook.

SUGGESTIONS FOR GROWTH REGULATORS IN COTTON

Trade Name	Active Ingredients Similar Products	Suggested Rates Per Acre	Water Volume Recommended		COMMENTS
			GROUND	AIR	
GROWTH REGULATORS					
Mepichlor 0.35 lb ai per gallon	Mepiquat Chloride Pix Mepex	2-16 fl oz	>2	>2	Apply when plants are in early bloom stage. Mepichlor should not be applied if plants are under severe stress from weather factors, mite, insect or nematode damage, disease stress, herbicide injury or fertility stress. Option of single, dual or up to four low rate multiple applications. If drought stress occurs when Pix is applied, or after a full rate (0.5 to 1 pt) is applied, results won't be optimal. Low rate multiple applications initiated at pin-head square give producers the option of discontinuing applications if stresses occur.
Mepex Gin Out 0.35 lb ai per gallon	Mepiquat Chloride + Kinetin	8 fl oz	>2	>2	Apply when plants are in early bloom stage. Product should not be applied if plants are under severe stress from weather factors, mite, insect or nematode damage, disease stress, herbicide injury or fertility stress. Sequential applications can be made 14-21 days later if needed.
Pentia 0.82 lb ai per gallon	Mepiquat Pentaborate	4-24 fl oz/A	>10	>2	Lower application rates may begin at pinhead square with sequential applications 14 days apart as needed. Total seasonal use must not exceed 48 oz/A. Do not apply to insect, disease, or fertility-stressed cotton, drought-stressed cotton or cotton lacking soil moisture. Do not apply to cotton stressed from herbicide injury.
Stance 0.736 lb ai per gallon 0.184 lb ai per gallon	Mepiquat Chloride + Cyclanilide	2-3 fl oz/A	>10	>2	Begin initial applications at 50% matchhead square growth stage. Sequential applications may be made 7-14 days later as needed. Do not apply to insect, disease, or fertility-stressed cotton, drought-stressed cotton or cotton lacking soil moisture. Do not apply to cotton stressed from herbicide injury.

COTTON HARVEST AID SUGGESTIONS FOR OKLAHOMA

	AVERAGE TEMP >70 F	AVERAGE TEMP < 70 F
Yield Projection <300 lbs./A	Gramoxone Inteon* (16-32 oz) Gramoxone Inteon fb Gramoxone Inteon* (8-16 oz fb 16-32 oz) Ginstar* (6-8 oz) Resource (6-8 oz) or Aim* (1 oz) or ET (1.4 oz) or Blizzard* 0.5-0.6 oz plus COC	Gramoxone Inteon* (16-32 oz) Gramoxone Inteon fb Gramoxone Inteon* (8-16 oz fb 16-32 oz) Resource* (6-8 oz) or Aim* (1 oz) or ET (1.4 oz.) or Blizzard* 0.5-0.6 oz plus COC
Yield Projection 300 – 500 lbs./A	Gramoxone Inteon fb Gramoxone Inteon* (8-16 oz fb 16-32 oz) Ethephon + Def or Folex (1-2 pt + 0.75 pt) Ethephon + Resource (1-2 pt + 6-8 oz) Finish fb Def or Folex (1 pt. fb 12-16 oz) First Pick + Ginstar (3 pts + 3-6 oz) First Pick + Def or Folex (3 pts + 1 pt) Ginstar* (6-10 oz) Finish + Ginstar (1 pt + 3-8 oz) Ethephon + Ginstar (1-2 pt + 3-8 oz) Ethephon (1-2 pt) + Resource* (6-8 oz) or Aim* (1oz) or ET* (1.4 oz) or Blizzard* (0.5-0.6 oz) fb Resource* (4-6 oz) or Aim* (1oz) or ET* (1.4 oz) or Blizzard* (0.5-0.6 oz) fb Resource* (4-6 oz)	Gramoxone Inteon fb Gramoxone Inteon* (8-16 oz fb 16-32 oz) Ethephon + Def or Folex (1-2 pt + 1 pt) Ethephon + Resource (1-2 pt + 6-8 oz) Finish + Def or Folex (1 pt + 1 pt) First Pick + Ginstar (3 pts + 3 oz) First Pick + Def or Folex (3 pts + 1 pt) Ethephon + Harvade (1-2 pt + 8 oz) Ethephon (1-2 pt) + Resource* (6-8 oz) or Aim* (1oz) or ET* (1.4 oz) or Blizzard* (0.5-0.6 oz) fb Resource* (4-6 oz) or Aim* (1oz) or ET* (1.4 oz) or Blizzard* (0.5-0.6 oz)
Yield Projection >500 lbs./A	Finish + Def. or Folex (1-2 pt + 1 pt) Ethephon + Def or Folex (1-2 pt + 1 pt) Ethephon + Resource (1-2 pt + 6-8 oz) Def./Folex fb Gramoxone Max* (1 pt fb 11-21 oz) First Pick + Ginstar (3 pts + 3-6 oz) First Pick + Def or Folex (3 pts + 1 pt) Finish + Ginstar (1 pt + 6-8 oz) Ginstar* (12 oz) Ethephon (1-2 pt) + Resource* (6-8 oz) or Aim* (1oz) or ET* (1.4 oz) or Blizzard* (0.5-0.6 oz) fb Resource (4-6 oz) or Aim* (1oz) or ET (1.4 oz) or Blizzard	Finish + Def. or Folex (1.5-2 pt + 1 pt) Ethephon + Def or Folex (1-2 pt + 1 pt) Ethephon + Resource (1-2 pt + 6-8 oz) Gramoxone Max fb Gramoxone Max* (5-11 oz fb 16-21 oz) First Pick + Ginstar (3 pts + 3 oz) First Pick + Def or Folex (3 pts + 1 pt) Ethephon (1-2 pt) + Resource (6-8 oz) or Aim* (1oz) or ET* (1.4 oz) or Blizzard* (0.5-0.6 oz) fb Resource* (4-6 oz) or Aim* (1oz) or ET* (1.4 oz) or Blizzard* (0.5-0.6 oz)

Fb= followed by (a second application normally made 7-14 days after initial application).

Most chemicals applied to dry leaves will need addition of a silicone surfactant to aid in leaf penetration.

In cooler temperatures, addition of a crop oil concentrate and/or ammonium sulfate will enhance activity

of Ethephon, Def./Folex or Dropp. COC required with Harvade.

A desiccant rate of Gramoxone Max (11-21 oz) might be required 7-10 days after a boll opener and/or defoliant application to condition the crop for stripper harvest.

Use ET or Aim + COC to help desiccate weeds in problems areas.

Ethephon is sold as Prep, Ethephon 6, Super Boll, Boll'd.

Resource must be applied with 1-2 pints COC/A; NIS can be used under ideal conditions)

*These Treatments do not include a boll opener and should only be used on cotton that is >85% open.

PASTURE AND RANGE INSECT CONTROL SUGGESTIONS

Pest, Damage and Treatment Threshold	Insecticide Formulation and MOA Group*	Rate of Product/Acre	Comments
<p>Ants (including fire ants) Ants range in size from 1/16 inches to nearly 1/2 inch in length and from light tan to black in color. These social insects live in a colony with thousands of workers. The two most important pest species for rangeland and pasture are the red imported fire ant and the red harvester ant.</p> <p><u>Damage:</u> Fire ants can be an irritant to cattle as they feed. Harvester ants sometimes clear large patches of grass as they feed.</p> <p><u>Threshold:</u> No threshold established.</p>	<p style="text-align: center;"><u>Baits</u></p> <p style="text-align: center;">Amdro Pro (20)</p> <p style="text-align: center;">Award (7B)</p> <p style="text-align: center;">Distance (7C)</p> <p style="text-align: center;">Extinguish (7A)</p> <p style="text-align: center;">Justice (5)</p> <p style="text-align: center;"><u>Non Baits</u></p> <p style="text-align: center;">Sevin 80S (1A) Sevin 80 WSP (1A) Sevin 4F (1A) Sevin XLR Plus (1A)</p>	<p style="text-align: center;">3-5 tbs/mound (1 to 1.5 lb/acre)</p> <p style="text-align: center;">1-3 tbs/mound (1 to 1.5 lb/acre)</p> <p style="text-align: center;">1 to 4 tbs/mound (1 to 1.5 lb/acre)</p> <p style="text-align: center;">3-5 tbs/mound (1 to 1.5 lb/acre)</p> <p style="text-align: center;">4-6 tbs/mound</p> <p style="text-align: center;">8.3 gms/gal water 1 pak/67.3 gal water 0.75 oz/gal water 0.75 oz/gal water</p>	<p>Do not exceed 4 applications per year. Do not exceed 8 lb per acre/year. 7 day waiting period for harvest.</p> <p>For non-grazed or horse-grazed pasture/rangeland only.</p> <p>For non-grazed rangeland and pasture only.</p> <p>0 day waiting period for grazing or harvesting.</p> <p>Individual mound treatment only. Repeat every 10-12 weeks as needed.</p> <p>For red imported fire ants. Individual mound treatment only. Repeat application in 7 days if activity resumes.</p> <p>For all ant baits: Apply treatment when ants are active and soil temperatures exceed 60 degrees. If treating individual mounds, estimate the mound density, and do not disturb the mound or apply the bait directly on the mound according to label directions.</p>
<p>Armyworm Caterpillar can reach slightly over 1 inch. Dark green or brown with 5 stripes along body.</p> <p><u>Damage:</u> Feed on foliage, usually a problem in the spring.</p> <p><u>Threshold:</u> Treat when caterpillars are abundant and foliage is being destroyed.</p>	<p><i>Bacillus thuringiensis</i></p> <p style="text-align: center;">Biobit (11B1, B2)</p> <p style="text-align: center;">Javelin WG (11B1, B2)</p> <p style="text-align: center;">Xen Tari(11B1, B2)</p> <p style="text-align: center;">Confirm 2F (18)</p> <p style="text-align: center;">Lannate^r (1A)</p> <p style="text-align: center;">Malathion 5EC (1B)</p> <p style="text-align: center;">Methyl parathion^r 4E (1B)</p> <p style="text-align: center;">Sevin 80S (1A) Sevin 80 WSP (1A) Sevin 4F (1A) Sevin XLR Plus (1A)</p> <p style="text-align: center;">Tracer (5)</p>	<p style="text-align: center;">0.5 - 2 lb</p> <p style="text-align: center;">0.25 - 1.5 lb</p> <p style="text-align: center;">0.5 - 2 lb</p> <p style="text-align: center;">8 fl oz</p> <p style="text-align: center;">0.75 - 3 pt</p> <p style="text-align: center;">2 pt</p> <p style="text-align: center;">1.5 pt</p> <p style="text-align: center;">1.25 - 1.875 lb 1.25 - 1.875 lb 2 - 3 pt 2 - 3 pt</p> <p style="text-align: center;">1-2 fl oz</p>	<p>Use higher rate for heavy infestations or when plant growth is rapid. A contact insecticide may be added for enhanced control of heavy populations. 0 day waiting period for grazing or harvesting.</p> <p>0 day waiting period for grazing or harvesting.</p> <p>For Bermudagrass pasture ONLY. 7 day waiting period for grazing, 3 day waiting period for harvest.</p> <p>0 day waiting period for grazing or harvesting.</p> <p>Remove livestock when spraying; 15 day waiting period for grazing or harvesting.</p> <p>For improved pasture only: do not apply more than 2 applications per season and not more than once every 14 days. Sevin label states a 14 day waiting period for grazing or harvesting.</p> <p>0 day wait for grazing, 3 day wait for hay or fodder</p>

PASTURE AND RANGE INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage and Treatment Threshold	Insecticide Formulation and MOA Group*	Rate of Product/Acre	Comments
<p>Fall armyworm Large striped caterpillar that reaches 1.5 inches when mature. Has an inverted "Y" in the front of its head.</p> <p><u>Damage:</u> Feed on foliage, reducing forage. Typically a problem in the fall.</p> <p><u>Threshold:</u> Treat when worms are abundant and foliage is being destroyed.</p>	<p><i>Bacillus thuringiensis</i> Biobit (11B1, B2) Javelin WG (11B1, B2) XenTari (11B1, B2)</p> <p>Confirm 2F (18)</p> <p>Lannate^r LV (1A) Lannate^r SP (1A)</p> <p>Malathion 5E (1B)</p> <p>Sevin 80S (1A) Sevin 80 WSP (1A) Sevin 4F (1A) Sevin XLR Plus (1A)</p> <p>Tracer (5)</p>	<p>0.5 to 2 lb 0.25 to 1.5 lb 0.5 to 2 lb</p> <p>8 fl oz</p> <p>0.75 to 3 pt 0.25-0.5 lb</p> <p>2 pt</p> <p>1.25 to 1.875 lb 1.25 to 1.875 lb 2 to 3 pt 2 to 3 pt</p> <p>1-2 fl oz</p>	<p>Use higher rate for heavy infestations or when plant growth is rapid. A contact insecticide may be added for enhanced control of heavy populations. 0 day waiting period for grazing or harvesting.</p> <p>0 day waiting period for grazing or harvesting.</p> <p>For Bermudagrass pasture ONLY. 7 day waiting period for grazing, 3 day waiting period for harvest.</p> <p>0 day waiting period for grazing or harvesting.</p> <p>For improved pasture only: do not apply more than 2 applications per season and not more than once every 14 days. Sevin label states a 14 day waiting period for grazing or harvesting.</p> <p>0 day wait for grazing, 3 day wait for hay or fodder.</p>
<p>Grasshopper Distinctive insects with enlarged hind legs for jumping. Adults have two pair of wings, forewings leathery, hind wings membranous. They have chewing mouthparts. Adults range in size from 1/2 – 2 inches long.</p> <p><u>Damage:</u> Feed on foliage. Can damage from spring through fall, but more of a problem in late summer. Small grasshoppers less than 1/2 inches are more easily controlled and can be spot treated with foliar spray if nesting sites are mapped out in spring.</p> <p><u>Threshold:</u> Small nymphs:(less than 1/2 inches) 24-100 per yard²</p> <p>Large: (greater than 1/2 inches) 8-40 per yard²</p>	<p>PASTURE:</p> <p>Dimilin 2L (15)</p> <p>Sevin 80S (1A) Sevin 80 WSP (1A) Sevin 4F (1A) Sevin XLR Plus (1A)</p> <p>RANGE:</p> <p>Dimilin^r 2L (15)</p> <p>Malathion 5E (1B)</p> <p>Methyl parathion 4E^r (1B)</p> <p>Sevin 80S (1A) Sevin 80 WSP (1A) Sevin 4F (1A) Sevin XLR Plus (1A)</p>	<p>2 fl oz</p> <p>1.25 to 1.875 lb 1.25 to 1.875 lb 2 to 3 pt 2 to 3 pt</p> <p>0.5 – 2 fl oz</p> <p>1.5 – 2 pt</p> <p>1.5 pt</p> <p>0.675 to 1.875 lb 0.675 to 1.875 lb 1 to 3 pt 1 to 3 pt</p>	<p>Apply when majority of grasshoppers are 2nd or 3rd instar nymphs (less than 1/2 inches). Do not exceed a total of 2 fl oz per year.</p> <p>For improved pasture: do not apply more than 2 applications per season and not more than once every 14 days. Sevin label states a 14 day waiting period for grazing or harvest in pastures.</p> <p>Applications of Dimilin may be applied as a Reduced Area & Agent Treatment (RAAT) strip spray. See label for specific directions. Apply when majority of grasshoppers are 2nd or 3rd instar nymphs (less than 1/2 inches). Do not exceed 1 fl oz/acre/year. If second application is needed, wait 2-3 weeks from first application.</p> <p>0 day waiting period for grazing or harvesting.</p> <p>Remove livestock when spraying: 15 day waiting period for grazing or harvesting.</p> <p>0 day waiting period for grazing. Do not make more than one application of Sevin per year, and do not exceed 1.0 lb ai/acre per year.</p>

PASTURE AND RANGE INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage and Treatment Threshold	Insecticide Formulation and MOA Group*	Rate of Product/Acre	Comments
Tick:	PASTURE: Sevin 80S (1A) Sevin 80 WSP (1A) Sevin 4F (1A) Sevin XLR Plus (1A) RANGE: Sevin 80S (1A) Sevin 80 WSP (1A) Sevin 4F (1A) Sevin XLR Plus (1A)	1.25 to 1.875 lb 1.25 to 1.875 lb 1 to 1.5 qt 1 to 1.5 qt 1.25 lb 1.25 lb 1 qt 1 qt	For improved pasture: do not apply more than 2 applications per season and not more than once every 14 days. Sevin label states a 14 day waiting period for grazing or harvesting in pastures. 0 day waiting period for grazing. Do not make more than one application of Sevin per year, and do not exceed 1.0 lb ai/acre per year.

*Restricted Use Insecticide.

MOA Group Tables start on page 46 of the handbook.

Pre-harvest Intervals and grazing restrictions

Amdro	7 day waiting period for harvest
Confirm	0 day waiting period for grazing or harvest
Dimilin	0 day waiting period for grazing or harvest
Extinguish	0 day waiting period for grazing or harvest
Lannate ^f	For bermudagrass ONLY. 7 day waiting period for grazing, 3 day waiting period for harvest
Malathion	0 day waiting period for grazing or harvest
Methyl parathion ^f	15 day waiting period for grazing or harvest
Sevin	14 day waiting period for grazing or harvest
Tracer	0 day waiting period for grazing, 3 day waiting period for hay or fodder.

* Numbers in parentheses (#) that follow the insecticide name are used to designate the mode of action of the insecticide according to the classification system developed by the Insecticide Resistance Action Committee, (IRAC) in 2005. It is intended to help in the selection of insecticides for preventative resistance management. If you make multiple applications for a specific pest during a growing season, simply select a registered insecticide with a different number for each application. To further delay resistance from developing, integrate other control methods into your pest management programs.

PASTURE AND RANGE WEED CONTROL SUGGESTIONS

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
2,4-D Amine 3.8 lb ai per gallon POST applications: 1 to 2 qt/A	Active Ingredients: 2,4-D Similar Products: Many Rates may vary due to formulation. MOA: 4	POST. Preferably apply when weeds are small and actively growing before the bud stage. Repeated applications may be needed for less susceptible weeds. Refer to label for application rates for specific target weeds.	Do not graze dairy animals for 7 days after application. Do not cut grass for hay for 30 days after treatment. Remove meat animals from treated areas 3 days prior to slaughter. Do not use on alfalfa, clover, other legumes, or newly seeded pastures. Do not apply if rainfall is expected within 1 hour.
2,4-D Ester 3.8 lb ai per gallon POST applications: 1 to 2 qt/A	Active Ingredients: 2,4-D Similar Products: Many Rates may vary due to formulation. MOA: 4	POST. Preferably apply when weeds are small and actively growing. Repeated applications may be needed for less susceptible weeds. Refer to label for application rates for specific target weeds.	Do not graze dairy animals for 7 days after application. Do not cut grass for hay for 30 days after treatment. Remove meat animals from treated areas 3 days prior to slaughter. Do not use on alfalfa, clover, other legumes, or newly seeded pastures. Do not apply if rainfall is expected within 1 hour. Use with caution as this formulation is volatile.
Amber CustomPak 75% WDG POST applications: 0.28 to 0.56 oz/A	Active Ingredient: Triasulfuron Similar Products: Amber Accu-Pak MOA: 2	POST. Apply to emerged and actively growing weeds. A nonionic surfactant should be included in the spray mixture. Apply the initial application at the standard rate of 0.28 oz/A, followed by a second application not more than 60 days later at up to 0.56 oz/A.	Do not cut for hay for 30 days following application. Grazing may occur immediately following application. Do not apply more than 0.84 oz/A per year.
Banvel 4 lb ai per gallon All applications: 0.5 pt/A to 2 qt/A	Active Ingredient: Dicamba Similar Products: Clarity, Overdrive, Sterling MOA: 4	POST. May be applied to small actively growing weeds as well as established weed growth. Refer to label for application rates for specific target weeds and growth stages. Use rates of 0.5 to 3 pt/A for annual and biennial weeds, and 0.5 to 2 qt/A for perennial weeds and woody brush and vines.	Do not exceed a total of 2 qt/A per season. Do not remove animals from treated areas for slaughter prior to 30 days after last application. See table for lactating animal grazing and haying restrictions. There is no waiting period between treatment and grazing for non-lactating animals.

Banvel timing Restrictions for Lactating Animals		
Rate per Treated Acre	Days Before Grazing	Days before Hay Harvest
Up to 1 pt /A	7 days	37 days
Up to 1 qt /A	21 days	51 days
Up to 2 qt /A	40 days	70 days

PASTURE AND RANGE WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Cimarron Plus 60% DF POST applications: 0.125 to 1.25 oz/A	Active Ingredient: Metsulfuron methyl Similar Products: Ally XP Metsulfuron Methyl 60 DF Purestand MOA: 2	POST. For best results, apply to young, actively growing weeds. The use rate depends upon the weed spectrum and size of weeds at application.	Do not apply more than 1.66 oz/A per year. There are no grazing or haying restrictions for this product. . Refer to label for precautions and restrictions of use in fescue and timothy grass. For sericea lespedeza control, apply 0.4 - 0.5 oz/A Cimarron Plus with 0.5% v/v surfactant in the fall during full bloom stage.

Crossbow 3.0 lb ai per gal POST applications: 1 to 4 qt/A	Active Ingredients: 2,4-D Triclopyr Similar Products: None MOA: 4 & 4	POST. Apply when weeds are actively growing. Re-treatment of hard to control weeds may be necessary. Apply no more than 1 gallon/A per season.	Do not allow lactating dairy animals to graze treated areas until the next growing season following application. Do not harvest hay for 14 days after application. Remove livestock from treated grass at least 3 days before slaughter.
Curtail 2.38 lb ai per gallon POST applications: 2 to 4 qt/A	Active Ingredients: Clopyralid 2,4-D Similar Products: None MOA: 4 & 4	POST. Apply when weeds are actively growing. Apply 2 qt/A rate on light to moderate infestations under good growing conditions. Apply 3 qt/A rate on dense infestations or poor growing conditions such as drought. For control of Russian knapweed, apply 3-4 qt/A at the early bud to mid-flowering stage or on fall regrowth.	Do not use on newly seeded areas until grass is well established as indicated by vigorous growth and development of tillers and secondary roots. Do not graze lactating dairy animals in treated areas for 14 days after application. Do not cut treated grass for hay within 30 days after application. Remove meat animals from freshly treated areas 7 days before slaughter. Withdrawal is not needed if 2 weeks or more have elapsed since application. Do not transfer livestock from treated grazing areas to sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated pasture.

PASTURE AND RANGE WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Curtail M 2.77 lb ai per gallon POST applications: 2 to 4 qt/A	Active Ingredients: Clopyralid MCPA Similar Products: None MOA: 4 & 4	POST. Apply when weeds are actively growing. Apply 2 qt/A rate on light to moderate infestations under good growing conditions. Apply 3 qt/A rate on dense infestations or poor growing conditions such as drought. For control of Russian knapweed, apply 3-4 qt/A at the early bud to mid-flowering stage or on fall regrowth.	Do not use on newly seeded areas until grass is well established as indicated by vigorous growth and development of tillers and secondary roots. Do not forage or graze dairy animals on treated areas for 7 days after application. Do not cut treated grass for hay within 30 days after application. Do not forage or graze meat animals on treated areas within 7 days of slaughter. Do not transfer livestock from treated grazing areas to sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated pasture.
Diuron 80 80% WDG PRE applications: 1 to 3 lb/A	Active Ingredients: Diuron Similar Products: None MOA: 7	PRE. Apply 1 to 3 lb/A after sprigging bermudagrass and before emergence of bermudagrass or weeds. For control of emerged annual weeds up to 4 in height, apply 0.5 to 1 lb/A. If bermudagrass has emerged at time of treatment, temporary burn of exposed plant parts may occur.	Do not graze or feed foliage from treated areas to livestock within 70 days after application. Do not treat areas where sprigs are planted less than 2" deep as crop injury may result.
Gramoxone Extra^r 2.5 lb ai per gallon POST applications: 1.25 to 1.5 pt/A	Active Ingredients: Paraquat Similar Products: Gramoxone Max Gramoxone Super Tres Cyclone Max MOA: 22	POST. Apply to native pastures for control of downy and Japanese brome. Apply in spring after 90% node formation of brome species, but before full bloom. Emerged grasses will be burned by application, but application after 90% node formation will allow adequate time for native grasses to recover and attain maximum growth in the use season. Addition of either an NIS or COC is required.	Do not apply more than 1.5 pt/A per year. Do not apply to pastures with more than 3 inches of height at time of application.
Grazon P+D^r 2.54 lbs ai per gallon POST applications: 1 to 4 pt/A	Active Ingredients: Picloram 2,4-D Similar Products: Galaxy MOA: 4 & 4	POST Use higher application rates in areas with dense weed populations or for longer residual control. For best results the lower rate should be used only when environmental conditions are favorable for plant growth and when the plants are in the growth stage recommended on the label. Repeat treatments may be applied if necessary as long as 4 qt/A per year is not exceeded.	Do not allow lactating dairy animals to graze treated areas within 7 days after application. Do not harvest grass cut for hay from treated areas for 30 days after application. Meat animals must be withdrawn from treated forage at least 3 days before slaughter. Do not exceed 4 qt/A per year. Do not transfer livestock from treated grazing areas to broadleaf crop areas without first allowing 7 days of grazing on untreated grass pasture.
Outrider 1.33 ounces per acre POST application: Prowl H2O Dow Products	Active Ingredients: sulfosulfuron Similar Products: none MOA: 2	POST. Apply with 0.25% non-ionic surfactant in 10 to 40 gallon per acre. Retreating with 1.33 ounces per acre is permitted, but total annual applications cannot exceed 2.66 ounces per acre. May be grazed immediately after treatment. Delay hay harvest for 14 days following treatment	Bermudagrass pastures. Apply to actively growing johnsongrass that is at least 18 to 24 inches tall and up to the heading stage. Sedges should be actively growing with sufficient leaf area to intercept the herbicide. See label for spot treatment applications and approved tank mixtures

PASTURE AND RANGE WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Overdrive 0.7 lb ae per gallon POST applications: 4 to 8 fl oz/A	Active Ingredients: Diflufenzopyr Dicamba Similar Products: Banvel, Clarity, Sterling MOA: 4 & 4	POST. Apply to small actively growing weeds. Use higher rates within the rate range if treating larger weeds.	Do not apply in less than 3 gallons of spray volume per acre. Do not apply within 4 hours of an expected rainfall. Do not apply more than 10 fl oz/A per year. Do not apply aerially. Near desirable vegetation. Do not apply near crops sensitive to growth regulator type herbicides.
Pasturegard 2 lb ae per gallon POST applications: 1.5 to 4 pt/A	Active Ingredients: Triclopyr Fluroxypyr Similar Products: None MOA: 4 & 4	POST. Apply to small actively growing weeds. For sericea lespedeza control, apply 1.5 to 2 pts/A, with surfactant, from late May through July when soil moisture is adequate. New sericea growth should not be grazed and should be taller than the standing old growth from previous year.	Do not apply more than 4 quarts per acre per growing season. Do not exceed 0.5 lb ae/A fluroxypyr or 2.0 lb ae/A triclopyr per season. Do not reseed treated areas for at least 3 weeks after application. Do not harvest treated area for hay for at least 14 days after application. Do not feed treated hay or allow livestock to graze treated grass within 3 days of slaughter, if treatment and slaughter occur in the same year.
Rave 63.8% WDG POST applications: 2 to 4 oz/A	Active Ingredients: Triasulfuron Dicamba Similar Products: None MOA: 2 & 4	POST. Refer to label for treatable grasses and specific application rates. For new seedlings of these grasses, do not apply until at least 60 days after emergence of the desirable grasses or 30 days after sprigging of bermudagrass. In addition to the 2 to 4 oz/A rate, applications of 5oz/A may be made to when heavy infestations of the weeds listed in the label exist.	Do not cut for hay for 37 days after application. Do not apply within 4 hours of an expected rainfall. Do not make more than one application per year. Do not apply near vegetation that is sensitive to growth regulator type herbicides.
Reclaim 3 lb ai per gal POST applications: 1.33 pt/A	Active Ingredient: Clopyralid Similar Products: Stinger Transline Rates may vary due to formulation. MOA: 4 & 4	POST. The herbicidal response of mesquite is strongly influenced by foliage condition, stage of growth and environmental conditions. For best results, apply when new growth foliage has turned from light to dark green, when soil temperature is above 75°F at a depth of 12 to 18 inches, and soil moisture is adequate for plant growth.	Do not apply more than 1.33 pt/A per annual growing season. Hay harvest is not considered to be feasible for at least one year following application because of standing woody plants.
Redeem R&P 3 lb ai per gal POST applications: 1.5 to 4 pt/A	Active Ingredient: Triclopyr Clopyralid Similar Products: None MOA: 4 & 4	POST. Apply at a rate of 1.5 to 2 pt/A for control of annuals and up to 4 pt/A for control of deep rooted perennial broadleaf weeds. Refer to the label for suggested application rates for specific target weeds.	Do not harvest hay for lactating dairy animals until the next growing season. Do not harvest hay for other livestock for 7 days after treatment. Do not graze or harvest green forage for lactating dairy animals for 14 days after treatment. There are no grazing restrictions for other livestock. Do not transfer from treated areas to sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated pasture or feeding of untreated hay. Do not apply more than 4 pt/A per year.

PASTURE AND RANGE WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
<p>Remedy 4 lb ai per gal</p> <p>POST applications: 1.33 pt/A</p>	<p>Active Ingredient: Triclopyr</p> <p>Similar Products: Forestry Garlon 4 Garlon 3A Garlon 4 Pathfinder II Remedy RTU Tahoe 3A Rates may vary due to formulation.</p> <p>MOA: 4</p>	<p>POST. Apply anytime the target weeds or brush is actively growing. Refer to label for application rates for specific target weeds and brush.</p>	<p>Grazing and Haying Restrictions (Lactating Dairy Animals): Application of 2 qt/A or less: Do not graze or harvest green forage from treated area for 14 days after treatment. Greater than 2 qt/A: Do not graze or harvest green forage until the next growing season. Do not harvest hay until the next growing season.</p> <p>Grazing and Haying Restrictions (Other Livestock): Application of 2 qt/A or less: No grazing restrictions. Do not harvest hay for 7 days after treatment. Greater than 2 qt/A to 4 qt/A: Do not graze or harvest green forage from treated area for 14 days following treatment. Do not harvest hay for 14 days after treatment. Greater than 4 qt/A: Do not harvest hay until the next growing season.</p> <p>Withdraw livestock from grazing treated areas or consumption of treated hay at least 3 days before slaughter.</p>
<p>Roundup Original Max 5.5 lb ai per gal</p> <p>All applications: 8 to 11 fl oz/A</p>	<p>Active Ingredient: Glyphosate</p> <p>Similar Products: Many Rates may vary due to formulation.</p> <p>MOA: 9</p>	<p>PRE (pasture). May be applied prior to planting or emergence of forage grasses.</p> <p>Spot Treatment (pasture). Apply in areas where the movement of domestic livestock can be controlled.</p> <p>POST (rangeland). Apply 8 to 11 fl oz/A to control or suppress many weeds. Apply when most mature brome plants are in early flower and before green-up of desired rangeland grasses</p>	<p>PRE (pasture). Remove domestic livestock before application and wait 8 weeks after application before grazing or harvesting.</p> <p>Spot Treatment (pasture). Do not treat more than 10% of the total pasture area at one time.</p> <p>Remove domestic livestock before application and wait 14 days after application before grazing livestock or harvesting.</p> <p>POST (rangeland). Do not make more than one application per year.</p> <p>Grazing of treated areas should be delayed to encourage growth of desirable perennials.</p>

PASTURE AND RANGE WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
<p>RT Master 3 lb ai per gal</p> <p>All applications: 12 to 48 fl oz/A</p>	<p>Active Ingredient: Glyphosate 2,4-D</p> <p>Similar Products: None</p> <p>MOA: 9 & 4</p>	<p>PRE (pastures). May be used to control perennial pasture species listed on the label prior to replanting.</p> <p>Spot treatment (pastures). Apply in areas where the movement of domestic animals can be controlled. Remove domestic livestock before application and wait 14 days after application before grazing livestock or harvesting. No more than 0.1 of any acre should be treated at one time.</p> <p>POST (rangelands). Apply 12 to 16 fl oz/A to control or suppress many weeds. Apply when most mature brome plants are in the early flower and before the plants including seedheads turn color.</p>	<p>Do not use in any counties other than: Alfalfa, Beaver, Blaine, Canadian, Cimarron, Custer, Dewey, Ellis, Garfield, Grant, Harper, Kay, Kingfisher, Logan, Major, Noble, Pawnee, Payne, Roger Mills, Texas, Woods, and Woodward.</p> <p>PRE (pastures). Remove domestic livestock before application and wait 8 weeks after application before grazing or harvesting.</p> <p>POST (rangelands). Do not graze lactating dairy animals on treated areas within 7 days after application. Do not harvest grass cut for hay from treated areas for 30 days. Withdraw meat animals from treated forage at least 3 days before slaughter.</p>
<p>Spike 20P 0.2 lb ai per gal</p> <p>POST applications: Less than 20 inches of annual rainfall: 10 lb/A More than 20 inches annual rainfall: 20 lb/A</p>	<p>Active Ingredient: Tebuthiuron</p> <p>Similar Products: None</p> <p>MOA: 7</p>	<p>POST. May be applied anytime except when the soil is frozen or is saturated with moisture. Applications should be made prior to the resumption of active seasonal growth in the spring or before expected seasonal rainfall. Dormant season application is recommended to minimize herbicidal effects on desirable forage grasses. Refer to label for application rates for specific target weeds.</p>	<p>Do not apply where bedrock is continuously exposed or in areas of bedrock overlain by soils that are shallow or discontinuous. Do not apply in areas adjacent to sinkholes or depressions lacking external drainage which occur in areas of karst topography. Do not apply to high shrink/swell soils which develop deep cracks upon drying. Do not cut hay for livestock feed for one year after a treatment. Do not apply more than once per year. There are no label restrictions which require livestock grazing to be delayed following an application.</p>
<p>Surmount 1.34 lb ae per gal</p> <p>POST applications: Up to 0.75 to 3 qt/A</p>	<p>Active Ingredient: Picloram Fluroxypyr</p> <p>Similar Products: None</p> <p>MOA: 4 & 4</p>	<p>POST. For best results treat when weeds are small and actively growing in the spring before bloom, however, certain weeds may also be treated in late summer to fall. Refer to label for application rates for specific target weeds.</p>	<p>Do not apply more than 3 qt/a per year. Do not apply to newly sprigged bermudagrass until runners (stolons) have reached at least 6 inches in length. Do not harvest hay within 7 days after application. Meat animals grazing for up to 2 weeks after treatment should be removed from treated areas three days prior to slaughter. Do not graze lactating dairy animals on treated areas within two weeks after treatment. Do not exceed a total of 2 qt /A per year. Do not transfer livestock from treated areas onto broadleaf crops without first allowing 7 days of grazing untreated grass pasture.</p>

PASTURE AND RANGE WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
<p>Tordon 22K^r 2 lb ai per gal</p> <p>POST applications: Up to 2 qt/A</p>	<p>Active Ingredient: Picloram</p> <p>Similar Products: None</p> <p>MOA: 4</p>	<p>POST. For best results treat when weeds are small and actively growing in the spring before bloom, however, certain weeds may also be treated in late summer to fall. Refer to label for application rates for specific target weeds. May be applied at up to 2 qt /A for control of noxious weeds.</p>	<p>Do not cut grass for feed within two weeks after treatment when applying more than 1 qt /A. Meat animals grazing for up to 2 weeks after treatment should be removed from treated areas three days prior to slaughter. Do not graze lactating dairy animals on treated areas within two weeks after treatment. Do not exceed a total of 2 qt /A per year.</p>
<p>Velpar DF 75% DF</p> <p>PRE applications: 0.9 – 1.5 lb/A</p>	<p>Active Ingredient: Hexazinone</p> <p>Similar Products: None</p> <p>MOA: 5</p>	<p>POST. Make a single application when weeds are actively growing for control of smutgrass and other weeds in bermudagrass/bahiagrass. For control of undesirable woody plants, apply from late winter through summer, pre-budbreak until new growth hardens off.</p>	<p>Do not treat newly sprigged or sodden areas. Do not cut treated vegetation for hay or forage nor graze domestic animals on treated areas for 60 days. Do not use on frozen soils.</p>
<p>Weedmaster 3.87 lb ai per gal</p> <p>POST applications: 4 pt/A</p>	<p>Active Ingredient: Dicamba 2,4-D</p> <p>Similar Products: Brash KambaMaster Veteran 720 Rates may vary due to formulation.</p> <p>MOA: 4</p>	<p>POST. Best results will be obtained if applied at the germinating stage of weeds. Retreatments may be made as needed, however, do not exceed a total of 8 pt/A per season. Newly seeded areas may be injured if rates greater than 2 pt/A are applied.</p>	<p>Do not apply more than 8 pt/A per season. Do not permit meat animals being finished for slaughter to graze treated fields within 30 days of slaughter. Do not graze lactating dairy animals within 7 days of treatment. Do not harvest dry hay or silage within 37 days of treatment. There is no waiting period between treatment and grazing of non-lactating animals. Do not use on bentgrass, susceptible grass pastures, lesedeza, wild winter peas, vetch, clover, and alfalfa pastures as injury will occur.</p>

^r Restricted Use.

MOA Group Tables start on page 46 of the handbook.

This section was not revised in 2008.

BRUSH CONTROL

Estimated Levels of Weed Control Normally Expected with Brush Herbicides^a																										
Herbicide	Black berry	Buckbrush	Black Locust	Cedar	Elms	Greenbriar	Hawthorn	Honey locust	Honey suckle	Mesquite	Multiflora rose	Oak, Blackjack	Oak, Post	Oak, Sand Shinery	Osage Orange	Pecan	Persimmon	Pine	Poison Ivy	Prickly pear	Sagebrush	Salt Cedar	Sumac	Wild plum	Willows	Yucca
2,4-D	N	H	H	N	N	N	H	N	N	--	N	R	--	--	N	--	N	N	N	--	--	--	H	--	--	--
Banvel	R	N	N	N	N	N	N	N	N	--	R	N	--	--	N	--	R4	N	N	--	--	--	N	--	--	--
Cimarron	H	R	H	N	R	N	R	H	R	3	R	N	--	--	R	--	N	N	N	--	3	--	H	H	R	--
Cimarron Max	H	R	H	N	R	N	R	H	R	R	R	N	--	--	R	3	N	N	3	--	R	3	H	H	R	3
Crossbow	R	R	R	N	R	N	R	R	R	--	N	R	--	--	N	--	N	N	R	--	--	--	R	--	--	--
glyphosate	H	N	R	N	R	N	R	R	H	--	H	R	--	--	N	--	N	N	H	--	--	--	N	--	--	--
Grazon P+D ^r	R	R	R	N	R	R	R	H	R	--	R	R	--	--	N	--	R	N	N	--	--	--	R	--	--	--
Remedy	H	R	R	N	R	R	R	R	R	--	N	R	--	--	H	--	N	R	R	--	--	--	R	--	--	--
Spike	R	R	R	R1	H	N	R	R	H	--	H	R	--	--	N	--	N	H	R	--	--	--	N	--	--	--
Surmount	R	--	R	R1	R	N	R	R	R	N	R	N	N	N	R	N	R	N	N	--	R	--	R	R	N	N
Tordon 22K ^r	R	N	N	R	N	N	N	H	N	--	R	N	--	--	N	--	R4	R	N	--	--	--	N	--	--	--
Velpar	R	R	R	H	R	N	R	H	H	R	H	R	R	--	R	R	R	N	R	--	--	--	R	R	R	R
Weedmaster	R	R	N	N	R	N	R	R	R	--	N	R	--	--	N	--	N	N	R	--	--	--	R	--	--	--

a. **H** = Highly recommended, has been shown to be effective if used properly. ^r Restricted Use.

H = Highly recommended, has been shown to be effective if used properly.

R = Recommended, intermediately susceptible or listed on company label.

N = Not recommended, has not performed in research or is not listed on the label.

1 = Small red cedar

2 = September application

3 = Suppression only

4 = Soil application

This section was not revised in 2008.

SUGGESTED HERBICIDES FOR BRUSH CONTROL

WEEDS	TIME OF APPLICATION	AMOUNT OF HERBICIDE PER ACRE	COMMENTS
<u>Yucca</u>	April-May	Velpar L (hexazinone)	Resistant to most herbicides used on rangelands. Some control with Velpar applied to individual plants. Spot apply 2 cc/plant on up-hill side.
<u>Brush</u> Blackberry	Flowering through September	Roundup or Touchdown (glyphosate) (1 to 1.5%) solution with hand-held equipment	Plants must be actively growing and thorough coverage is necessary. Treat spots (less 10% of area) and there is a 14 day grazing restriction. Grass in treated spot is also killed. Various formulations of glyphosate require different additives, so read label.
	July after next year's canes have developed	Remedy (triclopyr) (1 to 2 pt product/A)	One application will control 85 to 90% of plants. Important that plants are actively growing and fruiting canes fully developed before spraying. Respraying is often necessary to get satisfactory kill of established plants. Control of blackberry after burning has been variable with control often being unsatisfactory.
Buckbrush	May	2,4-D LV ester (1.5 to 2 lb/A)	Treat as soon as leaves fully expanded and plants actively growing. Treatment only effective for a two week period and treatments made after May are often ineffective.
	Spring (soil application)	Spike (20P) (tebuthiuron) (10 to 20 lb product)	Rate depends on soil type. Refer to label for correct rate.
Cedars	March to May	Tordon 22K [†] (picloram) Velpar L (hexazinone)	Tordon 22K is the current formulation being marketed for rangeland use. Effective as individual tree treatment by applying at base of tree. See label for rate and use restriction. Can be effective as spot treatment of individual trees. Herbicide is applied at base of tree and rate depends on tree size. See label for rate and use.
Elms	Fall to Spring (soil application) March to May	Spike (20P) tebuthiuron (10 to 20 lb product) Tordon 22K [†] (picloram) (2 qt product/A)	Rate depends on soil texture. Not effective on fine textured clay soils. For individual trees, use 1 cc of undiluted Tordon 22K per inch of stem diameter.
Greenbriar	May and June	Tordon 22K [†] (picloram) + Remedy (triclopyr)	Mixture as foliage wetting spray gives some control. Respraying will be necessary. Burning, mowing, and grazing will help control.
Hawthorn	May and June	2,4-D LV ester (2 lb/A)	Retreatment is usually necessary to obtain tree kill.
Locust, Black	June and July	2,4-D (1 lb/A)	Some respraying may be necessary to control resprouts.
Locust, Honey	June and July	Remedy (triclopyr) (1 qt/A)	Best results with spraying individual trees. Mix 2 qts Remedy with 100 gallons water and spray to wet leaves. Some respraying may be necessary to control resprouts.
Mesquite	June	Remedy (triclopyr) (1 pt product/A) or Reclaim (1.33 pt/A)	For best results, spray during the period 40 to 90 days after green growth appears in spring and when soil moisture is adequate and soil temperature at 12 inches is 75°F. One good way to get good tree kill is to individually treat the base of each tree with 20% Remedy and 80% diesel fuel mix applied as low volume basal application. Applications can be made from May through October and will cost about 15¢/1-inch diameter tree.

[†] Restricted Use Pesticide

This section was not revised in 2008.

SUGGESTED HERBICIDES FOR BRUSH CONTROL (CONT'D)

WEEDS	TIME OF APPLICATION	AMOUNT OF HERBICIDE PER ACRE	COMMENTS
Oak, Blackjack and Post	June	Remedy (triclopyr)	Spray only if conditions are desirable for good tree growth. Refer to label for rate and other information.
	Early Spring (soil application)	Spike (20P) (tebuthiuron) (10 to 20 lb product/A)	Rate depends on soil texture. Do not use on fine textured clay soils. See label for detailed instructions.
Oak, Sand Shinnery	June	Remedy (triclopyr) (0.5 to 1 pt product/A)	Spray in years of good soil moisture. A bad basal resprouter so retreatment will be necessary. This rate will give fair to good top control of oaks, but little root-kill. Increasing rate helps some on top kill, but doesn't really help root-kill that much.
Oak, Sand Shinnery (cont'd)	Early Spring	Spike (20P) (tebuthiuron) (5 to 15 lb product/A)	The results with Spike on sand shinnery oak have not been as predictable as with the other oaks. It is very difficult to get good root-kill of shinnery without getting grass damage. Sometimes there is adequate root-kill at the low rate while on other sites it takes the high rate. Some of this variation is probably due to variations in amount and depth of sand deposited. However, part of the variation may also be due to past management practices. It is very difficult to get adequate root-kill on areas that have been burned, sprayed, or mowed recently.
Osageorange	June-July	Remedy (triclopyr) (1 to 2 pt product/A)	Easy to control if adequate soil moisture.
Pecan	June	2,4-D (2 to 4 lb/A)	Retreatment will be necessary.
Persimmon, Common	June-Feb.	Banvel (injected) (1 cc product/injection)	Injection cuts made every 3 inches around the base of the tree. Cuts must penetrate the bark. This treatment is very effective on undisturbed larger trees. For sprouts, 1 inch and smaller, one cc of Banvel applied in early spring or September at the base of each sprout has given good control.
		Banvel (conventional basal spray) (4 to 8 lb/100 gal of water)	Apply to ground under tree as basal treatment using 1/8 to 1/4 pint of spray mix per inch of stem diameter.
	May-June	Tordon 22K [†] (picloram) (basal spray) 2 cc/inch diameter	On stems 2 inches or less in diameter, apply 2 cc per inch of stem diameter. Apply undiluted herbicide at base of plants. Applications can also be made in September if moisture conditions are adequate. Applications made directly on the stem at ground level have been very effective on sprouts. On larger trees, stems must be injected with 2 cc of product every 3 inches around the base of the tree.
	June-July	Remedy (triclopyr) 1 pt/A broadcast or 1 pt/100 gal and spray to wet leaves to point of run-off	Expect good brown-out and top kill of persimmons with resprouting from roots 1 and 2 years after treatment with only 50% reduction in stem density 2 years after treatment. Will require retreatment every 4 to 5 years. Probably a better option than mowing since some stem reduction results.
Plum, Wild	June	2,4-D (1 to 2 lb/A)	Retreatment will be necessary.
Poison Ivy	When foliage full leaf	Roundup or Touchdown (glyphosate) 2% solution with hand-held equipment	Thoroughly wet all foliage. Repeated applications may be required to maintain control. There is a 14 day grazing restriction after spot treating.

[†] Restricted Use Pesticide

This section was not revised in 2008.

SUGGESTED HERBICIDES FOR BRUSH CONTROL (CONT'D)

WEEDS	TIME OF APPLICATION	AMOUNT OF HERBICIDE PER ACRE	COMMENTS
<u>Brush</u> (cont'd) Rose, Multiflora	Early spring (soil application)	Tordon 22K ^r (picloram)	Tordon 22K is very effective. See label for rate and use restrictions.
	Early Spring (soil application)	Spike (20P) (tebuthiuron) (10 to 20 lb product)	Rate depends on soil texture.
Sagebrush	May and June	2,4-D (0.5 to 1 lb/A)	Spray only in year of adequate rainfall.
Salt cedar	When leaves fully developed	2,4-D (0.25 to 0.5 lb/A)	For suppression but very little tree kill with this treatment. Repeat applications every time trees releaf. May require several treatments each year.
Sumac	June	2,4-D LV ester (1 lb/A)	Usually easy to control.
		Grazon P+D ^r (1 qt/A)	
	Spring (soil application)	Spike (20P) (tebuthiuron) (10 to 20 lb product)	Rate depends on soil texture.
Willows	Summer	2,4-D (1 lb/A)	Usually easy to control.

^r Restricted Use Pesticide

Footnote: All uses of atrazine on pastures and rangelands have been discontinued.

For additional information the following may be helpful:

Pest Plants of Oklahoma Grazing Lands at <http://www.pestplants.okstate.edu>

Weed Control in Pastures

Fact Sheet 2771

Ecology and Management of Sericea Lespedeza

Fact Sheet 2874

Thistles in Oklahoma and Their Identification

Fact Sheet 2776

Integrated Control of Musk Thistles in Oklahoma

Fact Sheet 7318

Response of Selected Woody Plants in the United States to Herbicides

ARS Agriculture Handbook No. 493

This section was not revised in 2008.

SUGGESTED HERBICIDES FOR BRUSH CONTROL (CONT'D)

Herbicides	Rates		Lactating Dairy Animals	Beef and Non-Lactating Dairy Animals			
	Product	Ib/ai	Before Grazing	Before Hay Harvest	Before Grazing	Before Hay Harvest	Removal Before Slaughter
CIMARRON (Metsulfuron, Methyl)	0.10 to 0.40 oz	0.06 to 0.24 oz	0	0	0	0	0
AMBER	0.28-0.56 oz		0	30 days	0	30 days	0
BANVEL 4L (Dicamba)	Up to 1 pt Up to 2 pt Up to 4 pt	0.5 1.0 2.0	7 days 21 days 40 days	37 days 51 days 70 days	0 0 0	0 0 0	30 days 30 days 30 days
CROSSBOW 3S (Triclopyr + 2,4-D)	1 to 6 qts	0.75 to 4.50	14 days	N.G.S.	0 ⁵	7 days ⁵	3 days
CURTAIL (2,4-D + Clopyralid)	2 to 4 qts	1.19 to 2.38	14 days	30 days	0	30 days	7 days ¹¹
CYCLONE MAX ^r (paraquat)	0.7 to 1.3 pts	0.25 to 0.47	1 month ²	1 month ²	1 month ²	1 month ²	0
GRAZON P+D ^r	1 to 8 pts	0.32 to 2.54	7 days	30 days	0	30 days	3 days
REMEDY (Triclopyr)	2 qts or less 2 to 4 qts over 4 qts	.0 or less 2.0+ -4.0 4.0+ -6.0	14 days N.G.S. N.G.S.	N.G.S. N.G.S. N.G.S.	0 14 days ¹⁰ 14 days ¹⁰	7 days 14 days N.G.S.	3 days 3 days 3 days
ROUNDUP/RASCAL/ RULER/ TOUCHDOWN (Glyphosate) Spot or Wiper ¹ Broadcast	Any labeled rate Any labeled rate	-- --	14 days 8 weeks	14 days 8 weeks	14 days 8 weeks	14 days 8 weeks	0 0
SPIKE 20 P (Tebuthiuron)	0.5 oz/14 sq ft 3.75-20 lbs/A	-- 0.75 to 4.0	0 ⁷ 0 ⁷	1 year ⁷ 1 year ⁷	0 ⁷ 0 ⁷	1 year ⁷ 1 year ⁷	0 ⁷ 0 ⁷
STINGER 3E (Clopyralid)	0.66 to 1.33 pt	0.25 to 0.5	0	0	0	0	0 ⁹
TORDON 22K ^r (Picloram ³)	0.5 to 2 pts	0.125 to 0.5	14 days	14 days	0	0	0
2,4-D/MCPA ⁴	--	0.5 to 2.0	7-14 days	30 days	0-7 days	0-30 days	3 days
WEEDMASTER/ CIMARRON MAX (Dicamba + 2,4-D)	1 to 4 pts	0.48 to 1.93	7 days	37 days	0	37 days	30 days
WILFARM 2,4-D	--	1.0 to 2.0	7 days	30 days	0	30 days	3 days

N.G.S. = Not until the next growing season.

¹Do not treat more than one-tenth of any given acre at one time with spot or wiper applications. Remove livestock before application.

²Restrictions based on the degree of new seedling establishment before grazing. Suggested at least 6 inches of grass or legume seedling growth which is approximately one month. Late fall seeding may require 3 to 5 months before the suggested 6-inch height is reached.

³Remove livestock to untreated grass pasture for 7 days before transferring livestock to broadleaf crop or pasture areas. Removal before slaughter statement only applies to animals grazing treated forage for a period of up to 2 weeks after application. Use only west of the Mississippi.

⁴Be sure to check individual product labels for restrictions and use rates due to the large number of formulations available.

⁵14 days if more than 2 gal/A rate used.

⁷If no more than 20 lbs per acre used, in areas receiving greater than 20" rain/year--areas less than 20" rain/year if no more than 10 lbs per acre used.

⁹Remove livestock to untreated grass pasture for 7 days before transferring livestock to broadleaf crop or pasture areas.

¹⁰If less than 25% of a grazed area is treated; no restrictions.

¹¹Withdrawal not needed if 2 weeks or more elapsed since application.

^r Restricted Use Pesticide

PEANUT INSECT CONTROL SUGGESTIONS

Insect and Time Most Prevalent	Damage and/or Insect Description	Insecticide (MOA Group) and Amount Per Acre		Comments
Beet armyworm Summer Note: Treatment thresholds ¹	Striped-green caterpillar that has a black spot above the second pair of true legs.	Warrior ^r (3) Adjourn ^r (3) Silencer ^r (3) Lannate LV ^r (1A) Lannate SP ^r (1A) Asana XL ^r (3) Tracer (5) Proaxis ^r (3) Prolex ^r (3) Javelin (11B2)	3.84 oz 5.8-9.6oz 3.84oz 1.25-3.0 pt .375-1.0 lb 5.8-9.6 oz 2.0-3.0 oz 3.84 oz 1.54 oz 0.25-1.5 lb	14 day waiting period to harvest. Aids in control Suppression only Do not feed treated vines and do not apply within 21 days of harvest. Do not feed or graze livestock on treated vines. Do not exceed 29 oz per season. 21 day waiting period to harvest. Do not allow grazing of crop residue or harvest of crop residue for hay until 14 days after application. Do not apply within 3 days of nut harvest. Do not apply more than 9.0 fl oz per acre per crop, or make more than 3 applications per calendar year. Do not apply within 14 days of harvest. Do not apply more than 0.96 pts per acre per season. Do not apply within 14 days of harvest. Do not apply more than 0.38 pts per acre per season. No waiting period to harvest. A <i>Bacillus thuringiensis</i> (B.t.) product.
Blister beetles July-August	3-striped most common in peanuts.	Sevin XLR+ (1A)	0.5-1.0 qt	14 day waiting period to harvest
Cabbage looper Summer See comments ¹	Looper - large green caterpillar with white stripes – tapers toward head	Lannate LV ^r (1A) Lannate SP ^r (1A) Javelin (11B2) Tracer (5) Orthene75S (1B)	1.5-3.0 pt 0.50-1.0 lb 0.25-1.5 lb 1.5-3.0 oz 1.0-1.3 lbs	Large loopers can be difficult to control. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. 14 days to digging.
Corn earworm Summer See comments ¹	Caterpillars chew holes in foliage and feed on terminal buds	Sevin XLR+ (1A) Adjourn ^r (3) Silencer ^r (3) Lannate LV ^r (1A) Lannate SP ^r (1A) Orthene 75S (1B) Warrior ^r (3) Tracer (5) Danitol ^r (3) Asana XL ^r (3) Javelin (11B2) Proaxis ^r (3) Prolex ^r (3)	1.0-1.5 qt 2.9-5.8oz 2.56-3.84oz 0.75-3.0 pt 0.25-1.0 lb 1.0-1.3 lbs 2.56-3.84 oz 1.5-3.0 oz 10.6-16.0 oz 2.9-5.8 oz 0.25-1.5 lb 2.56-3.84 oz 1.02-1.54 oz	14 day waiting period to harvest. 21 day waiting period to harvest See restrictions under beet armyworm comments. 14 days to digging. 14 day waiting period to harvest. See restrictions under beet armyworm comments. 14 days to digging. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments.
Granulate Cutworm ¹	Larvae found at soil surface beneath peanut foliage. Mottled gray and tan with many dark granules over surface of the body.	Asana XL ^r (3) Adjourn ^r (3) Silencer ^r (3) Sevin XLR+ (1A) Lannate LV ^r (1A) Lannate SP ^r (1A) Javelin (11B2) Proaxis ^r (3) Prolex ^r (3) Warrior ^r (3)	5.8-9.6 oz 5.8-9.6oz 1.92-3.20oz 2.0 qt 1.5-3.0 pt 0.50-1.0 lb 0.25-1.5 lb 1.92-3.20 oz 0.77-1.28 oz 1.92-3.20 oz	See restrictions under beet armyworm comments. 14 day waiting period to harvest. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. 14 day waiting period to harvest.

PEANUT INSECT CONTROL SUGGESTIONS (CONT'D)

Insect and Time Most Prevalent	Damage and/or Insect Description	Insecticide (MOA Group) and Amount Per Acre		Comments
Fall armyworm Summer ¹	Large striped caterpillar with inverted "y" on front of head.	Sevin XLR+ (1A) Adjourn ^r (3) Silencer ^r (3) Danitol ^r (3) Lannate LV ^r (1A) Lannate SP ^r (1A) Tracer (5) Javelin (11B2) Asana XL ^r (3) Orthene 75S (1B) Proaxis ^r (3) Prolex ^r (3) Warrior ^r (3)	1.0-1.5 qt 9.0oz 2.56-3.84oz 10.6-16.0 oz 0.75-1.5 pt 0.25-0.50 lb 2.0-3.0 oz 0.25-1.5 lb 9.6 oz 1.0-1.3 lb 2.56-3.84 oz 1.28-2.05 oz 2.56-3.84 oz	14 day waiting period to harvest. 21 day waiting period to harvest. 14 day waiting period to harvest. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. 14 days to digging. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments.
Grasshoppers Summer	Consume foliage	Warrior ^r (3) Adjourn ^r (3) Silencer ^r (3) Orthene 75S (1B) Asana XL ^r (3)	2.56-3.84 oz 5.8-9.6oz 2.56-3.84oz 0.33-0.66 lbs 5.8-9.6 oz	14 day waiting period to harvest. 14 day waiting period to harvest. See restrictions under beet armyworm comments.
Potato Leafhopper Summer	Small hopping or flying wedge-shaped insects—sap feeders, cause yellowing of foliage and brown leaf tips (called "Hopperburn").	Warrior ^r (3) Adjourn ^r (3) Silencer ^r (3) Sevin XLR+ (1A) Orthene 75S (1B) Asana XL ^r (3) Danitol ^r (3) Lannate LV ^r (1A) Lannate SP ^r (1A) Proaxis ^r (3) Prolex ^r (3)	1.92-3.20 oz 2.9-5.8oz 1.92-3.20oz 1.0 qt 1.0-1.3 lb 2.9-5.8 oz 6.0-10.6 oz 0.75-3.0 pts 0.25-1.0 lb 1.92-3.20 oz 0.77-1.28 oz	14 day waiting period to harvest. 14 day waiting period to harvest. See additional restrictions on previous page. Note. Threshold information from Georgia states treatments should be considered when you find 25-30% hopperburn and leafhoppers present 14 day waiting period to harvest. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments.
Lesser cornstalk borer (LCB) Mid-June through September. Economic infestation more common from late July on	Bluish-green worm; up to 0.66 in long - very active when touched. Tunnels nuts and stems, cuts pegs near soil surface. Begin applicaton when infestation level reaches 8-10% in dryland peanuts and 15% in irrigated peanuts.	Lorsban 15G (1B) Adjourn ^r (3) Warrior ^r (3) Silencer ^r (3) Orthene 97 (1B) Asana XL ^r (3) (aids in control) Javelin (11B2) Proaxis ^r (3) Prolex ^r (3)	6.8-13.9 lb 9.6oz 3.84 oz 3.84oz 4.0-8.0 oz 9.6 oz 0.25-1.5 lb 3.84 oz 1.54 oz	Lorsban granular application at pegging using the higher rate in a narrow band over the row and an in-row foliage opener can provide excellent control of LCB's and good suppression of Southern blight, with rainfall or irrigation following application. Two full rate (2.0 lb) applications per season may be applied. Also, provides suppression of Southern blight. Do not harvest within 21 days after treatment and do not feed treated peanut forage or hay to meat or dairy animals Aids in control. Suppression only. Do not feed treated forage or hay to lievestock or allow grazing in treated areas. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments. See restrictions under beet armyworm comments.

PEANUT INSECT CONTROL SUGGESTIONS (CONT'D)

Insect and Time Most Prevalent	Damage and/or Insect Description	Insecticide (MOA Group) and Amount Per Acre		Comments
<p>Rednecked peanutworm</p> <p>May to September with heaviest infestations occurring from mid-summer through September.</p>	<p>Small, greenish-white worm with crimson necks. Scar and perforate terminals (buds) destroying or deforming the young leaves and stunting growth.</p>	<p>Sevin XLR+ (1A)</p> <p>Adjourn^r(3)</p> <p>Asana XL^r (3)</p> <p>Silencer^r(3)</p> <p>Tracer (5)</p> <p>Proaxis^r (3)</p> <p>Prolex^r (3)</p> <p>Warrior^r (3)</p>	<p>1.0 qt</p> <p>2.9-5.8oz</p> <p>2.9-5.8 oz</p> <p>1.92-3.20oz</p> <p>1.5-3.0 oz</p> <p>1.92-3.20 oz</p> <p>0.77-1.28 oz</p> <p>1.92-3.20 oz</p>	<p>Research indicates that peanuts can tolerate considerable feeding by peanutworms without reducing yield. Unless populations become quite heavy (80-100% terminals infested) or infestations occur in combination with other foliage feeders, such as corn earworms, insecticide applications are unwarranted</p> <p>See restrictions under beet armyworm comments.</p> <p>See restrictions under beet armyworm comments.</p> <p>See restrictions under beet armyworm comments.</p> <p>14 day waiting period to harvest.</p>
<p>Spider mites</p> <p>Summer; during hot dry weather, most common after first of August.</p> <p>Note: See footnote 2 for additional products.</p>	<p>Very small (1/50 inch) damage indicated by reddish brown discoloration of leaves. Mites can be wind or machinery transported to fields. Frequently develop in weeds, fence/turn rows, and move to peanuts when dry weather hits</p>	<p>Omite (14)</p> <p>Silencer^r(3)</p> <p>Warrior^r (3)</p> <p>Comite (14)</p> <p>Danitol^r (3)</p> <p>Proaxis^r (3)</p> <p>Prolex^r (3)</p>	<p>3.0-5.0 lb</p> <p>3.84oz</p> <p>3.84 oz</p> <p>2.0 pt</p> <p>10.6-16.0 oz</p> <p>3.84 oz</p> <p>1.54 oz</p>	<p>Do not apply within 14 days of harvest. No more than two applications per season. Two or more treatments 5 days apart may be necessary to get control.</p> <p>Suppression only.</p> <p>14 day waiting period to harvest.</p> <p>Apply 20 gal.of finished spray per acre by ground and 5 gal. per acre by air. Do not apply within 14 days of harvest and do not graze or feed livestock on treated area.</p> <p>Do not apply within 14 days of harvest or grazing.</p> <p>See restrictions under beet armyworm comments.</p> <p>See restrictions under beet armyworm comments.</p>
<p>Southern corn rootworm</p>	<p>This rootworm is the larva of the spotted cucumber beetles. The larva is yellowish-white with a brown head and somewhat wrinkled body. The larva may reach 0.5 inch in length</p>	<p>Lorsban15G (1B)</p> <p>Silencer^r(3)</p>	<p>6.8-13.9 lb</p> <p>2.56-3.84oz</p>	<p>Apply in a narrow band over the row during early pegging. (See comments under LCB section.) Rainfall or irrigation is needed following application. Rate based on 36" row spacing.</p>
	<p>Tend to occur most commonly on heavier soils. Damage to shell may appear as a small brown spot on nut. If spots are noted, open nuts and check for larvae</p>	<p>Thimet^r 20G (1B)</p> <p>Warrior^r (3)</p> <p>Proaxis^r (3)</p> <p>Prolex^r (3)</p>	<p>3.87-5.28 lb</p> <p>2.56-3.84 oz</p> <p>2.56-3.84 oz</p> <p>1.02-1.54 oz</p>	<p>Apply as a band over the fruiting zone at pegging. Do not graze or feed hay for forage. Rate based on 36" row spacing.</p> <p>14 day waiting period before harvest.</p> <p>See restrictions under beet armyworm comments.</p> <p>See restrictions under beet armyworm comments.</p>

PEANUT INSECT CONTROL SUGGESTIONS (CONT'D)

Insect and Time Most Prevalent	Damage and/or Insect Description	Insecticide (MOA Group) and Amount Per Acre		Comments
Thrips May through June Check immediately after emergence.	Tiny, slender, insects, most commonly found in terminals—rasp new leaves causes blotching and deformed terminals	Lannate LV ^r (1A)	1.5-3.0 pt	Do not feed treated vines.
		Silencer ^r (3)	2.56-3.84oz	
		Lannate SP ^r (1A)	0.5-1.0 lb	21 day waiting period before harvest.
		Sevin XLR+ (1A)	1.0 qt	14 day waiting period to harvest.
		Proaxis ^r (3)	2.54-3.84 oz	See restrictions under beet armyworm comments.
		Prolex ^r (3)	1.02-1.54 oz	See restrictions under beet armyworm comments.
		Orthene 75S (1B)	0.5-1.0 lb	Do not feed forage or hay or graze treated areas.
		Orthene 97 (1B) Broadcast	6.0-12.0 oz	Note: Research has not been able to show consistent yield increases even with control of heavy thrips populations.
		Banded	3.0-6.0 oz	Insecticide applications should be restricted to instances where very high populations exist and severe damage, with destruction of terminals, occurring in seedling plants.
		Warrior ^r (3)	2.56-3.84 oz	Do not feed forage or hay or graze treated areas. Do not apply more than 15.36 oz/A/season. See footnote 3.
	“AT PLANT APPLICATIONS” Granular Insecticide Box applications Thimet 20G ^r (1B)	3.87 lb	Apply granules evenly in the furrow at planting. Do not graze or feed treated hay or forage. 90 day pre-harvest interval. Rate is for 36” row spacing.	
	Temik 15G ^r (1A)	7.0-14.0 lb	Apply in seed furrow and cover with soil. Check label for restrictions. 90 day pre-harvest interval.	
	Hopperbox application Orthene 75S (1B)	4.0 oz/100 lbs of seed	Apply as a planter box treatment evenly over seed, alternating 1/3 seed, then 1/3 chemical until box is filled. Do not attempt to mix Orthene with seeds by stirring or agitation. This may damage seeds prior to planting. Do not graze or feed treated hay or forage	

^r Restricted use Pesticides.

MOA Group Tables start on page 46 of the handbook.

- 1 Thresholds: For foliage feeding pests (e.g., corn earworm and armyworms) - the threat of yield reduction due to defoliation exists primarily when plants are from 60 to 90 days old. Check fields frequently during July and August for earworms, armyworms, etc. and apply insecticides if populations exceed 3 to 5 larvae/row ft. in dryland or 6 to 8 larvae/row ft. in irrigated peanuts. For granulate cutworms - if feeding on foliage, use the same guidelines provided above for foliage feeders; however, if cutworms are feeding on pegs or pods, treatment should begin if larval numbers exceed 2 to 3 per row ft. in irrigated or dryland peanuts.
- 2 Additional miticides: Limited control (suppression) has been obtained using either M-pede (potassium salts of fatty acids), Pyrellin(pyrethrins and rotenone) or Saf-T-Side (petroleum oil). The latter two are toxic to fish and should not be used near water. Saf-T-Side should not be used with, before, or after spraying dinitro compounds, or fungicides containing sulfur. Also, do not use with Carbaryl or Dimethoate.
- 3 Systemics for thrips: Several formulations of this type have been used in Oklahoma with erratic results. Success with these compounds is usually related to thrips pressure, moisture conditions and planting time. Currently, prophylactic use of these compounds in Oklahoma is not recommended. These compounds are presented here only as a guideline to rates and application methods.

This section was not revised in 2008.

PEANUT WEED CONTROL (CONT'D)

Rotational Cropping Restrictions in Months for Peanut Herbicides

Herbicide	Crops							
	Alfalfa	Canola	Corn	Cotton	Peanut	G. Sorghum	Soybean	Wheat
<i>Soil-applied</i>								
Dual II Magnum, Cinch	4	a	0	0	0	0	0	4.5
Outlook, Propel	a	a	0	0	0	0	0	4
Prowl	b	b	0	0	0	b	0	4
Pursuit	4	c	18.5 ^d	18.5	0	18.5	0	4
Sequence	4	a	0	0	0	0	0	4.5
Sonalan HFP	b	b	b	b	0	b	0	b
Strongarm	30 ^e	30 ^e	18 ^f	10	0	18	0	4
Treflan HFP	0	0	12	0	0	12	0	12
Valor	12 ^g	12 ^g	1/2 ^h	1/2 ^h	0	1/2 ^h	0	1/2 ^h
Zorial Rapid 80	0	a	a	0	0	a	0	a
<i>Foliar-applied</i>								
2,4-DB	a	a	a	a	a	a	a	a
Basagran	a	a	a	a	a	a	a	a
Cadre	a	40	9	18 ⁱ	0	18	9	4
Gramoxone Max	0	0	0	0	0	0	0	0
Poast Plus	0	0	4	0	0	4	0	4
Pursuit	4	c	18.5 ^d	19	0	19	0	4
Select 2EC	1	1	1	1	1	1	1	1
Storm	a	a	a	a	a	a	a	a
Ultra Blazer	a	a	a	a	a	a	a	a

^a. See label for specific crop rotation restrictions.

^b. May be planted the following cropping season.

^c. Only Clearfield or Sumner Canola varieties can be planted the year following a Pursuit application.

^d. Clearfield corn hybrids can be planted anytime.

^e. Must also conduct a successful field bioassay.

^f. Unless Clearfield corn will be planted, then 10 months.

^g. Must conduct a successful field bioassay.

^h. First listed interval is for up to 2 oz/A rate, second interval is for 2 to 3 oz/A rate.

ⁱ The restriction is 18 months if at least 15 inches of rainfall has been received since the time of application and November 1 of the same year, otherwise, the restriction is 26 months.

This section was not revised in 2008.

PEANUT WEED CONTROL

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
2,4-DB 2 lb ai/gal POST applications: 0.8 to 1.6 pts /A	Active Ingredient: 2,4-DB Similar Products: Butoxone 200 Butoxone 7500 Butyrac 200 MOA: 4	POST. Apply to peanuts 2 to 12 weeks after planting. Refer to label for tank mix instructions.	Do not apply later than 100 days after planting or 30 days before harvest. Do not feed treated vines or peanut hay to livestock. Do not apply if peanut plants are under stress from drought as injury may occur. Do not apply more than 2 applications per season. Do not apply this product through any type of irrigation system.
Basagran 4 lbs. ai per gallon POST applications: 1 to 2 pints /A	Active Ingredients: Bentazon Similar Products: None MOA: 6	POST. Product can be applied from peanut cracking through pegging. Product may be applied in a tank mix with one of the following herbicides: Blazer, Frontier, Poast Plus, Starfire, 2,4-DB amine. Refer to label for specific tank mix instructions.	Do not cultivate within 5 days before or 7 days after application. To achieve consistent weed control, crop oil concentrate, urea ammonium nitrate, or ammonium sulfate additives need to be used. Refer to label for more specifics on additives to be used. Do not apply more than 4 pts per acre per season. Rainfall or overhead irrigation within 4 hours after application may reduce effectiveness of product. Do not apply through any type of irrigation system. Treated peanut hay and forage may be fed to livestock. Do not graze treated fields for at least 50 days after the last treatment.
Cadre 70 % WSP POST applications: 1.44 fl oz. /A	Active Ingredient: Imazapic Similar Products: None MOA: 2	POST. Apply at a rate of 1.44 fl oz. per acre early postemergence to control broadleaf and grass weeds. Refer to label for tank mix applications. Will not control pigweed populations that have developed resistance to this herbicide mode of action.	Do not apply this product through any type of irrigation system. Do not graze or feed treated peanut hay to livestock. Do not apply more than 1.44 fl oz. per acre of Cadre DG per application or per use season. Do not apply if rainfall within 3 hours is expected, reduced weed control may result. Do not apply by helicopter, airplane, or any other aerial equipment. Do not use a nonionic surfactant as an adjuvant. Include either a crop oil concentrate, or methylated seed oil concentrate or blends of these two at 1 qt. per acre.
Dual II Magnum 7.64 lbs. ai per gallon All applications: 0.8 to 1.33 pts. /A	Active Ingredient: Metolachlor Similar Products: Dual IIG Magnum Dual Magnum Cinch MOA: 15	PPI. Apply and incorporate into the top 2 inches of soil within 2 weeks before planting. PRE. Apply during or after planting, but before weeds or crops emerge. Postplant Incorporated. Apply and shallowly incorporate into the soil after planting, but before peanut germination.	Do not apply through any type of irrigation system other than a center pivot.
Gramoxone Max[†] 3 lb. ai per gallon POST applications: 5.4 to 10.8 fl. oz. /A	Active Ingredients: Paraquat Similar Products: Cyclone Max MOA: 22	POST. Application to 1" to 6" emerged annual grass and broadleaf weeds at ground crack. A second application may be made up to 28 days after ground crack.	Do not apply this product through any type of irrigation equipment. Rain occurring 30 minutes or more after application will have no effect on the activity of the product. Do not apply a total of more than 10.8 fl. oz. per acre per season. Do not make more than two applications per season. Do not apply by air. Refer to label for tank mix applications.

[†] Restricted Use.

This section was not revised in 2008.

PEANUT WEED CONTROL (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Outlook 6 lbs ai per gallon All applications: See table.	Active Ingredient: Dimethenamid Similar Products: Frontier 6.0 Propel MOA: 15	PPI. Apply and incorporate into the top 1-2 inches of soil up to 2 weeks before planting. PRE. Rainfall, irrigation, or shallow incorporation after application is required to move this product off of the soil surface. POST. Must be applied before weed seedling emergence. Apply up to 80 days prior to harvest. ALL applications. May be used in split applications as long as the total rate does not exceed the maximum rate given for each soil type.	Herbigation applications must be applied only through center pivot, lateral move, solid set, or hand move irrigation systems. Do not apply this product through any other irrigation system. Refer to label for specific herbigation instructions. Do not apply more than a total of 32 fl. oz per acre, per season. Use higher rates (25-32 fl. oz. per acre) for improved control or suppression of difficult weeds.

All Applications	Outlook Application Rates Per Acre		
	Soil Textural Group	Less than 3% OM	3% or more OM
	Coarse	20-24 fl. oz	24-28 fl. oz
	Medium	24-28 fl. oz	28-32 fl. oz
	Fine	28-32 fl. oz	32 fl. oz

Poast Plus 1.0 lbs ai per gallon POST applications: 1.5 to 3.75 pts /A	Active Ingredients: Sethoxydim Similar Products: Poast MOA: 1	POST. Apply to actively growing weeds. Most effective control will result from making applications early when weeds are small.	Do not cultivate within 5 days before or 7 days after application. Cultivating 7 days or later after treatment may help provide season-long control. Do not apply through any type of irrigation equipment. Do not apply to crops under stress, in irrigated areas it may be necessary to irrigate before application to insure active weed growth. Do not graze or feed hay or forage to livestock. Do not apply within 40 days of harvest.
Prowl 3.3 lb. ai per gal SOIL applications: 1.2 to 2.4 pts per acre	Active Ingredients: Pendimethalin Similar Products: Pendimax & Prowl H2O MOA: 3	PPI. Apply up to 60 days prior to planting and incorporate within 7 days of application.	This product can be applied through a sprinkler including center pivot, lateral move, end tow, side (wheel) roll, traveler, big gun, solid set, or hand move irrigation systems. Do not apply this product through any other type of irrigation system.

This section was not revised in 2008.

PEANUT WEED CONTROL (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Pursuit 2S 2.0 lb. ai per gallon All applications: 4 fl oz. /A Sequential applications: 2 oz. /A PRE & 2 oz. /A POST	Active Ingredients: Imazethapyr Similar Products: Pursuit DG MOA: 2	POST. Apply when weeds are actively growing and before they exceed a height of 3 inches. SOIL. May be applied before, during, or after planting. May be applied up to 45 days prior to planting. PPI. Should be thoroughly incorporated to a depth of 1 to 2 inches.	Should be applied a minimum of one hour before rainfall or overhead irrigation. Do not apply more than 4 fl oz. /A during the growing season. Refer to label for weeds controlled and weeds reduced. Will not control pigweed populations that have developed resistance to this herbicide mode of action.
Select 2EC 2.0 lb. ai per gallon POST applications: 6 to 16 fl. ozs /A	Active Ingredients: Clethodim Similar Products: None MOA: 1	POST. Apply to actively growing grasses. Applications made to grass plants stressed by insufficient moisture or cold temperatures, or to grass plants exceeding recommended growth stages may result in unsatisfactory control.	Do not apply if rain is expected within 1 hour of application. Do not apply through any type of irrigation equipment. The addition of AMS may improve grass control for difficult to control species. Do not apply to crop under stress. Do not apply within 40 days of harvest.
Sequence 5.25 lb ai per gallon All applications: 2.5 to 3.5 pt/A	Active Ingredients: Metolachlor & Glyphosate Similar Products: None MOA: 15 & 9	EPP. Apply prior to planting for control of emerged actively growing weeds and soil residual activity. Do not incorporate if applied EPP, or crop injury will result. PRE. Apply after planting but before crop emergence for control of emerged actively growing weeds and soil residual activity.	Do not graze or feed forage or fodder from Sequence treated crops to livestock for 30 days following application. Do not harvest peanuts for 90 days following application. Do not exceed 2.5 pt/A on sandy loam soils or 3.5 pt/A on medium and fine soils. Do not exceed 2.67 lb ai/A S-metolachlor per crop year. PRE applications must be applied before ground cracking of emerging peanut plants.
Sonalan HFP 3.0 lb. ai per gallon PPI applications: See table.	Active Ingredients: Ethalfluralin Similar Products: Sonalan 10G MOA: 3	PPI. Incorporate into the top 2 to 3 inches of soil. Incorporation should occur within 48 hours of application.	Do not graze or forage treated crop, or cut for hay or silage.

Broadcast Rates/Acre for Sonalan HFP	
Soil texture	Pints/A
Coarse	1.2 to 2
Medium	2 to 2.5
Fine	2.5 to 3

This section was not revised in 2008.

PEANUT WEED CONTROL (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Storm 4 lbs. ai per gallon POST applications: 1.5 pts. /A	Active Ingredients: Bentazon & Acifluorfen Similar Products: Galaxy MOA: 6 & 14	POST Refer to label for required additives. Do not apply sequential applications of Blazer or Storm within 15 days of the initial application of Storm.	Do not apply within 75 days of harvest. Do not use treated plants for feed or forage. Do not apply to weeds or crops under stress. Rainfall or overhead irrigation within 4 hours after application may reduce the effectiveness of product. Do not apply through any type of irrigation system. Do not cultivate within 5 days before or 7 days after application.
Strongarm 84% WDG All applications: 0.3 to 0.45 oz. /A	Active Ingredients: Diclosulam Similar Products: None MOA: 2	PRE. A rate of 0.3 oz. /A may be applied from immediately after planting through "at-cracking" stage. Delayed PRE and at cracking applications. Rate of 0.45 oz. /A may be applied from no less than 5 days after planting through "at-cracking" stage.	Do not allow livestock to graze treated areas or harvest forage or hay from treated areas. Do not harvest peanuts for 30 days following application. Do not apply more than 0.45 oz. per acre per year. Do not apply to soils with a pH of 7.2 or greater. Do not apply when below normal soil and/or air temperatures are expected within 5 days of application. Do not apply by air. Do not apply through any type of irrigation system. Do not use in peanuts grown under drip irrigation.
Treflan HFP 4 lbs ai per gallon PRE applications: 1.0 to 1.5 pts /A	Active Ingredients: Trifluralin Similar Products: Treflan Trifluralin MOA: 3	PRE. Apply and incorporate before planting, at planting or immediately after planting. For coarse soil textures, apply 1.0 pts /A. For medium soil textures, apply 1.5 pts /A. Refer to label for tank mix applications.	Must be incorporated within 24 hours of application. Refer to label for chemigation directions.
Ultra Blazer 2 lb ai per gal All applications: 1.5 pts /A	Active Ingredient: Acifluorfen Similar Products: None MOA: 14	All applications: Apply product at soil cracking stage or postemergence.	Do not apply more than 2.0 pts per acre per season. Allow at least 15 days between sequential applications of product. Do not use treated plants for feed or forage. Rainfall or overhead irrigation within 4 hours after application may reduce the effectiveness of product. Do not apply through any type of irrigation equipment.
Valor WP 51% WP SOIL applications: 1.0 to 2.0 oz/A	Active Ingredient: Flumioxazin Similar Products: Valor <u>Rates may vary due to formulation</u> MOA: 14	PRE. Application may be made prior to planting or preemergence. Application must be made within 2 days after planting and prior to crop emergence. Application after the crop has begun to crack, or are emerged, will result in severe crop injury.	Do not graze treated fields or feed treated forage or hay to livestock. Do not incorporate into the soil after application. Do not apply more than 3 oz/A during a single growing season. Do not irrigate when crop is cracking. Do not use on crops grown for seed. Do not tank mix with Strongarm.
Zorial Rapid 80 80% DF PRE applications: 0.5 lb /A	Active Ingredients: Norflurazon Similar Products: None MOA: 12	PRE. Apply as a preemergence surface application immediately after planting and before weeds and crop emerge.	Do not apply to crops that are near cracking, at cracking, or emerged, as crop injury may result. Do not make more than one application per year.

MOA Group Tables start on page 46 of the handbook.

PEANUT DISEASE CONTROL GUIDELINES

QUICK GUIDE TO PEANUT DISEASES

DISEASE (PATHOGEN)	SYMPTOMS	CONTROL
Seedling disease (<i>Rhizoctonia solani</i> , <i>Pythium</i> spp., <i>Fusarium</i> spp.)	Seed rot, pre- or post-emergence death of seedlings. Dark brown sunken lesions on stems. Seedlings are stunted or die at a later date. Inadequate stand may result.	(1) Plant high quality seed with strong vigor. (2) In-furrow or planter box application of fungicide. See Table 1.
Aspergillus crown rot (<i>Aspergillus niger</i>)	Swelling of lower stem below soil line, becoming corky and brittle, eventual dark decay develops; branches or whole plants wilt and die; extensive crown and root decay; decayed crown and stem bases covered with black, powdery mass.	(1) Plant high quality seed with strong vigor. (2) Plant seed treated with fungicide(s). (3) Do not throw dirt to peanuts. (4) Control stem and root boring insects where warranted.
Early leaf spot (<i>Cercospora arachidicola</i>)	Circular, brown to dark brown spots on leaves usually surrounded by a yellow border. Spots are brown on lower leaf surface. Infected leaves turn yellow and drop. Stems and pegs have oval, dark brown spots.	(1) Apply foliar fungicides either on a 14-day schedule or according to the early leaf spot advisory where available. (2) Practice crop rotation. (3) Utilize residue management program. See Table 3.
Late leaf spot (<i>Cercosporidium personatum</i>)	Symptoms are similar to early leaf spot except spots are darker in color and the yellow border is faint absent. Spots are black on the lower leaf surface.	(1) Apply foliar fungicides on a 10 to 14-day schedule. (2) Same cultural controls as for early leaf spot. See Table 3.
Pepper spot (<i>Leptosphaerulina crassiasca</i>)	Numerous small, dark brown to black spots on one leaf surface which lack yellow borders. Leaves may develop a V-shaped scorch before yellowing and dropping. Similar spots on stems.	(1) Apply foliar fungicides on a 14-day schedule. (2) Same cultural controls as for early leaf spot. See Table 3.
Web blotch (<i>Phoma arachidicola</i>)	First appears as a greenish-gray to brown webbing or irregularly-shaped blotch on upper leaf surface, later becoming darker brown and extending through to the lower leaf surface.	(1) Apply foliar fungicides on a 10 to 14-day schedule. (2) Same cultural controls as for early leaf spot. See Table 3.
Tomato Spotted Wilt (Tomato spotted wilt virus (TSWV))	Symptoms are variable and may include leaf mottling and distortion; ring spots on new leaflets; plant stunting; and yellowing, wilting, and death of shoots or entire plants.	Plant varieties with resistance to tomato spotted wilt.
Southern blight (<i>Sclerotium rolfsii</i>)	Yellowing and wilting of branches or whole plants, wilted branches turn brown and die. White, coarse mold covers lower stems and may grow over the soil surface and plant debris on ground. Numerous small, round, brown sclerotia are formed on stems and debris.	(1) Rotate peanuts with cotton, corn, or grain sorghum. (2) Moldboard plow to bury sclerotia. (3) Do not throw soil to plants during cultivation. (4) Make preventive applications of a suggested fungicide. See Table 4.
Limb rot (<i>Rhizoctonia solani</i>)	Circular, sunken lesions on lower limbs contacting soil, light to dark brown in color, becoming elongated and zonate (banded). Infected branches wilt and die, infection may spread inward to kill several branches or whole plant.	(1) Rotate with grain crops to slow disease build-up. (2) Avoid excessive mechanical damage to vines. (3) Time irrigations to avoid excessive canopy wetness. (4) Manage peanuts to avoid excessive top growth. (5) Make foliar applications of a suggested fungicide. See Table 4.
Sclerotinia blight (<i>Sclerotinia minor</i>)	May be confused with southern blight. White and fluffy mold, most evident when canopy is wet, growing on lower stems near crown or on lateral branches. Light tan to pale white lesions develop. Affected branches or whole plants wilt, die, and turn dark brown to black. Small, irregularly shaped, black sclerotia found on and in infected stems, pegs, pods, and seeds.	(1) Plant a resistant variety (Tamsparn 90). (2) Avoid spreading sclerotia to clean fields on equipment, animals, or hay. (3) Time irrigations to avoid prolonged canopy wetness. (4) Harvest and/or plant early to avoid cool, wet conditions late in season. (5) Apply suggested fungicide to susceptible runner varieties. See Table 4.
Verticillium wilt (<i>Verticillium dahliae</i>)	Symptoms usually become apparent at mid-season; leaves turn yellow with brown marginal scorch. Branches or whole plants are stunted, turn yellow, and may wilt and may die when drought stressed. Cutting across petiole bases, stems, or roots reveals brown discoloration of vascular system.	(1) Long-term rotation with non-host crops may provide control. (2) Avoid rotations with cotton, okra, or potatoes in infested fields. (3) Irrigate to maintain adequate soil moisture. (4) Clean equipment when moving from infested to clean fields.

PEANUT DISEASE CONTROL GUIDELINES (CONT'D)

QUICK GUIDE TO PEANUT DISEASES (CONT'D)

DISEASE (PATHOGEN)	SYMPTOMS	CONTROL
Northern root-knot nematode (<i>Meloidogyne hapla</i>)	Infected plants form dense, bushy root system. Tiny galls (swellings) are formed at the points of root branching. Galls may also form on pods and pegs. On sandy soils, plants may be stunted and pale green in color. Stunted plants are usually clustered and rows grow unevenly.	Sample soil to determine population level. Where populations are damaging rotate with corn, grain sorghum, sudan grass, or cotton and sample again. Apply a suggested nematicide if necessary. See Table 2.
Peanut root-knot nematode (<i>Meloidogyne arenaria</i>)	Large galls form on roots and pods causing extreme swelling and disfiguration of below ground plant parts. Severly affected plants are stunted and pale green in color. Stunted plants are usually clustered and rows grow unevenly.	Sample soil to determine population level. Where populations are damaging rotate with corn, grain sorghum, sudan grass, or cotton and sample again. Apply a suggested nematicide if necessary or plant a resistant variety. See Table 2.
Root-lesion nematode (<i>Pratylenchus brachyurus</i>)	Brown pin-point spots on pods and pegs. Spots enlarge and turn darker in color leaving a peppered appearance. High populations reduce plant growth and pod set. Pegs may be weakened leaving pods in soil at harvest.	Rotation is not effective for this nematode. Sample soil and roots and apply a suggested nematicide if damaging levels are present. See Table 2.
Pod rot (<i>Rhizoctonia solani</i> , <i>Pythium</i> spp.)	Light brown to reddish-brown areas on pods, later becoming black, entire pod may be affected. Pod may rot completely and be either soft and mushy or firm and skeletonized. Kernel and inner pod wall may be covered with cream to dark brown mold (mycelium). Kernels are often completely decayed.	(1) Rotate peanuts with summer grain crops or sudan grass. (2) Spanish varieties are more tolerant than runners. (3) Maintain adequate levels of calcium fertility in soil. (4) Avoid excessive use of low-quality irrigation water. (5) Make preventive applications of a fungicide suggested for pod rot control where severe. See Table 4.
Black hull (<i>Thielaviopsis basicola</i>)	Superficial, large, dull black patches on pod hulls. May cause seed discoloration and peg decay when severe.	Rotate infested fields with grain sorghum.

For additional information about peanut diseases and their control consult EPP 7186, 7187, 7655, 7663, and 7664.

SEEDLING DISEASE CONTROL IN PEANUTS

The goal of seedling disease control is to achieve an adequate and uniform stand. Seedling diseases are effectively controlled in most instances by fungicide seed treatments already applied by seed dealers. However some growers report difficulty in stand establishment. Hopper-box or in-furrow treatments (See Table 1) may increase the level of seedling disease control in problem fields over a seed treatment alone. Expect about 2-3 weeks of protection from these treatments. Other stresses such as cold soil, a poorly prepared seedbed, herbicide injury, excessive rain, and poor quality seed may also contribute to stand failures.

TABLE 1. FUNGICIDES FOR AT-PLANT CONTROL OF PEANUT SEEDLING DISEASE

COMMON NAME (FUNGICIDE MOA GROUP): FORMULATION AND RATE	REMARKS
azoxystrobin (11): Abound 2.08F 0.4 to 0.6 fl oz/1000 ft row	Spray in furrow at planting.
<i>Bacillus subtilis</i> : Kodiak HB 0.3D 2 to 4 oz/cwt seed	Biological seed treatment that can be used in combination with a fungicide seed treatment. Treat seed in planter box.
carboxin (7) + PCNB (14) + metalaxyl (4): Prevail 33.1D 4 to 8 oz/cwt seed	Treat seed in planter box.
mefenoxam (4) + PCNB (14): Ridomil Gold PC 10.5G 12.5 to 25 lb/acre	Apply in a 4-inch band at planting.
PCNB (14): Terraclor 15G 7 to 13 lb/acre Terraclor 4F 2 to 4 pt/acre Terraclor 2E 4 to 8 pt/acre	Apply in furrow at planting.

Check labels for feeding restrictions.

MOA Group Tables start on page 46 of the handbook.

PEANUT DISEASE CONTROL GUIDELINES (CONT'D)

NEMATODE CONTROL IN PEANUTS

Plant parasitic nematodes are microscopic, slender worm-like organisms that live in soil and feed on plant roots. The most important nematode pest of peanuts in Oklahoma is the northern root-knot nematode. The peanut root-knot nematode was recently identified in a few fields in southwestern Oklahoma. Root-lesion and ring nematodes are also common in peanuts, but they are less damaging. Reductions in plant growth and yield result when nematode populations exceed critical levels. High populations may damage peanuts to an extent that a crop cannot be grown profitably. The goal of nematode management is to reduce populations below damaging levels. Crop rotation is very effective in reducing populations of root-knot nematodes. Cotton, corn, grain sorghum, and sudan grass are excellent rotation crops for root-knot control. However, rotation is not as effective against the root-lesion nematode because it can reproduce on a wide range of crops. If rotation cannot be practiced or if root-lesion nematode is a problem, chemical control should be considered. Fields can be checked for potential nematode problems by examining roots and pods during the season for symptoms of nematode feeding. Above-ground symptoms of nematode do not always develop, but where they do, these areas of poor growth or stunted plants should be examined. Declining yields are also symptom of a nematode problem.

Efficient nematode management depends upon knowing which species is present and its population level in the soil. Symptoms of nematode feeding on plants during the growing season are a warning of a potential nematode problem. Soil sampling also is useful for assessing the potential for economic damage. Sampling must be done before a peanut crop is planted because nematode problems cannot be corrected during the growing season. Samples can be collected before planting in the spring. However, sampling late in the season, just prior to or at harvest will increase the chances of accurately measuring nematode levels. Root-lesion nematode can be difficult to detect in soil. Therefore, both roots and soil are needed for more accurate analysis of this nematode. Entire fields, areas in fields where plants are growing poorly, or both may be sampled. If a large field is to be sampled, divide it into smaller units and process the samples separately or sample along a w-shaped pattern across the entire field to ensure a representative sample. Collect soil from root zone (2-10 inches deep avoiding the upper 2 inches of soil). Include some fibrous (feeder) roots when possible. Bulk the samples in a bucket, thoroughly mix the sampled soil and roots, and retain approximately one quart for analysis. Avoid letting the samples dry or exposing them to intense heat or freezing temperatures. Mail samples as soon as possible after collection to the OSU Plant Disease and Insect Diagnostic Laboratory, Oklahoma State University, 125A Noble Research Center, Stillwater, OK 74078; either directly or through your county extension office.

If the test report indicates a potentially damaging level of nematodes, management strategies should be implemented. Infested fields with damaging populations may either be rotated to a non-host crops for two years, a nematicide applied (See Table 2), or a nematode resistant variety (NemaTAM) can be planted where peanut root knot is found. 'NemaTAM' is not effective against the northern root-knot nematode. Where crop rotation is applied, fields should be sampled again to ensure nematode populations have declined to safe levels before planting peanuts without nematicide. Nematicides are dangerous pesticides and should be used with utmost caution.

TABLE 2. NEMATICIDES FOR CONTROL OF PEANUT NEMATODES

COMMON NAME (INSECTICIDE MOA GROUP): FORMULATION AND RATE	REMARKS
aldicarb (1A): Temik 15G [†] 15 to 22 oz/1000 ft of row - single application or Temik 15G [†] 11 oz/1000 ft of row- split application	Single application at planting. Apply in a 6 to 12-inch band and incorporate 2 to 4 inches deep. Split application. Apply in seed furrow or banded (6 to 12 inches) and incorporate 2 to 4 inches deep. Make second application 45 days after planting in a 12 to 18-inch band over the row, and incorporate immediately. Do not apply within 90 days of harvest.
dichloropropene: Telone II [†] 52 to 106 fl oz/1000 ft	Row fumigation at least 7 days before planting. Apply when soil is dry to allow fumigant penetration. Inject through one or two (8 to 12 inches apart) chisels 12 inches deep and seal by packing. Plant when odor is no longer detectable at the fumigation depth.

[†] Restricted Use Pesticide
MOA Group Tables start on page 46 of the handbook.

CHECK LABELS FOR FEEDING RESTRICTIONS

FOLIAR DISEASE CONTROL IN PEANUTS

Early leaf spot is the most important foliar disease of peanuts in Oklahoma. The disease affects nearly all of the peanut acreage in the state each year. Web blotch is a problem mainly in the western half of the state on Spanish varieties. Late leaf spot is less common, but more difficult to control. Pepper spot also is an occasional problem. Foliar disease control is essential in the production of a high-yielding peanut crop. Yield losses can exceed 50% where foliar diseases are allowed to defoliate plants.

PEANUT DISEASE CONTROL GUIDELINES (CONT'D)

FOLIAR DISEASE CONTROL IN PEANUTS (CONT'D)

Spanish varieties are particularly prone to leaf spot damage because they often become infected earlier in the season than runner varieties.

While crop rotation is useful in delaying the development of foliar diseases, fungicide sprays (See Table 3) are required for effective control. Fungicides provide from 10 to 14 days of protection before weathering and loss of effectiveness occurs. In addition, fungicides only protect healthy foliage from infection and do not cure established infections. Therefore, they must be applied preventively, and repeated applications are required to provide season-long control. Fungicides should be applied in a sufficient volume of water to achieve thorough coverage. A minimum volume of 15 gal/acre is suggested for ground applications while aerial applications should be in a minimum volume of 5 gal/acre. While chemigation is effective when targeting soilborne diseases, it is not very effective in the control of foliar diseases because residue left on the leaf after chemigation is not sufficient to provide adequate disease control. Chlorothalonil (e.g. Bravo) at the maximum labeled rate would be the only recommended fungicide for foliar disease control by chemigation.

Spray programs should be started 30 to 45 days after planting. Delaying spray programs until disease appears is risky and resulting disease control may not be satisfactory. Once the first application is made, sprays should be repeated on 14-day intervals until two weeks before anticipated harvest.

Early Leaf Spot Advisory (MESONET) - Daily leaf spot advisories are available to assist growers in the efficient application of fungicides for control of early leaf spot. Using a full-season calendar program to time sprays is very effective, but expensive. The advisory program permits growers to spray only when weather conditions are favorable for infection. Weather variables are collected from automated weather stations located in each county of the state. Use of the advisory program permits a reduction of the number of sprays while maintaining control. The advisory program has been extensively tested in Oklahoma and proven to be effective. However, strict adherence to risk management rules is required to ensure success. Fields must be closely monitored to ensure that early leaf spot does not exceed damaging levels or that other foliar diseases, not controlled with the advisory program, are not present. Daily advisories are available on the Internet at <http://agweather.mesonet.org/> by selecting "Crops" and then "Peanuts" and then "Peanut leaf spot model".

The advisory program identifies and accumulates hours of weather favorable for infection of peanut leaves by the fungus that causes early leaf spot. An infection hour is one hour when the relative humidity is 95% or greater and temperature is between 60.8° and 86.7°F. Beginning 30 days after planting or ten days since the last spray, a spray is recommended when 36 infection hours are exceeded. To simplify advisories and make their use more general, the last effective spray date is reported daily. As favorable periods for infection accumulate, the last effective spray date moves forward in time. For the first spray, a spray is recommended when the last effective spray first exceeds 30 days after planting. For subsequent sprays, a spray is recommended when the last effective spray date first exceeds the date of the previous spray. A spray is not needed when the last effective spray date is before 30 days after planting or when the peanuts have been sprayed after the last effective spray date. Advisories must be received daily once the peanuts are thirty days old or it has been 10 days since the last spray. The Internet site for the advisory program contains an interactive page where a spray advisory can be obtained simply by entering the planting date and the date of the last spray (if applicable).

Risk management rules for the early leaf spot advisory are:

- 1) If fields cannot be sprayed within three days of exceeding the last effective spray date, spray on a 14-day schedule.
- 2) Use only highly effective fungicides (Absolute, Bravo, Tilt/Bravo, Folicur, Proline, Provost, Stratego, Headline). If another fungicide is used, spray on a 14-day schedule.
- 3) If levels of early leaf spot exceed 25% infection (leaflets with spots or defoliated), revert to a 14-day schedule.
- 4) If late leaf spot, web blotch, or pepper spot are identified, revert to a 14-day schedule.
- 5) Be wary of weather forecasts, spray if rain or dew is in the forecast and a field is close to exceeding the last effective spray date. The Internet site contains a forecast page with 60-hr precipitation and dew point forecasts for several locations in the state. If forecasted temperatures are below the forecasted dew point, dew is expected.
- 6) Maintain the spray program until 14 days before anticipated harvest.

AUPnuts Advisory Program - AUPnuts is another spray advisory program that can be used by growers to efficiently time fungicide sprays for foliar disease control. The program was developed in Alabama and has been tested for early leaf spot in Oklahoma and proven to be effective. The program also has been effective in the southeast where late leaf spot also is a problem. Its effectiveness against web blotch and pepper spot is unknown. The AUPnuts program is likely to recommend more sprays than

PEANUT DISEASE CONTROL GUIDELINES (CONT'D)

FOLIAR DISEASE CONTROL IN PEANUTS (CONT'D)

the early leaf spot program. Risk management rules described above for the early leaf spot advisory also must be followed for AUPnuts except for rule 4 (AUPnuts controls late leaf spot) and rule 5 (forecasts are part of the AUPnuts program).

The main weather variable used in AuPnuts is a rain event. A rain event is any day with 1/10 of an inch or more of rain and/or irrigation. The program also uses five-day NWS precipitation forecasts which can be obtained from the news. For days when irrigation is planned, substitute 100% for the precipitation forecast. Calculate an average precipitation forecast for next five days (add the precipitation forecasts for the next five days and divide by five). A rain gauge (one per field) is the only equipment needed to run AUPnuts. Rules for the AUPnuts advisory program are:

First spray: After emergence begin counting rain events. Spray if: 1) four rain events have been counted since emergence and the average chance of rain for the next five days is 50% or greater; or, 2) five rain events have been counted since emergence and the average chance of rain for the next five days is 40% or greater; or, 3) six or more rain events have been counted since emergence. If leaf spot is seen (two or more spots per plant), spray immediately.

Second and all later sprays: Ten days after the previous spray, begin counting rain events and check the five-day forecast daily. Spray if: 1) no rain event has been counted and the average chance of rain for the next five days is 50% or greater; or, 2) one rain event has been counted and the average chance of rain for the next five days is 40% or greater; or, 3) two rain events have been counted and the average chance of rain for the next five days is 20% or greater; or, 4) three rain events have been recorded. Continue the program until 14 days before anticipated harvest.

Fungicide resistance management - The potential for development of resistance in leaf spot fungi is a concern for several fungicide classes that have a site specific mode of action. Resistance development can result in loss of effectiveness and control failures. Most of the at-risk fungicides are systemic to some degree. At-risk fungicides can be grouped according to mode of action. Group 1 fungicides (benzimidazoles) such as Topsin, and Group 11 (strobilurin) fungicides such as Abound and Headline are very prone to resistance development and sudden losses in effectiveness have been reported for some diseases. Group 3 (triazole) fungicides such as Folicur and Tilt are less prone to resistance development. However, a slow decline in sensitivity to triazole fungicides can develop after prolonged use. The following resistance management guidelines should be followed when using at-risk fungicides:

- 1) Reduce initial pathogen levels through the use of good cultural practices such as crop rotation.
- 2) Follow label directions - do not exceed the maximum number of consecutive applications, and do not use less than the minimum labeled rate.
- 3) Do not exceed the maximum allowed amount or number of applications per season. Extending the allowed amount of one group 11 fungicide with another, or one group 3 fungicide with another will increase the risk of resistance development.
- 4) Keep the disease pressure low by using an effective application schedule.
- 5) Calibrate the sprayer. Configure spray tips to apply a sufficient volume of water to achieve good coverage.
- 6) Avoid using Group 1, Group 3, or Group 11 fungicides all season long. Use alternating sprays or blocks of sprays of these fungicides with unrelated fungicides or tank-mix with unrelated fungicides. For example, Group 3 and Group 11 fungicides can be applied in alternating sprays or blocks of sprays with a protectant (multi-site, Group M) fungicide such as chlorothalonil (e.g. Bravo) or mancozeb (e.g. Dithane). Group 3 and Group 11 fungicides also can be applied in alternating sprays or blocks of sprays with each other. Tank mixtures of at risk fungicides with a protectant or with fungicides in another group are appropriate.
- 7) Alternating or tank-mixing one Group 3 fungicide with another or one Group 11 fungicide with another will not help prevent resistance development.

PEANUT DISEASE CONTROL GUIDELINES (CONT'D)

TABLE 3. FUNGICIDES FOR CONTROL OF FOLIAR PEANUT DISEASES

COMMON NAME (FUNGICIDE MOA GROUP) FORMULATION AND RATE/ACRE	REMARKS
azoxystrobin (11): Abound 2.1F 18.5 to 24.6 fl oz	Controls leaf spots, southern blight, and limb rot (see Table 4). Apply 60 and 90 days after planting. Apply a non Group 11 fungicide for foliar disease control as needed during other parts of the season.
boscalid (7): Endura 70WG 6.5 to 10 oz	Apply on 14-day intervals. Also controls Sclerotinia blight at 8 to 10 oz (See Table 4).
chlorothalonil (M): Bravo, Applause, Chloronil, Echo, Equus, or Chlorothalonil 6F 1.0 to 1.5 pt Bravo Ultrex or Equus 82.5DF 0.9 to 1.36 lb Echo 90DF 0.87 to 1.25 lb	Apply on 14-day intervals. Use the high rate when applied alone or the low rate when applied in a tank mixture with another fungicide.
copper hydroxide (M): Kocide 101, Champion, or Nu Cop 50W 1.5 to 3 lb Kocide or Nu Cop DF 1.5 to 3 lb Kocide, Champ, or Nu Cop 3F 1 to 2 pt Kocide 2000 or Champ DF 1 to 2 lb	Tank mix or alternate with another fungicide on 14-day intervals. Use the high rate when applied alone or the low rate when applied in a tank mixture with another fungicide.
copper sulfate (M): Cuprofix Dispers 20DF 2-4 lb Cuprofix Ultra 40DF 1-2 lb	Tank mix or alternate with another fungicide on 14-day intervals. Use the high rate when applied alone or the low rate when applied in a tank mixture with another fungicide.
fluoaxastrobin (11): Evito 480SC 5.7 fl oz	Controls leaf spots, southern blight, and limb rot (see Table 4). Apply on 14-day intervals. Do not make more than two sequential applications before alternating with a non Group 11 fungicide. Utilize resistance management strategies.
mancozeb (M): Dithane, Manzate, or Penncozeb 75DF 1.5 to 2.0 lb Dithane, Manzate, or Penncozeb 4F 1.2 to 1.6 qt	Tank mix or alternate with another fungicide on 14-day intervals. Use the high rate when applied alone or the low rate when applied in a tank mixture with another fungicide. Use a spreader/sticker.
mancozeb (M) + copper (M) Mankocide DF 3 to 4 lb Cuprofix MZ Dispers 2.5 to 4.75 lb	Tank mix or alternate with another fungicide on 14-day intervals. Use the low rate for tank-mixes and the high rate when applied alone in alternation with another fungicide. Use a spreader/sticker.
propiconazole (3): Tilt, Bumper, or Propimax 3.6E 2.5 to 4 fl oz	Tank mix the low rate with another fungicide or use the high rate alone on 14-day intervals. Utilize resistance management strategies.
propiconazole (3) + chlorothalonil (M) Tilt Bravo SE 4.3F 1.5 pt	Contains an equivalent of 2 fl oz Tilt and 1 pt Bravo 6F per acre. Apply on 14-day intervals.
propiconazole (3) + flutolanil (7): Artisan 3.6F 1.6 to 2 pt	Combination of Tilt (0.6 lb/gal) for foliar diseases and Moncut (3 lb/gal) for southern blight and limb rot (See Table 4). Apply at mid season and repeat 4 weeks later. Use a non-group 3 fungicide for foliar disease control before, in between, and after Artisan applications as necessary.
propiconazole (3) + trifloxystrobin (11): Stratego 2.08F 7 fl oz	Apply on 14-day intervals. Do not make more than 2 consecutive applications before switching to a non Group 11 fungicide.
prothioconazole (3): Proline 4F 5 to 5.7 fl oz/A	Controls leaf spots, southern blight, and limb rot (see Table 4). Make up to 4 mid-season applications on 14-day intervals. Utilize resistance management strategies.
prothioconazole (3) + tebuconazole (3): Provost 3.6F 7 to 8 fl oz	Controls leaf spots, southern blight, and limb rot (see Table 4). Make up to 4 mid-season applications on 14-day intervals. Utilize resistance management strategies.
pyraclostrobin (11): Headline 2.08E 6 to 12 fl oz	Controls foliar diseases, and southern blight and limb rot (See Table 4). For foliar diseases, use 6 fl oz on 14-day intervals or 9 to 12 fl oz for 21-day intervals. Utilize resistance management strategies. Do not make more than two sequential applications before alternating with a non Group 11 fungicide.
tebuconazole (3) : Folicur, Muscle, Orius, Trisum, or Tebuzol 3.6F 7.2 fl oz	Controls leaf spots, southern blight, and limb rot (see Table 4). Use a spreader/sticker. Make up to 4 mid-season applications beginning 60 days after planting. Use another fungicide for early and late-season leaf spot control. Utilize resistance management strategies.

Check labels for feeding and days to harvest restrictions.

MOA Group Tables start on page 46 of the handbook.

PEANUT DISEASE CONTROL GUIDELINES (CONT'D)

TABLE 3. FUNGICIDES FOR CONTROL OF FOLIAR PEANUT DISEASES (CONT'D)

COMMON NAME (FUNGICIDE MOA GROUP) FORMULATION AND RATE/ACRE	REMARKS
tebuconazole (3) + trifloxystrobin (11) : Absolute 500SC 4.36F 3.5 fl oz	Apply on 14-day intervals, but do not make more than 2 consecutive applications before alternating with a non Group 11 fungicide. Use a spreader/sticker.
thiophanate methyl (1): Topsin or T-Methyl 70W 8 oz Topsin or T-Methyl 4.5F 10 fl oz Thiophanate Methyl 85 WDG 6.4 oz	Apply on 14-day intervals in a tank mixture with chlorothalonil (e.g. Bravo) or mancozeb (e.g. Dithane).

Check labels for feeding and days to harvest restrictions.

MOA Group Tables start on page 46 of the handbook.

SOILBORNE DISEASE CONTROL IN PEANUTS

Important soilborne diseases of peanuts include southern blight, Sclerotinia blight, pod rot, and Verticillium wilt. Limb rot can also be a problem in the production of irrigated runner varieties. These diseases usually appear from mid-season to late-season. Soilborne diseases can increase to high levels with continuous cropping of peanuts, causing substantial yield losses. Crop rotation should be practiced in the long-term management of these diseases. Fungicides are effective in reducing losses to these diseases, but they must be applied preventively for maximum effectiveness. Knowledge of field history is essential in anticipating outbreaks of these diseases.

Southern blight can be reduced with cultural practices. These include: 1) Long rotations (at least 2 years out of peanut) with corn, grain sorghum, cotton, or sudan grass; 2) Moldboard plow to reduce levels of the fungus in the upper soil profile; 3) Planting on a raised bed; 4) Avoid throwing dirt against peanut vines during cultivation; 5) Avoid frequent irrigation with small amounts of water. Fungicides (See Table IV) should be applied where long rotations have not been practiced and where southern blight is a yield-limiting factor.

Sclerotinia blight is extremely destructive so precautions should be taken to avoid contamination of clean fields. Avoid carrying sclerotia (seeds of the fungus) into clean fields in soil or on infested plant debris with equipment or animals. Sclerotia can survive for long periods (at least five years), but crop rotation will slow disease build-up. Avoid frequent irrigations with small amounts of water. Tamsan 90 is a resistant variety and should be planted where Sclerotinia blight is anticipated. The fungicide registered for Sclerotinia blight (See Table IV) provides only about 40% control and a yield increase of about 750 lb/acre on susceptible runner varieties. Yield increases with this fungicide in Tamsan 90 and other spanish varieties have not been sufficient to offset the cost of treatment.

Verticillium wilt can be severe some years in contaminated fields. Spanish varieties are most susceptible. There are no effective controls for this disease except to avoid drought stress with adequate irrigation and to dig peanuts before infected plants die where a large number of plants show symptoms. Avoid rotations with cotton which is also susceptible to this disease. Avoid spreading the fungus to clean fields in soil or infested plant debris.

Limb rot is not normally severe in Oklahoma, but can become a problem in wet years on irrigated runner varieties. Avoid over-irrigation and excessive vine injury. The fungicides Abound, Folicur, and Moncut (See Table 4) effectively control this disease. Crop rotations with corn, grain sorghum, and sudan grass also may be beneficial.

Pod rot is a complex disease caused by one or more of several different fungi. It can be severe on some sandy soils, on runner and virginia varieties, and may be aggravated by nematode and soil insect feeding. Calcium deficiency may be involved in the pod rot complex, but most soils in Oklahoma are innately high in calcium and do not respond to applications of gypsum. Salty irrigation water also has been implicated in increasing pod rot. Crop rotation with corn, grain sorghum, or sudan grass is suggested where pod rot becomes severe. A full-season, preventive fungicide program may provide an economic return (See Table 4). Avoid using PCNB alone where pod rot is a problem because this fungicide increases levels of Pythium pod rot.

PEANUT DISEASE CONTROL GUIDELINES (CONT'D)
TABLE 4. FUNGICIDES FOR CONTROL OF SOILBORNE PEANUT DISEASES

DISEASE	COMMON NAME (FUNGICIDE MOA GROUP): FORMULATION AND RATE/ACRE	REMARKS
Southern blight Limb rot	azoxystrobin (11): Abound 2.08F 18.5 to 24.6 fl oz	Ground sprayer and aerial applications. Controls southern blight, limb rot, and leaf spots (see Table 3). Apply 60 and 90 days after planting.
	fluoxastrobin (11): Evito 480SC 4F 5.7 fl oz	Ground sprayer and aerial applications. Controls southern blight, limb rot, and leaf spots (see Table 3). Apply on 14-day intervals during mid-season. Do not make more than two consecutive applications before switching to a non Group 11 fungicide.
	flutolanil (7): Moncut 50W 2 to 4 lb	Make ground, aerial, or chemigation application 60 days after planting. Use the higher rates where disease pressure is heavy. A split application may be used by making a second 2-lb application 30 days after the first.
	propiconazole (3): Tilt, Bumper, or Propimax 3.6E 4 to 8 fl oz	<u>Southern blight only.</u> Apply by chemigation in a minimum of 1/2 inch water 45 to 60 days after planting and repeat on 2-3 week intervals. Do not apply more than 16 fl oz per season. Chemigation application will not control of leaf spots.
	propiconazole (3) + flutolanil (7): Artisan 3.6F 1.6 to 2 pt	Combination of Tilt (0.6 lb/gal) for foliar diseases (See Table 3) and Moncut (3 lb/gal) for southern blight and limb rot. Ground, aerial, or chemigation application. Apply at mid season (60-70 days after planting) and repeat 4 weeks later.
	propiconazole (3) + trifloxystrobin (11): Stratego 2.08F 14 fl oz	<u>Limb rot only.</u> Ground and aerial applications. Apply 60 days after planting and repeat 30 days later. Applications for limb rot will also control leaf spots (See Table 3).
	prothioconazole (3): Proline 4F 5.7 fl oz/A	Ground and aerial applications. Controls southern blight, limb rot, and leaf spots (see Table 3). Make up to 4 mid-season applications on 14-day intervals. Utilize resistance management strategies.
	prothioconazole (3) + tebuconazole (3): Provost 3.6F 7 to 8 fl oz	Ground and aerial applications. Controls southern blight, limb rot, and leaf spots (see Table 3). Make up to 4 mid-season applications on 14-day intervals beginning 60 days after planting. Utilize resistance management strategies.
	pyraclostrobin (11): Headline 2.08E 12 to 15 fl oz	Controls southern blight, limb rot, and leaf spots (see Table 3). Apply on 14-day intervals by ground sprayer, aircraft, or chemigation. Do not make more than two consecutive applications before alternating with a non Group 11 fungicide.
	tebuconazole (3): Folicur, Muscle, Orius, Trisum, or Tebuzol 3.6F 7.2 fl oz	Controls southern blight, limb rot, and leaf spots (see Table 3). Make up to 4 mid-season applications by ground sprayer or aircraft on a 14-day schedule beginning 60 days after planting. Use a spreader/sticker.
	tebuconazole (3) + trifloxystrobin (11) : Absolute 500SC 4.36F 7 fl oz	<u>Limb rot only.</u> Ground and aerial applications. Apply 60 days after planting and repeat 30 days later. Applications for limb rot will also control leaf spots (See Table 3).
Pod rot	mefenoxam (4) + PCNB (14): Ridomil Gold PC 10.5G 50 lb	Pythium and Rhizoctonia pod rots. Apply in a 12-inch band at pegging to early pod set (45 to 60 days after planting). Do not apply within 75 days to harvest.
	mefenoxam (4): Ridomil Gold 4E 0.5 to 1 pt	Pythium pod rot only. Apply by chemigation in a minimum of 1/2 inch water at pegging to early pod set (45 to 60 days after planting).
	mefenoxam (4): Ridomil Gold 2.4G 11.8 lb	Pythium pod rot only. Apply in a 12-inch band at pegging to early pod set (45 to 60 days after planting).
Sclerotinia blight	boscalid (7): Endura 70WG 8 to 10 oz	Ground-sprayer, aerial, and chemigation applications. Make first application after row closure when conditions become favorable, or at the first sign of disease. Make up to two additional applications on 14 to 21 day intervals. Also controls foliar diseases (see Table 3). Do not exceed 30 oz/season or apply within 14 days of harvest.
	fluzinam (M): Omega 4F 1 to 1.5 pt	Apply by ground sprayer or chemigation. Make the first application at canopy closure, after canopy closure when conditions become favorable, or at the first sign of disease. Make up to 2 additional applications at 3 to 4 week intervals. Do not exceed 4 pints per season or apply within 30 days of harvest.

Check labels for days to harvest and feeding restrictions.

MOA Group Tables start on page 46 of the handbook.

SMALL GRAINS INSECT CONTROL SUGGESTIONS

Pest, Damage and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre	Comments
<p>Aphids Corn leaf aphid: blue green with black legs, cornicles and antennae; antennae less than ½ length of body</p> <p>English grain aphid: lime green, “spindly legs” with black antennae, cornicles and legs. Antennae more than ½ length of body.</p> <p>Bird cherry oat aphid: olive green with brownish-red spot on back around base of cornicles.</p> <p>Rice root aphid is similar in appearance to bird cherry oat aphid, but tends to feed on crown, beneath the soil.</p> <p><u>Damage:</u> Corn leaf aphid and English grain aphid do not usually require control.</p> <p>Bird cherry oat aphid can reduce yield, and is an important vector of Barley Yellow Dwarf virus.</p> <p><u>Threshold:</u> Treat for bird cherry oat aphids if numbers exceed 30 per stem, or calculate threshold using worksheet found in <i>F-7183: Small Grain Aphids in Oklahoma</i>. Consider using low rate of Cruiser or Gaucho seed treatment if planting for forage + grain. There is no established threshold for English grain aphid, corn leaf aphid, or rice root aphid.</p>	<p style="text-align: center;"><u>Planting Time</u></p> <p style="text-align: center;">Cruiser 5FS (4A)</p> <p style="text-align: center;">Gaucho 480 (4A) Gaucho XT (4A)</p> <p style="text-align: center;"><u>Post-Plant</u></p> <p style="text-align: center;">Cobalt (3, 1B)</p> <p style="text-align: center;">Dimethoate^r 4E (1B)</p> <p style="text-align: center;">Karate w Zeon (3) (lambda cyhalothrin)</p> <p style="text-align: center;">Lannate^r LV^r (1A) Lannate^r SP^r (1A)</p> <p style="text-align: center;">Lorsban 4E (1B) (chlorpyrifos)</p> <p style="text-align: center;">Malathion (1B)</p> <p style="text-align: center;">Methyl parathion^r 4E (1B)</p> <p style="text-align: center;">Mustang MAX^r (3)</p> <p style="text-align: center;">Proaxis 0.5 CS (3) Prolex 1.25 CS (3)</p>	<p style="text-align: center;">0.75 to 1.33 fl oz/cwt seed</p> <p style="text-align: center;">1 to 3 fl oz/cwt seed 3.4 fl oz/cwt seed</p> <p style="text-align: center;">7-13 fl oz</p> <p style="text-align: center;">0.5 to 0.75 pt</p> <p style="text-align: center;">1.92 fl oz (0.03 lb ai/A)</p> <p style="text-align: center;">0.75 to 1.5 pt 0.25 to 0.5 lb</p> <p style="text-align: center;">0.5 to 1 pt (0.25 to 0.5 lb ai/A)</p> <p style="text-align: center;">1.5 pt</p> <p style="text-align: center;">0.5 to 1.5 pt</p> <p style="text-align: center;">3.2 to 4.0 fl oz</p> <p style="text-align: center;">3.84 fl oz 1.54 fl oz</p>	<p>Wheat and barley. No grazing restriction. Do not use treated seed as feed.</p> <p>Wheat and barley. 45 day waiting period for grazing. Do not use treated seed as feed.</p> <p>14 day waiting period for forage and hay, 28 days for grain or straw.</p> <p>Wheat only. 14 day waiting period for grazing, 35 day waiting period for harvest. Two applications per season.</p> <p>Wheat, wheat hay, and triticale. 7 day waiting period for grazing and 30 day waiting period for harvest.</p> <p>10 day waiting period for grazing, 7 day waiting period for harvest.</p> <p>14 day waiting period for grazing, 28 day waiting period for harvest. Two applications per season.</p> <p>7 day waiting period for grazing or harvesting.</p> <p>15 day waiting period for grazing or harvest. Temperatures should be above 50°F for application.</p> <p>Control may be variable. 14 day waiting period for grazing or harvesting.</p> <p>Wheat, wheat hay, and triticale. 30 day waiting period for grazing or harvesting.</p>

SMALL GRAINS INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre	Comments
<p>Army cutworm Gray striped caterpillar that curls up in to a tight “C” when disturbed. Evident from January through March</p> <p><u>Damage:</u> Cuts plants at soil line, can kill plants if it enters the crown</p> <p><u>Threshold:</u> 2-3 caterpillars per foot of row if conditions are dry, if moisture is adequate, 4-5 per foot of row.</p>	<p>Baythroid XL (3)</p> <p>Cobalt (3, 1B)</p> <p>Karate^f w Zeon (3) (lambda cyhalothrin)</p> <p>Mustang MAX^f (3)</p> <p>Proaxis^f 0.5 CS (3) Prolex^f 1.25 CS (3)</p>	<p>1 to 1.8 fl oz.</p> <p>13 to 25 fl oz</p> <p>0.96 to 1.60 fl oz 1.92 to 3.20 fl oz</p> <p>1.28 to 4.0 fl oz</p> <p>1.92 to 3.20 fl oz 0.77 to 1.28 fl oz</p>	<p>7 day waiting period for grazing, 30 days for harvest.</p> <p>14 day waiting period for forage and hay, 28 days for grain or straw.</p> <p>Wheat, wheat hay, and triticale. 7 day waiting period for grazing and 30 day waiting period for harvest.</p> <p>14 day waiting period for grazing or harvesting.</p> <p>Wheat, wheat hay, and triticale. 30 day waiting period for grazing or harvest.</p>
<p>Armyworm Dark green or brown caterpillar with 5 stripes along body.</p> <p><u>Damage:</u> Feed on flag leaf, awns and may “clip” heads.</p> <p><u>Threshold:</u> Treat if 4-5 unparasitized armyworms are found per ft of row.</p>	<p>Baythroid XL (3)</p> <p>Cobalt (3, 1B)</p> <p>Karate w Zeon (3) (lambda cyhalothrin)</p> <p>Lannate^f LV (1A) Lannate^f SP (1A)</p> <p>Methyl parathion^f 4E (1B)</p> <p>Mustang MAX^f (3)</p> <p>Pennacp-M^f (1B)</p> <p>Proaxis^f 0.5CS (3) Prolex^f 1.25 CS (3)</p> <p>Tracer (5)</p>	<p>1.8 to 2.4 fl oz</p> <p>13 to 25 fl oz</p> <p>1.28 to 1.92 fl oz (0.02 to 0.03 lb ai/A)</p> <p>0.75 to 1.5 pt 0.25 to 0.5 lb</p> <p>1.5 pt</p> <p>1.76 to 4.0 fl oz</p> <p>2 to 3 pt</p> <p>2.56 to 3.84 fl oz 1.02 to 1.54 fl oz</p> <p>1 to 3 fl oz</p>	<p>7 day waiting period for grazing, 30 days for harvest.</p> <p>14 day waiting period for forage and hay, 28 days for grain or straw.</p> <p>Wheat, wheat hay, and triticale. 7 day waiting period for grazing and 30 day waiting period for harvest.</p> <p>10 day waiting period for grazing, 7 day waiting period for harvest.</p> <p>15 day waiting period for grazing or harvest. Temperatures should be above 50°F for application.</p> <p>14 day waiting period for grazing or harvesting.</p> <p>15 day waiting period for grazing or harvesting.</p> <p>Wheat, wheat hay, triticale. 30 day waiting period for grazing or harvest.</p> <p>14 day waiting period for grazing, 21 day waiting period for harvest.</p>

SMALL GRAINS INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre	Comments
<p>Brown wheat mite Tiny red to dark brown mites that feed on leaves, associated with dry, hot weather.</p> <p><u>Damage:</u> Plants appear to be drought stricken.</p> <p><u>Threshold:</u> Treat if mites and damage are evident.</p>	<p>Cobalt 3, (1B)</p> <p>Dimethoate 4E (1B)</p> <p>Lorsban^r 4E (1B) chlorpyrifos)</p> <p>Methyl parathion^r 4E (1B)</p>	<p>13 to 25 fl oz</p> <p>0.33 to 0.5 pt</p> <p>0.5 to 1 pt (0.25 to 0.5 lb ai/A)</p> <p>1 pt</p>	<p>14 day waiting period for forage and hay, 28 days for grain or straw.</p> <p>Wheat only. 14 day waiting period for grazing, 35 day waiting period for harvest. Two applications per season.</p> <p>14 day waiting period for grazing, 28 day waiting period for harvest. Two applications per season.</p> <p>15 day waiting period for grazing or harvest. Temperatures should be above 50°F for application.</p>
<p>Fall armyworm Large, brown, green or black caterpillar with stripes, up to 1.5 inches. Has a light colored, inverted “Y” on head.</p> <p><u>Damage:</u> Eat small plants in Fall</p> <p><u>Threshold:</u> Treat if 3-4 larvae are found per foot of row AND feeding damage is evident.</p>	<p>Baythroid XL (3)</p> <p>Karate w Zeon (3) Warrior w Zeon (3) (Lambda T and others)</p> <p>Lannate^r LV (1A) Lannate^r SP (1A)</p> <p>Methyl parathion^r 4E (1B)</p> <p>Mustang MAX^r (3)</p> <p>Proaxis^r 0.5 CS (3) Prolex^r 1.25 CS (3)</p> <p>Tracer (5)</p>	<p>1.8 to 2.4 fl oz</p> <p>1.28 to 1.92 fl oz 2.56 to 3.84 fl oz</p> <p>0.75 to 1.5 pt 0.25 to 0.5 lb</p> <p>1.5 pt</p> <p>3.2 to 4.0 fl oz</p> <p>2.56 to 3.84 fl oz 1.02 to 1.54 fl oz</p> <p>1.5 to 3 fl oz</p>	<p>7 day waiting period for grazing; 30 days for harvest.</p> <p>Wheat, wheat hay, and triticale. 7 day waiting period for grazing and 30 day waiting period for harvest. Do not apply more than 0.06 lb ai./season.</p> <p>10 day waiting period for grazing, 7 day waiting period for harvest.</p> <p>15 day waiting period for grazing or harvest. Temperatures should be above 50° for application.</p> <p>14 day waiting period for grazing or harvesting.</p> <p>Wheat, wheat hay, triticale. 30 day waiting period for grazing or harvest.</p> <p>14 day waiting period for grazing, 21 day waiting period for harvest.</p>

SMALL GRAINS INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre	Comments
<p>False wireworm/Wireworm Slender, hard bodied, wormlike larvae.</p> <p><u>Damage:</u> Feed on seed and newly germinated plants below the soil surface. Results in bare patches with no stand emergence. More severe when dry soils delay germination.</p> <p><u>Threshold:</u> Treat if 1 larva is found per foot².</p>	Cruiser 5FS (4A)	0.75 to 1.33 fl oz/cwt seed	Wheat and barley. Do not use surplus treated seed for feed or food. Follow label instructions for application and storage conditions.
	Gaucho 480 (4A) Gaucho XT	1 to 3 fl oz/cwt seed 3.4 fl oz/cwt	Wheat and barley. 45 day waiting period for grazing. Do not use treated seed as feed. Gaucho and Cruiser are not labeled specifically for false wireworm; performance varies with soil moisture and soil temperature.
	Lindane 30 ^f (2A) barley: wheat, rye oats:	1.35 fl oz/cwt seed 1.40 fl oz/cwt seed	Registration for lindane has been canceled effective July 1, 2007 and all existing stocks must be used by July 2009.
<p>Grasshopper</p> <p><u>Damage:</u> May occur in mid-May through early June and August through October. May destroy field margins in fall, or chew leaves and clip heads in spring.</p> <p><u>Threshold:</u> 7-10 per yd² in vegetation next to wheat. 3 per yd² in the field. See F-7196 for additional information.</p>	Baythroid XL (3)	1.8 to 2.4 fl oz	7 day waiting period for grazing; 30 days for harvest.
	Dimethoate 4E (1B)	0.75 pt	Wheat only. 14 day waiting period for grazing, 35 day waiting period for harvest. Two applications per season.
	Furadan LFR (1A)	0.25 to 0.5 pt	Do not graze or feed treated forage to livestock. 2 applications per season.
	Karate w Zeon (3) Warrior w Zeon (3) (Lambda T and others)	1.28 to 1.92 fl oz 2.56 to 3.84 fl oz	Wheat, wheat hay, and triticale. 7 day waiting period for grazing and 30 day waiting period for harvest.
	Lorsban ^f 4E (1B) (Warhawk, Whirlwind)	0.5 to 1 pt	14 day waiting period for grazing, 28 day waiting period for harvest. Two applications per season.
	Malathion 5E (1B)	1.5 pt	7 day waiting period for grazing or harvesting.
	Methyl parathion ^f 4E (1B)	0.75 to 1 pt	15 day waiting period for grazing or harvesting.
	Mustang MAX ^f (3)	3.2 to 4.0 fl oz	14 day waiting period for grazing or harvesting.
	PennCap-M ^f (1B)	2 to 3 pt	15 day waiting period for grazing or harvesting.
	Proaxis ^f 0.5 CS (3) Prolex ^f 1.25 CS (3)	2.56 to 3.84 fl oz 1.02 to 1.54 fl oz	Wheat, wheat hay, triticale. 30 day waiting period for grazing or harvesting.
Sevin XLR (1A)	0.5 to 1.5 qt	Apply 0.5 to 0.75 qt for small nymphs; apply 1 to 1.5 qt for mature grasshoppers. Wheat only; 21 day waiting period for harvest.	

SMALL GRAINS INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre	Comments
<p>Greenbug Lime-green aphid with darker green stripe down back. Tips of legs, cornicles and most of antennae are black.</p> <p><u>Damage:</u> Injures plants by injecting toxin, leaves turn yellow, then die. Occasional problem in fall or spring; occurs more commonly in warm, dry conditions.</p> <p><u>Threshold:</u> Treatment thresholds depend on value of crop, and cost of control. To determine treatment threshold, and obtain a Glance 'n Go sampling form, use the Cereal Aphid Expert System: http://entopl.okstate.edu/gbweb/ or request a CD-Rom Copy and a set of laminated Glance 'n Go forms from Tom Royer (rtom@okstate.edu) 127 NRC, Stillwater, OK 74078 or contact you local county OCES office for information on determining thresholds and sampling.</p>	<u>Seed Treatment</u>		
	Cruiser 5FS (4A)	0.75 to 1.33 fl oz/cwt seed	Wheat and barley. No grazing restriction. Do not use treated seed as feed.
	Gaucho 480 (4A) Gaucho XT (4A)	1 to 3 fl oz/cwt seed 3.4 fl oz/cwt seed	
	<u>Post-Plant</u>		
	Dimethoate 4E (1B)	0.5 to 0.75 pt	Wheat only. 14 day waiting period for grazing, 35 day waiting period for harvest. Two applications per season.
	Karate w Zeon (3) Warrior w Zeon (3) (Lambda T and others)	1.92 fl oz 3.84 fl oz	
	Lorsban ^r 4E (1B) (Warhawk, Whirlwind)	0.5 to 1 pt	14 day waiting period for grazing, 28 day waiting period for harvest. Two applications per season.
	Malathion (1B)	0.5 to 1.5 pt	
	Methyl parathion ^r 4E (1B)	0.5 to 1.5 pt	7 day waiting period for grazing or harvesting.
	Mustang MAX ^r (3)	3.2 to 4 fl oz	
PennCap-M ^r (1B)	2 to 3 pt	15 day waiting period for grazing or harvesting.	
Proaxis ^r 0.5 CS (3) Prolex ^r 1.25 CS (3)	3.84 fl oz 1.54 fl oz		

SMALL GRAINS INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre	Comments
<p>Hessian fly Small, fragile mosquito-like fly (adult) larva is whitish, shiny, about 3/16 inches. Flaxseed (puparium) is 3/16 inches, dark brown, inserted at joint of stem.</p> <p><u>Damage:</u> Stunts plants in fall, causes lodging of heads in spring.</p> <p><u>Threshold:</u> No established threshold. Delayed planting will reduce the incidence of Hessian fly infestations, but there is no established “fly free” planting date for most of Oklahoma. Some wheat varieties are resistant to the common Hessian fly biotypes (A, B, C and D) found in Oklahoma.</p>	<p>Cruiser 5FS (4A)</p> <p>Gaucho 480 (4A) Gaucho XT</p>	<p>0.75 to 1.33 fl oz/cwt seed</p> <p>1 to 3 fl oz/cwt seed 3.4 fl oz/cwt</p>	<p>Do not use surplus treated seed for feed or food. Follow label instructions for application and storage conditions.</p> <p>Wheat and barley. 45 day waiting period for grazing. Do not use treated seed as feed.</p> <p>Seed treatments will not provide control of spring brood Hessian fly.</p>
<p>Pale western cutworm Caterpillar is gray with no prominent stripes.</p> <p><u>Damage:</u> Cuts plants below soil surface. Generally found in the Oklahoma Panhandle, about 2-3 weeks later than army cutworm.</p> <p><u>Threshold:</u> Treat if 2 or more larvae are found per linear foot of row.</p>	<p>Baythroid XL (3)</p> <p>Karate w Zeon (3) Warrior w Zeon (3) (Lambda T and others)</p> <p>Mustang MAX^r (3)</p> <p>Proaxis^r 0.5 CS (3) Prolex^r 1.25 CS (3)</p>	<p>1.0 to 1.8 fl oz</p> <p>0.96 to 1.6 fl oz 1.92 to 3.2 fl oz</p> <p>1.76 to 4.0 fl oz</p> <p>1.92 to 3.20 fl oz 0.77 to 1.28 fl oz</p>	<p>7 day waiting period for grazing; 30 days for harvest.</p> <p>Wheat, wheat hay, and triticale. 7 day waiting period for grazing and 30 day waiting period for harvest.</p> <p>14 day waiting period for grazing or harvest.</p> <p>Wheat, wheat hay, and triticale. 30 day waiting period for grazing or harvest.</p>

SMALL GRAINS INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre	Comments
<p>Russian wheat aphid Lime to green colored, “powdery” body, with an elongated, spindle-shaped body. Has a “double tail” appearance when viewed from the side. Lacks prominent cornicles.</p> <p><u>Damage:</u> Infested leaves may have longitudinal white or purple streaks. Leaves may roll up and look like “onion leaves.” If heavily infested, plants may become prostrate or flattened.</p> <p><u>Thresholds:</u> Treatment thresholds are variable, depending upon growth stage and crop condition. See FS-7183 for treatment guidelines.</p>	<p><u>Planting Time</u></p> <p>Cruiser 5FS (4A)</p> <p>Gaucha 480 (4A) Gaucha XT</p> <p><u>Post-Plant</u></p> <p>Baythroid XL (3)</p> <p>Dimethoate 4E (1B)</p> <p>Karate w Zeon (3) Warrior w Zeon (3) (Lambda T and others)</p> <p>Lorsban^r 4E (1B) (Warhawk, Whirlwind)</p> <p>Methyl parathion^r 4 E (1B)</p> <p>Mustang MAX^r (3)</p> <p>Proaxis^r 0.5 CS (3) Prolex^r 1.25 CS (3)</p>	<p>0.75 to 1.33 fl oz/cwt seed</p> <p>1 to 3 fl oz/cwt seed</p> <p>1.8 to 2.4 fl oz</p> <p>0.5 to 0.75 pt</p> <p>1.28 to 1.92 fl oz 2.56 to 3.84 fl oz</p> <p>0.5 to 1 pt</p> <p>0.5 to 1.5 pt</p> <p>3.2 to 4.0 fl oz</p> <p>2.56 to 3.84 fl oz 1.02 to 1.54 fl oz</p>	<p>Wheat and barley. No grazing restriction. Do not use treated seed as feed</p> <p>Wheat and barley. 45 day waiting period for grazing. Do not use treated seed as feed.</p> <p>7 day waiting period for grazing; 30 days for harvest.</p> <p>Wheat only. 14 day waiting period for grazing, 35 day waiting period for harvest. Two applications per season.</p> <p>Wheat, wheat hay, and triticale. 7 day waiting period for grazing and 30 day waiting period for harvest.</p> <p>14 day waiting period for grazing, 28 day waiting period for harvest. Two applications per season.</p> <p>15 day waiting period for grazing or harvest. Temperatures should be above 50°F for application.</p> <p>Control may be variable. 14 day waiting period for grazing or harvest.</p> <p>Wheat, wheat hay, triticale. 30 day waiting period for grazing or harvest</p>
<p>Wheat curl mite Tiny sausage-shaped mites that feed on leaves and heads.</p> <p><u>Damage:</u> They do not cause direct damage, but are a vector for Wheat Streak Mosaic Virus.</p> <p><u>Threshold:</u> None</p>	<p>No effective chemical control is registered.</p>		<p>Delayed planting and management of volunteer wheat may reduce problems.</p>

SMALL GRAINS INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage and Treatment Threshold	Insecticide Formulation and (MOA Group)*	Rate of Product per Acre	Comments
<p>White grub “C” shaped whitish grub with a tan head and swollen tip of abdomen, measuring up to 1½ inches.</p> <p><u>Damage:</u> Feed on roots. Cause stand loss, poor emergence and thin stands.</p> <p><u>Threshold:</u> None</p>	No effective chemical control is registered.		While there is no effective insecticide registered for white grub control, systemic seed treatments such as Gaucho or Cruiser may provide some suppression because they are labeled for control of white grubs in other crops; however, there is no Oklahoma data to support that possibility.
<p>Winter grain mite Tiny dark brown mites with red legs and a red spot on its abdomen. Prefer cool, moist climate, and are more active on cloudy days or evenings.</p> <p><u>Damage:</u> Leaves appear stunted and silver colored.</p> <p><u>Threshold:</u> No established threshold; treat if injury symptoms and mites are present. Day time temperatures that exceed 75° F will reduce populations.</p>	<p>Malathion (1B)</p> <p>Methyl parathion^f 4E (1B)</p>	<p>2 pt</p> <p>0.5 to 1.5 pt</p>	<p>7 day waiting period for grazing or harvest.</p> <p>15 day waiting period for grazing or harvest. Temperatures should be above 50°F for application.</p> <p>*Other products, such as dimethoate (Dimate and others) and chlorpyrifos (Lorsban, Whirlwind and others) can be applied under 2ee regulations, however since this pest is not specifically labeled, the user assumes all responsibility for the application and results.</p>

^f Restricted Use Pesticide

MOA Group Tables start on page 46 of the handbook.

Pre-harvest Intervals and grazing restrictions

Baythroid XL	7 day PHI for grazing, 30 day PHI for harvest. Two applications per season.
Cruiser 5FS	No grazing restriction
Dimethoate	14 day PHI for grazing, 35 days for harvest. Do not make more than 2 applications per season.
Furadan 4F, LFR	DO NOT GRAZE. See label for further restrictions
Gaucho 480, XT	45 day PHI for harvest or grazing.
Lorsban 4E	14 day PHI for grazing, 28 day PHI for harvest. Two applications per season.
Methomyl	14 day PHI for harvest or grazing.
Mustang MAX	14 day PHI for grazing or harvest.
Proaxis 0.5EC	30 day PHI for harvest or grazing
Prolex 1.25 CS	30 day PHI for harvest or grazing
Sevin XLR	No PHI for grazing, 21 day PHI for harvest.
Tracer	14 day PHI for grazing, 21 day PHI for harvest.
Thimet G	28 day PHI for harvest or grazing.
Warrior 1CS and others	7 days for grazing, 30 day PHI for harvest.

* Numbers in parentheses (#) that follow the insecticide name are used to designate its mode of action according to the classification system developed by the Insecticide Resistance Action Committee, (IRAC) in 2005. It is intended to help in the selection of insecticides for preventative resistance management. If you make multiple applications for a specific pest during a growing season, simply select a registered insecticide with a different number for each application. To further delay resistance from developing, integrate other control methods into your pest management programs.

SMALL GRAIN WEED CONTROL

Estimated Levels of Weed Control Normally Expected with Wheat Herbicides^a

Herbicide	Winter Broadleaves										Summer Broadleaves										Winter Grasses						General or Restricted Use						
	Bushy wallflower	Carolina geranium	Chickweed	Corn gromwell	Cutlf. eveningprimrose	Flixweed	GF Pepperweed (ALS Res.)	Henbit	Prickly lettuce	Purple deadnettle	Shepherd's purse	Curly dock	Field bindweed	Horseweed	Kochia (ALS Suscept.)	Pigweed spp.	Plains coreopsis	Red Horned Poppy	Russian thistle	Smallseeded Falseflax	Vetch spp.	Wild buckwheat	Wild sunflower	Cheat	Downy & Jap. brome	Jointed goatgrass		Rescuegrass	Rye	Ryegrass (ALS Suscept)	Wild oats		
Soil appl. (PRE)																																	
Amber	9	9	9	-	9	9	0	9	8	9	9	8	-	8	8	9	9	-	8	8	8	8	9	0	0	0	0	0	0	8	0	Gen.	
Finesse	9	9	9	9	9	9	0	9	9	-	9	8	-	8	-	-	7	9	-	9	-	9	9	0	0	0	0	0	0	8	0	Gen.	
Glean	9	9	9	9	9	9	0	9	9	-	9	8	-	8	-	-	9	9	-	9	-	9	9	0	0	0	0	0	0	8	0	Gen.	
Foliar appl. (POST)																																	
Aim	8	-	3	-	6	8	7	8	5	8	8	-	7	-	8	8	-	-	8	-	0	7	7	0	0	0	0	0	0	0	0	Gen.	
Ally	8	-	-	-	-	8	-	0	7	-	8	-	-	7	6	7	-	-	5	-	0	4	6	0	0	0	0	0	0	0	0	Gen.	
Amber	8	0	-	-	-	7	9	-	6	9	-	8	-	-	8	8	7	8	-	8	7	8	7	9	0	0	0	0	0	0	0	0	Gen.
Banvel	9	-	-	-	-	9	-	9	7	-	9	-	-	6	9	9	-	-	9	-	8	7	9	0	0	0	0	0	0	0	0	Gen.	
Beyond	8	-	-	-	-	8	-	0	0	-	8	-	-	0	0	0	-	-	0	-	0	0	0	9	9	9	8	8	8	9	Gen.		
Bronate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	8	-	-	9	-	8	7	8	0	0	0	0	0	0	0	0	Gen.	
Buctril	8	-	-	-	-	8	-	8	8	-	8	-	-	6	9	7	-	-	8	-	7	7	8	0	0	0	0	0	0	0	0	Gen.	
Express	8	-	-	-	-	8	-	-	7	-	8	-	-	6	8	7	-	-	7	-	5	6	6	0	0	0	0	0	0	0	0	Gen.	
Finesse	9	9	9	9	8	9	0	9	9	-	9	9	-	9	-	9	9	9	-	9	5	9	6	0	0	0	0	0	0	0	0	Gen.	
Finesse G & B	9	9	9	9	8	9	0	9	9	-	9	-	-	-	-	9	7	9	-	9	5	9	6	9	6	0	4	0	7	8	Gen.		
Glean	9	9	9	9	8	9	0	9	9	-	9	-	-	-	-	9	7	9	-	9	5	9	6	0	0	0	0	0	0	0	0	Gen.	
Harmony GT	9	-	-	-	-	-	-	-	7	-	-	-	-	6	8	8	-	-	7	-	5	7	7	0	0	0	0	0	0	0	0	Gen.	
Hoelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	9	Res.		
Maverick	8	-	-	-	-	8	-	0	6	-	8	-	-	5	2	3	-	-	2	-	1	3	2	9	5	0	4	0	5	5	Gen.		
MCPA	8	-	-	-	-	8	8	8	-	5	-	8	-	-	4	4	5	-	-	5	-	4	4	5	0	0	0	0	0	0	0	0	Gen.
Olympus	8	2	8	2	2	9	-	5	6	-	9	-	2	-	2	5	2	-	2	9	-	-	-	9	8	4	3	0	0	7	Gen.		
Olympus Flex	8	2	8	2	5	9	-	5	6	-	9	-	2	-	2	5	2	-	2	9	5	-	-	9	7	3	3	0	8	9	Gen.		
Osprey	-	-	6	-	5	-	-	5	-	-	5	-	-	-	-	5	-	-	-	-	5	-	-	6	6	0	0	0	9	9	Gen.		
Peak	8	-	8	-	8	9	-	4	8	8	-	-	-	6	5	7	-	-	8	8	0	7	7	0	0	0	0	0	0	0	0	Gen.	
Puma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	9	Gen.		
Rave	9	-	8	-	8	9	8	8	9	-	9	7	7	8	9	9	9	-	9	8	8	8	9	0	0	0	0	0	0	0	0	Gen.	
2,4-D	9	-	-	-	-	9	9	6	8	-	9	-	7	4	7	8	9	-	9	-	6	5	8	0	0	0	0	0	0	0	0	Gen.	
Harvest Aids																																	
Ally + 2,4-D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.	
Ally + glyphosate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.	
Banvel+2,4-D+Ally	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.	
Banvel + Bronate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.	
glyphosate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.	
Landmaster BW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.	
Fallow / Burndown																																	
Banvel	-	-	-	-	-	-	-	-	-	-	-	7	6	7	8	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.	
Gramoxone Max	-	-	-	-	-	-	-	-	-	-	-	0	0	5	5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Res.	
Fallowmaster	9	9	9	9	9	9	9	9	9	9	9	9	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.	
glyphosate	9	9	9	9	9	9	9	9	9	9	9	9	8	6	9	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.	
MCPA	-	-	-	-	-	-	-	-	-	-	-	6	3	6	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.	
RT Master	9	9	9	9	9	9	9	9	9	9	9	9	8	9	9	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.	
2,4-D	-	-	-	-	-	-	-	-	-	-	-	6	5	6	7	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.	

^a Rating scale: 0 no control; 5 or less poor; 6 poor-fair; 7 fair; 8 fair-good; 9 good. Ratings assumes the herbicides are applied according to the label under optimum growing

SMALL GRAIN WEED CONTROL (CONT'D)

Rotational Cropping Restrictions in Months with Wheat Herbicides

Herbicide	Crops							
	Alfalfa	Canola	Corn	Cotton	Peanut	G. Sorghum	Soybean	Wheat
Soil appl. (PRE)								
Amber	a	a	22 ^b	a	a	14 ^c	14 to 36 ^c	0
Finesse	a	a	11 ^c	14 ^c	a	14 to 25 ^c	14 ^c	0
Glean	a	a	a	14 ^c	a	14 to 25 ^c	14 ^c	0
Foliar appl. (POST)								
Aim	12	12	0	0	12	0	0	0
Ally	c	c	12 ^c	14 to 22 ^c	c	10 ^c	c	1
Amber	a	a	22 ^b	a	a	14 ^c	14 to 36 ^c	0
Banvel	b	b	b	b	b	b	b	b
Beyond	-	40	9	18 ^d	0	18	9	4
Bronate Advanced	1	1	1	1	1	1	1	1
Buctril	1	1	1	1	1	1	1	1
Express	1.5	2	1.5	1.5	1.5	1.5	1.5	0
Finesse	a	a	11 ^c	14 ^c	a	14 to 25 ^c	14 ^c	0
Finesse Grass & BL	b	b	b	b	b	b	b	b
Glean	a	a	a	14 ^c	a	14 to 25 ^c	14 ^c	0
Harmony GT	1.5	1.5	0	1.5	1.5	1.5	0	0
Hoelon	b	b	b	b	b	b	b	b
Maverick	a	a	22 ^c	12 ^c	a	22 ^c	12 ^c	0
MCPA	b	b	b	b	b	b	b	b
Olympus	a	a	18 ^b	12 ^b	a	12 ^b	12 ^h	0
Olympus Flex	b	12 ^b	12 ^b	10 ^b	b	9 ^b	5 ^b	0
Osprey	10	10	12	3	3	10	3	0.25
Peak	22	10 to 18 ^f	1 ^e	10 to 18 ^f	10	1	10 to 18 ^f	0
Puma	b	b	b	b	b	b	b	b
Rave	24 ^a	b	4 to 36 ^b	b	b	14 ^g	11 to 36 ^b	0.5
2,4-D	1	1	0	1	1	1	1	1
Harvest Aids								
Ally + 2,4-D	c	c	12 ^c	14 to 22 ^c	c	10 ^c	c	1
Ally + glyphosate	c	c	12 ^c	14 to 22 ^c	c	10 ^c	c	1
Banvel+2,4-D+Ally	c	c	12 ^c	14 to 22 ^c	c	10 ^c	c	1
Banvel + Bronate	b	b	b	b	b	b	b	b
glyphosate	0	0	0	0	0	0	0	0
Landmaster BW	1	1	0	1	1	1	1	1
Fallow / Burndown								
Banvel	b	b	b	b	b	b	b	b
Gramoxone Max	0	0	0	0	0	0	0	0
Fallowmaster	b	b	b	b	b	b	b	b
glyphosate	0	0	0	0	0	0	0	0
MCPA	b	b	b	b	b	b	b	b
RT Master	1	1	0	1	1	1	1	1
2,4-D	1	1	0	1	1	1	1	1

a. Must conduct a successful bioassay before planting.

b. See label for specific crop rotation restrictions.

c. Based on soil pH below 7.9, if soil pH is greater than 7.9 see label. Clearfield hybrids may be planted 4 months after application.

d. The restriction is 18 months if at least 15 inches of rainfall has been received since the time of application and November 1 of the same year, otherwise, the restriction is 26 months. See label.

e. Clearfield hybrids may be planted immediately after application.

f. STS soybeans may be planted 10 months after application.

g. Based on soil pH below 7.9, if soil pH is greater than 7.9 then the rotation must be 24 months.

h. STS soybeans may be planted 4 months after application.

SMALL GRAIN WEED CONTROL SUGGESTIONS

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
<p>2, 4-D 3.8 lbs. ai per gallon POST applications: 1/2 to 3 pints /A</p> <p>Unison 1.74lbs. ai per gallon POST applications: ½ TO 3 pints/A</p>	<p>Active Ingredient: 2,4-D amine and ester</p> <p>Similar Products: Many</p> <p>Active Ingredient: 2,4-D acid</p> <p>Similar Products: None</p> <p>MOA: 4</p>	<p>POST. For annual and biennial broadleaf weeds, apply 1/2 to 2 pints per acre. Do not apply until wheat is fully tillered and prior to the jointing stage. For perennial broadleaf weeds, apply 1 to 2 pints per acre. Do not apply until wheat is fully tillered and prior to the jointing stage. Emergency Weed Control. For perennial broadleaf weeds, apply 3 pints per acre, when weeds are approaching bud stage, after the grain dough stage.</p>	<p>Do not spray grain in the boot to dough stage. Emergency Weed Control. The 3 pints per acre application can produce crop injury to wheat. Where scattered weeds are present, spot treatment is suggested to minimize the extent of crop injury. 2,4-D can stop or limit tillering of wheat, therefore do not apply unless wheat is fully tillered.</p>
<p>Affinity BroadSpec 50% SG</p> <p>POST applications: 0.4 to 1 oz. /A</p>	<p>Active Ingredient: Thifensulfuron methyl Tribenuron methyl</p> <p>Similar Products: None</p> <p>MOA: 2, 2 & 2</p>	<p>POST. Make applications after the crop is in the 2-leaf stage, but before the flag leaf is visible. Fallow: Apply 1.6 – 3.2 oz/a in the spring, summer or fall when the majority of weeds have emerged and are actively growing.</p>	<p>POST. If sprayed at a rate less than 0.4 – 0.6 oz. per acre, consult Tank Mix Section of the label for additional info on required combinations. Any Application Timing: Do not harvest sooner than 45 days after the last application. Do not make more than one application per crop season. Do not use in soils with a pH greater than 7.9. Do not apply when rainfall is threatening, 6 hours of dry weather are needed to allow sufficient absorption.</p>
<p>Agility SG 70.7 % SG</p> <p>POST applications: 1.6 – 3.2 oz. /A</p>	<p>Active Ingredient: Thifensulfuron methyl Tribenuron methyl Metsulfuron methyl Dicamba</p> <p>Similar Products: None</p> <p>MOA: 2 & 4</p>	<p>POST. Apply 1.6 – 3.2 oz per acre after crop is in the 2-leaf stage but before the jointing stage, and when the target weeds are actively growing. Fallow: Apply 1.6 – 3.2 oz/a in the spring, summer or fall when the majority of weeds have emerged and are actively growing.</p>	<p>Do not apply within 6 hours of an expected rainfall. Do not apply to stressed or dormant weeds. Do not graze livestock in treated areas or feed forage or hay from treated area to livestock.</p>
<p>Aim 2 EC</p> <p>POST applications: 0.5 – 1.9 fl. Oz.</p>	<p>Active Ingredient: Carfentrazone</p> <p>Similar Products: Avalanche Aim EW</p> <p>MOA: 14</p>	<p>POST. Apply POST to weeds 1 to 4 inches tall and rosettes less than three inches across. For dense weed pressure, use the higher recommended rate plus tank mix combinations. Any Application Timing: Apply to all tillage systems from 30 days before planting up to the jointing stage of growth.</p>	<p>Post: Can be tank-mixed with most other herbicides like 2,4-D, Banvel, or ALS herbicides to broaden weed spectrum. Contact herbicide, good coverage essential for control. Apply with 0.25% NIS with at least 80% active ingredient strength. UAN at 0.5-1.0% or 2-4 lb of Ammonium sulfate may be added. Aim has no soil residual. Rotation to most other row crops can occur immediately after application. Do not apply more than 1.9 oz/acre/season. Do not harvest for forage within 7 days of application.</p>
<p>Ally Extra 71.25% XP</p> <p>POST applications: 0.2 to 0.4 oz. /A</p>	<p>Active Ingredient: Thifensulfuron methyl Tribenuron methyl Metsulfuron methyl</p> <p>Similar Products: None</p> <p>MOA: 2, 2 & 2</p>	<p>POST. Make applications after the crop is in the 2-leaf stage, but before the flag leaf is visible. Fallow: may be used in the spring, summer or fall when the majority of weeds have emerged and are actively growing.</p>	<p>POST. If sprayed at a rate less than 0.4 oz. per acre, consult Tank Mix Section of the label for additional info on required combinations. Any Application Timing: Do not harvest sooner than 45 days after the last application. Do not make more than one application per crop season. Do not use in soils with a pH greater than 7.9. Do not apply when rainfall is threatening, 6 hours of dry weather are needed to allow sufficient absorption.</p>
<p>Amber Custom-Pak 75% WDG</p> <p>SOIL applications: 0.28 oz./A up to 0.56 oz./A</p> <p>POST applications: Up to 0.56 oz./A</p>	<p>Active Ingredient: Triasulfuron</p> <p>Similar Products: Amber Accu-Pak</p> <p>MOA: 2</p>	<p>PPI. Apply and incorporate into top 1 inch of soil. PRE. Apply after crop planting. Activating rainfall is required before weed emergence. POST. Apply before weeds exceed 6.0 inches and before the wheat is at pre-boot.</p>	<p>POST. Do not apply the enhanced rate (0.56 oz/A) in areas with a soil pH greater than 7.5, except in the Blacklands of TX and OK. Any Application Timing. Do not apply more than 0.56 oz./A in a calendar year. Do not plant Durum wheat less than 8 months after an Amber application. Other spring and winter wheat varieties may be replanted any time.</p>

SMALL GRAIN WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
<p>Assert 2.5 lbs. ai per gallon</p> <p>POST applications: 1.2 to 1.5 pts. /A</p>	<p>Active Ingredient: Imazamethabenz</p> <p>Similar Products: None</p> <p>MOA: 2</p>	<p>POST. Apply to wheat from the 2 leaf stage of the crop, but before development of the first internode (jointing). For use in controlling wild oats and wild mustard. A non-ionic surfactant containing at least 80% active ingredient must be used with Assert. Apply 1.5 pts per acre to control wild oat populations. Apply 1.2 pts per acre to wheat planted after November 15.</p>	<p>Do not make more than one application per growing season. Do not graze treated fields or cut treated forage for silage or hay. Wheat or barley straw may be fed or used for bedding. Do not tank mix Assert with 2,4-D ester unless the crop is fully tillered. Do not allow Assert to remain overnight in a liquid fertilizer solution. Do not apply when freezing temperatures have occurred or are forecasted. Do not tank mix with Banvel, any product containing dicamba, MCPA amine, or 2,4-D amine formulations. Allow at least 2 days of non-freezing temperatures before and after application.</p>
<p>Banvel 4 lb ai per gallon</p> <p>POST applications: 2 to 8 fl. oz. /A</p> <p>Vision 4lb. ai per gallon</p> <p>POST application: 2 to 8 fl. oz./A</p>	<p>Active Ingredient: Dicamba salt</p> <p>Similar Products: Clarity Distinct</p> <p>Active Ingredient: Dicamba acid</p> <p>Similar Products: None</p> <p>MOA: 4</p>	<p>POST. May be applied at rate up to 8fl. oz./A on fall seeded wheat after it exceeds the 3 leaf stage for suppression of perennial weeds. Applications may be made in the fall following a frost but before a killing freeze.</p>	<p>POST. Animals cannot be removed from treated area for slaughter prior to 30 days after last application. There is no waiting period between treatment and grazing for non-lactating dairy animals. Treated areas may not be grazed by lactating dairy animals before 7 days after treatment. Do not harvest hay from treated areas before 37 days after treatment.</p> <p>Any Application Timing: Do not use low rates of sulfonylurea herbicides on more mature weeds and/or on dense vegetative growth. For best performance, make applications when weeds are in the 2-3 leaf stage and rosettes are less than 2 inches across.</p>
<p>Beyond 1.0 lb ai per gallon</p> <p>POST applications: 4-6 fl oz. /A</p> <p>Apply to Clearfield wheat only</p>	<p>Active Ingredient: Imazamox</p> <p>Similar Products: None</p> <p>MOA: 2</p>	<p>POST. Apply from tillering to just prior to joint. Apply to broadleaf weeds less than 3 inches and grass weeds less than 4-5 inches.</p>	<p>POST. Do not apply to any wheat not designated as being imidazolinone tolerant (Clearfield). Do not apply more than 8 fl. oz. during the growing season. There should be an interval of at least 30 days between an application and feeding or grazing of wheat forage and hay. There should be at least 60 days from an application and wheat harvested for grain.</p>
<p>Bronate Advanced 5 lb ai per gallon</p> <p>POST applications: 12.8 to 25.6 fl oz/A</p>	<p>Active Ingredient: Bromoxynil MCPA</p> <p>Similar Products: Wolfpack Advanced Wildcard Xtra</p> <p>MOA: 6 & 4</p>	<p>POST. Optimum control when applied to actively growing weed seedlings. Apply from the 3 leaf stage but before the crop reaches the boot stage.</p>	<p>POST. Apply from the 3 leaf stage but before the crop reaches the boot stage.</p> <p>Refer to label for Application Method restrictions</p> <p>Any Application Method: Do not graze treated fields within 45 days after application. Do not apply when weeds are under moisture stress. Do not when weeds are under stress from cold temperatures.</p>
<p>Buctril 4 Cereals 4 lb ai per gallon</p> <p>Post applications: 0.75 -1pt/A</p>	<p>Active Ingredient: Bromoxynil</p> <p>Similar Products: Bromox</p> <p>MOA: 6</p>	<p>POST. Apply from emergence to the boot stage of wheat.</p> <p>All applications: Optimum weed control is obtained when applied to actively growing weed seedlings.</p>	<p>POST. Apply to the most susceptible weeds up to the 8 leaf stage or 4 in. in height. If weed forms rosette apply before weeds exceed 2 in. in diameter. Apply to other broadleaf weeds up to the 4 leaf stage, 2 in. in height or 1in. in diameter.</p> <p>Refer to label for General Weed List.</p> <p>Any Application Method: Do not graze fields within 45 days following treatment. Do not apply when crops are under moisture stress. Do not apply when crop canopy covers the weeds. Do not apply more than 1 pint per acre per year. Do not cut for feed or graze fall or winter treated underseeded alfalfa until spring, at least 60 days following treatment. Do not cut for feed or graze spring treated underseeded alfalfa within 30 days of following treatment.</p>

SMALL GRAIN WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Everest 70% WDG POST applications: 0.61 oz /A	Active Ingredient: Flucarbazone Similar Products: None MOA: 2	POST. Apply max of 0.61 oz per acre once per season. Make only one application per season.	POST. Do not apply by air. Do not apply when rain is expected within the next hour. Do not apply this product through any type of irrigation system. Observe minimum interval to harvest of 60 days after treatment. Do not apply before crop is fully emerged. Do not apply after jointing has started.
Express 50%SG POST applications: ¼ - ½ oz /A	Active Ingredient: Tribenuron methyl Similar Products: None MOA: 2	POST. Apply ¼ to 3/8 oz per acre for light infestation of broadleaf weeds. Apply ½ oz per acre for heavy infestation. Two applications may be made as long as the total does not exceed ½ oz per acre. Fallow: may be used in the spring, summer or fall when the majority of weeds have emerged and are actively growing.	POST. Apply after the crop is in the 2-leaf stage, but before the flag leaf is visible. Do not harvest within 45 days of last application. Do not apply to stressed crops. Do not apply to underseeded crops.
Fallowmaster 2.0 lbs ai per gallon POST applications: 32 to 52 oz. /A	Active Ingredients: Glyphosate and Dicamba Similar Products: None MOA: 9 & 4	POST. Refer to label for weeds controlled and specific application rates.	Do not plant any crop other than corn, wheat, barley, oats, or sorghum for 3 months after application. Delay planting for 15 days after application of this product. Do not feed or forage treated vegetation within 8 weeks after application.
Finesse 75% DF All applications: 0.2 to 0.5 oz. /A	Active Ingredient: Chlorsulfuron & Metsulfuron methyl Similar Products: None MOA: 2 & 2	PPI. May be applied at 0.4 oz. per acre (before winter wheat is planted) PRE. May be applied at 0.5 oz. per acre (after planting but before weeds emerge). POST. Apply 0.2- 0.4 oz. to wheat and barley any time the crop is in the 1-leaf stage, but before boot stage. Fallow. May be used at 0.2-0.4 oz/a in the spring, summer or fall when the majority of weeds have emerged and are actively growing.	Apply at ½ oz. per acre preemergence for suppression of annual ryegrass. Do not apply to fields with a soil pH of more than 7.9. Do not apply to fields with a pH less than 5.0.
Finesse Grass & Broadleaf 71.7% DF POST applications: See label	Active Ingredient: Chlorsulfuron and Flucarbazone Similar Products: None MOA: 2 & 2	POST. Apply in the fall or spring after the crop has at least 2 leaves present on the main stem and before crop jointing. If the wheat was seeded late, apply after the crop has started to tiller.	Do not apply PRE to the crop. Do not apply to fields with a soil pH of more than 7.9. For best control of annual ryegrass and wild oat, apply as early POST application when weeds are 1 leaf to tillering stage of growth. Do not graze, harvest forage, or harvest grain for at least 60 days after application.

SMALL GRAIN WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Glean FC 75% WDG SOIL applications: See Table POST applications: 1/6 to 1/3 oz. /A	Active Ingredient: Chlorsulfuron Similar Products: None MOA: 2	PRE. Apply preemergence in Southern part of state only. Adequate rainfall is needed to activate product before weeds germinate. POST. Apply 1/6 – 1/3 oz/a anytime after the crop has reached the 2-leaf stage, but before boot. Fallow: may be used in the spring, summer or fall when the majority of weeds have emerged and are actively growing.	Apply at ½ oz. per acre preemergence for suppression of annual ryegrass. Do not make more than one application in the same season.

Glean FC Application Areas and Rates

Area of the State	Max. Application Rate	Minimum Application Interval
Southern	1/2 oz. per acre preemergence	Once per crop period
Panhandle	1/3 oz. per acre postemergence	Once every 36 months
Areas east of Panhandle	1/3 oz. per acre postemergence	Once per crop period

Glyphosate 41% WSL POST applications: 1 to 4 pts /A	Active Ingredients: Glyphosate Similar Products: Roundup Ultra Roundup Ultra Max Roundup Pro Rattler Debit Credit Glyphomax Etc. MOA: 9	Harvest Aid. Apply after the dough stage of grain (30% or less grain moisture) and at least 7 days prior to harvest. Refer to label for weeds controlled list and application rates for each weed type. Pre Plant Burndown: Apply 8 fl. oz. per acre of product plus 0.5 to 1 percent nonionic surfactant in 3 to 10 gallons of water per acre. Application must be followed by conventional tillage no more than 15 days after treatment. Allow at least 2 days after application before tillage.	Do not apply to crops grown for seed, reduction in germination or vigor may occur. Do not apply more than 1 qt. per acre for preharvest applications.
Gramoxone Max[†] 3.0 lbs. ai per gallon All applications: 1.3 to 1.7 pt/A	Active Ingredients: Paraquat Similar Products: None MOA: 22	PRE Plant Burndown Weeds 1-3": 1.3-1.7 pts Weeds 3-6": 1.7-2.0 pts Weeds 6": 2.0-2.7 pts	Always use either a crop oil concentrate or a nonionic surfactant at rates recommended by the label. Apply with a minimum of 5 gals. of spray mix per acre. Apply when weeds are actively growing and 1-6" in height. Weeds 6" or taller may not be controlled. Avoid applying in extremely dusty conditions. Do not use around home gardens, schools, recreation parks, or playgrounds. Soil should be prepared as far ahead of planting as possible to allow maximum weed and grass emergence prior to treatment. Weeds and grasses emerging after application will not be controlled or suppressed. Do not apply to emerged crop as crop injury/death will occur.

[†] Restricted Use

SMALL GRAIN WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Hoelon^r 3EC 3 lb ai per gallon POST applications: See table	Active Ingredient: Diclofop-methyl Similar Products: None MOA: 1	POST. 1 pint to 1 quart per acre of crop oil approved for use in the crop may be added. Do not apply less than 77 days before harvesting wheat.	Do not allow livestock to graze treated fields. Do not harvest, forage or straw from treated fields prior to grain harvest. Do not apply more than one treatment per growing season. Maximum application rate is 1 lb/acre per growing season. Product does not control broadleaf weeds or perennial grassy weeds. Do not apply any phenoxy based herbicides, or Banvel within 5 days of application, or reduced grassy weed control will occur.
Harmony Extra SG 50%SG POST applications: 0.45 to 0.9 oz per acre.	Active Ingredient: Thifensulfuron methyl Tribenuron methyl Similar Products: None MOA: 2	POST. Apply 0.45-0.9 oz per acre for control or partial control of weeds listed on label. Apply 0.75 oz per acre when weed infestation is heavy. Apply 0.6 oz per acre when weed infestation is light. Make applications after the crop is in the 2-leaf stage, but before the flag leaf is visible. Fallow: Apply in the spring, summer or fall when the majority of weeds have emerged and are actively growing.	Do not use less than 0.45 oz per acre. Do not apply if rain is expected within 1 hour. Do not graze or feed forage or hay from treated areas to livestock (harvested straw may be used for bedding and/or feed) Multiple applications allowed as long as total does not exceed 1.0 oz /A. Crop rotation: wheat, barley and oat can be planted anytime after application. Any other crop can be planted 45 days after application except sugar beets, winter rape and canola which can be planted 60 days after application.
Harmony SG 50%SG POST applications: 0.45 to 0.9 oz per acre.	Active Ingredient: Thifensulfuron methyl Similar Products: None MOA: 2	POST. Apply 0.45-0.9 oz per acre for control or partial control of weeds listed on label. Apply 0.6 oz per acre when weed infestation is heavy. Apply 0.45 oz per acre when weed infestation is light. Make applications after the crop is in the 2-leaf stage, but before the flag leaf is visible. Fallow: Apply 0.45 - 0.9 oz per acre in the spring, summer or fall when the majority of weeds have emerged and are actively growing.	Do not use less than 0.45 oz per acre. Do not apply if rain is expected within 1 hour. Do not graze or feed forage or hay from treated areas to livestock (harvested straw may be used for bedding and/or feed) Multiple applications allowed as long as total does not exceed 1.0 oz /A. Crop rotation: wheat, barley, oat, soybeans and field corn can be planted anytime after application. Any other crop can be planted 45 days after application.

	Holeon^r 3EC Use rates Relative to Growth Stage		
	Pints/A		
Susceptible Annual Grassy Weeds	1-3 Leaf Stage	3-4 Leaf Stage	5 Leaf-2 Tillers
Annual ryegrass	1 1/3	1 1/3 to 2	2 to 2 2/3
Wild oat	2 to 2 2/3	2 2/3	Do not apply. Reduced weed control will occur.

^r Restricted Use.

SMALL GRAIN WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Landmaster BW 1.2 lbs ai per gallon EPP applications: 27 to 54 fl. oz. /A	Active Ingredient: glyphosate and 2,4-D Similar Products: None MOA: 9 & 4	EPP. Refer to label for specific rates on various weeds controlled. Product should be applied postemergence to vigorously growing weeds, prior to planting or emergence of wheat. Application should be delayed until maximum emergence of target weeds, but before weeds exceed the maximum size recommended.	Do not harvest or feed treated vegetation for 8 weeks after application. Do not graze or harvest spot treated areas for 30 days after application.
Maverick 75% WDG POST. 2/3 oz /A	Active Ingredient: Sulfosulfuron Similar Products: None MOA: 2	POST. Apply when target weeds are actively growing. Use 0.5 percent by volume nonionic surfactant concentration. Application should be made after the 2-leaf stage, but prior to the jointing stage.	Preemergence applications are not recommended Do not use product plus Malathion, as crop injury may result. Do not use nonionic surfactants or other additives that alter the pH of the spray solution below pH 5. Do not use low rates of liquid fertilizer as a substitute for surfactant.
MCPA Amine 3.7 lbs. ai per gallon POST applications: Up to 3 ¼ pints /A Wildcard 4.0 lbs. ai per gallon POST application: Up to 3 pints/A	Active Ingredient: MCPA amine Similar Products: None Active Ingredient MCPA ester MOA: 4	POST. Apply as a water mix spray by ground sprayer or airplane. Use ½ to 1 pint per acre for the more susceptible weeds after crop has reached the 3-4 leaf stage up to the boot stage. Use up to 3 pints per acre for less susceptible weeds after the crop has tillered and up to early boot stage. Do not spray from boot to dough stage.	Emergency control. Use 3 ¼ pints per acre for perennial broadleaf weeds. Apply when weeds are approaching bud stage, but do not spray grain in the boot to dough stage. The 3 ¼ pints per acre application can produce injury to wheat. Balance the severity of your weed problem against the possibility of crop damage. Where perennial weeds are scattered, spot treatment is suggested to minimize the effect of crop injury.
Olympus 70% WDG POST applications: 0.61 to 0.9 oz /A	Active Ingredient: Propoxycarbazone Similar Products: None MOA: 2	POST. Apply in the fall or spring to small actively growing weeds after the crop has emerged and has began tillering. Best results are achieved when applied in the fall. Olympus is both foliar and root absorbed.	Do not apply more than 1.2 oz/A per crop year. Do not harvest of grain within 71 days after application.
Olympus Flex 11.25 % WDG POST applications: 3 to 3.5 oz/A	Active Ingredient: Propoxycarbazone Mesosulfuron Similar Products: None MOA: 2 & 2	POST applications: Apply 3 oz/A to fall-sown or winter wheat in the fall or spring after the crop and weeds have emerged and before crop jointing. Apply to small actively growing weeds. Under dry conditions or in dense weed canopies, use 3.5 oz/A for best results.	Do not apply more than 3.5 oz/A in a crop year. Do not apply within 30 days of harvesting forage, and 71 days within harvesting for grain or straw. Do not apply with malathion, mancozeb, phosphorodithioate, chlorpyrifos, or methyl parathion as unacceptable crop response may occur.
Osprey 4.5 % WDG POST applications: 4.75 oz/A for most weed infestation 3.2 oz/A for wild oat control only	Active Ingredient: mesosulfuron Similar Products: None MOA: 2	POST applications: Apply to small actively growing weeds at the recommended rate once the crop and weeds have emerged. Osprey is only foliar absorbed, so the weeds must be emerged and actively growing at the time of application.	Do not make more than one application in a crop year. Do not apply more than 4.75 oz/A in a crop year. Do not apply within 30 days of harvesting for forage, and 60 days within harvesting for grain or straw. Do not apply with malathion, disyston, mancobez, or methyl parathion as crop injury/death may occur.

SMALL GRAIN WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Paramount 75% WSG SOIL applications: 5.3 oz /A	Active Ingredient: quinchlorac Similar Products: None MOA: 4	PPL Apply at 5.3 oz per acre for control of annual grasses and broadleaf weeds. All applications: Should be applied by ground application equipment. May be applied using aerial application equipment only when permitted by supplemental labeling. May be applied as either a broadcast or a spot spray application. Applications must be made to actively growing weeds.	Do not allow livestock to graze in treated areas. Do not harvest hay from treated areas within 309 days after application. Do not feed treated grasses, forage, hay, silage, straw, seed, nor seed screenings to livestock. Do not apply to water or to areas where surface water is present. Do not apply to irrigation ditches or areas that act as a channel for water entering cropland. Do not apply by air in the following counties: Choctaw, Craig, Rogers.
Peak Custom Pak 57% WDG POST applications: 0.38 to 0.5 oz /A	Active Ingredient: Prosulfuron Similar Products: Peak Accu-Pak MOA: 2	POST. May be applied over-the-top to actively growing crops from the emergence to before the second node is detectable in stem elongation. It is more important to time applications to the optimum weed heights listed on the table. Refer to product label for specifics on weed heights. In dry climates, crop oil is the preferred additive, instead of nonionic surfactant, when applying product alone with water as the carrier.	Do not apply to crops which are under severe stress due to drought, cold weather, hail, wind damage, sand cutting, flooding, water-logged soil, compacted soil, disease, insect damage, nutrient deficiency, or other causes. Also, should not be applied if weeds are under severe stress due to drought or are larger than optimum height listed on label. Do not apply if cold, wet environmental conditions are expected within 1 week after application. Do not make a foliar or soil application of any organophosphate insecticide within 15 days prior to or 10 days after an application of product. Do not apply product to crops that exhibit injury symptoms from a previous herbicide application or other causes.
PowerFlex 7.5% WDG POST Applications: 3.5 oz pr/A	Active Ingredient: Pyroxulam Similar Products: None MOA: 2	POST. Apply in fall or spring when the majority of the crop and weeds have emerged and are actively growing. Apply to 2 leaf to 2 tiller grass weeds, and broadleaf weeds 2 inches tall or 2 inches in diameter. Apply to wheat from 3 leaf to jointing. Apply with nonionic surfactant (0.25 to 0.5 % v/v) or crop oil concentrate (0.8 % v/v). Applications can be made with spray solutions containing liquid nitrogen (up to 50% solution, and not exceeding 30 lbs N per A). Fall applications made with AMS and NIS may aide in the control of tough to control weedy grasses.	Do not graze treated crop within 7 days following application. Do not cut treated crop for hay within 28 days following application. Do not harvest treated crop within 60 days following application. Do not apply more than 3.5 oz pr/A per growing season. Do not apply with irrigation water. Do not apply in tank mix with organophosphate insecticides. Do not apply with dicamba or amine formulations of 2,4-D or MCPA. Avoid applications to drought, or cold dormant crop or weeds. Avoid applications to ALS resistant weed populations.
Puma 1EC 1 lb. ai per gallon POST applications: 5.3 to 10.6 oz /A	Active Ingredient: Fenoxaprop Similar Products: None MOA: 1	POST. May be tank mixed with liquid nitrogen fertilizer. Only 28-32% UAN may be added. Do not exceed 5 gallons/acre of liquid nitrogen for ground applications or 50% of the total spray volume by air.	Do not apply within 70 days of harvest. Do not make more than one application in a growing season. Do not apply this product through any irrigation system.
Rage D-Tech 4.06 lb ai per gallon Preplant applications 8 – 32 oz/A POST applications 8-16 oz/A Harvest Aid 16 oz	Active Ingredients Carfentrazone-ethyl 2,4-D ester Similar Products: None MOA: 14 & 4	Preplant. For burndown of existing vegetation prior to planting. Plantback restrictions vary according to use rate from 3-14 days. POST. Apply from 3-tiller to jointing stage. Minimum of 10 GPA by ground, 5 GPA by air. Apply when weeds are less than 6" tall and actively growing	Apply Post on crop with NIS at 0.25% v/v. Can be applied with foliar fertilizers. Do not apply more than 32 oz/A per applications and a total of 32 oz per crop season. Preharvest Interval is 3 days. Do not dairy animals or meat animals being finished for slaughter for 14 days following application.

SMALL GRAIN WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Read and follow all label directions before product use. Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Rave 63.89% WDG POST applications: 2-4 oz. /A	Active Ingredient: Triasulfuron Dicamba Similar Products: None MOA: 2 & 4	POST. Apply 4 oz per acre after crop is fully tillered but not forming joints in the stem, and when the target weeds are actively growing.	Do not apply within 4 hours of an expected rainfall. Do not apply to stressed or dormant weeds or when expected within one week after application. For optimum control, make applications before emerged weeds are exposed to extended periods of freezing temperatures. Do not harvest hay or grain from treated fields for 37 days after treatment. Do not make more than one application per year.
Rhonox 75% DF POST applications: Up to 1 ½ pints /A	Active Ingredient: MCPA Similar Products: None MOA: 4	POST. Apply after grain is in the 3 to 4 leaf stage, but not forming joints in the stem. Do not spray in the boot to dough stage.	Do not allow livestock animals to forage or graze treated areas within 7 days of slaughter. Use a minimum of 10 gallons of water per acre for ground application and 2 gallons of water per acre for aerial application.
RT Master 4 lbs. ai per gallon EPP. applications: 2 qt. /A PRE. applications: 2 qt. /A Harvest Aid: 1 qt. /A	Active Ingredients: Glyphosate 2,4-D Similar Products: None MOA: 9 & 4	EPP. & PRE. Do not exceed 2 qts. per acre. Application must be made at least 30 days prior to planting. Harvest Aid. Provides weed control when applied prior to harvest. Apply after the hard dough stage of grain.	Do not apply more than 1 qt. per acre in preharvest applications. It is advised to not treat crops grown for seed. Allow at least 14 days between application and harvest of grain. Allow 7 days between application and grazing or harvest of forage or straw. This product may be applied after harvest of crop. Higher application rates may be required for control of large weeds which were growing in the crop at the time of harvest. This product is only labeled for the following counties: Alfalfa, Beaver, Blaine, Canadian, Cimarron, Custer, Dewey, Ellis, Garfield, Grant, Harper, Kay, Kingfisher, Logan, Major, Noble, Pawnee, Payne, Roger Mills, Texas, Woods, and Woodward.
Sencor 4 4 lb. ai per gallon POST applications: See table	Active Ingredients: Metribuzin Similar Products: Sencor DF MOA: 5	POST. Apply when crop is healthy and actively growing. May apply more than once per crop season. Allow a minimum of 21 days between applications if wheat is actively growing or allow 45 days if wheat is growing in adverse conditions, has entered dormancy, or is stressed due to frost damage, disease, drought, or excessive moisture. A maximum of 8 fl. oz. per acre for any one application is OSU's recommendation for Oklahoma.	Do not apply more than a total of 16 fl. oz. per acre per year. Do not graze wheat within 14 days of application. Do not harvest grain within 21 days after last application. Do not use a crop oil or any adjuvant containing vegetable or petroleum oil in any tank mix applications as crop injury may result. Do not use on soils containing less than 0.75% organic matter. Refer to label for variety tolerances.

SMALL GRAIN WEED CONTROL SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Recommended Postemergence Broadcast Applications of Sencor 4			
Crop Growth Soil	Soil Texture	Sencor 4 Rate (fl oz/A) % Organic Matter	
		0.75 TO 2.0 % O.M.	OVER 2.0 % O.M.
2 Leaf to 2 Tiller	Coarse	1.5 to 3	1.5 to 4.5
	Medium	1.5 to 4.5	3 to 4.5
	Fine	3 to 4.5	3 to 6
	Use these rates on crops with secondary roots smaller than 1 inch.		
3 Tiller to 4 Tiller	Coarse	4.5 to 6	6 to 7.5
	Medium	6 to 7.5	7.5 to 9
	Fine	7.5 to 9	7.5 to 9
	Do not apply within 2 weeks after grazing or breaking of winter dormancy. Apply after the crop is at or beyond the 3 tiller growth stage but before jointing. Secondary roots should be developed and larger than 1 inch long. Do not apply before 75 days after planting.		
Over 4 Tillers	Coarse	6 to 9	7.5 to 12
	Medium	6 to 12	7.5 to 12
	Fine	7.5 to 12	12 to 16
	Do not apply within 2 weeks after grazing or breaking of winter dormancy. Apply after the crop is at or beyond the 3 tiller growth stage but before jointing. Secondary roots should be developed and larger than 1 inch long. Do not apply before 75 days after planting.		

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
<p>Weedmaster 3.87 lb ai per gallon</p> <p>POST applications: 2 pints /A</p> <p>Outlaw 2.5 lbs. ai per gallon</p> <p>POST applications: 2 pints/A</p> <p>Latigo 4.2 lbs ai per gallon</p> <p>POST application: 2 pints/A</p>	<p>Active Ingredients: Dicamba salt and 2,4-D amine</p> <p>Similar Products: Rangestar</p> <p>Active Ingredients: Dicamba acid and 2,4-D ester</p> <p>Similar Products: None</p> <p style="text-align: center;">MOA: 4 & 4</p>	<p>POST. Do not apply until the wheat is fully tillered and prior to the jointing stage. Apply 0.5-1.33 pts. per acre for control of annual broadleaf weeds and suppression of perennial weeds.</p> <p>Preharvest: Product can be used to control weeds that may interfere with harvest of wheat. Apply up to 2 pints per acre to annual broadleaf weeds when wheat is in the hard dough stage and the green color is gone from the nodes (joints) of the stem.</p>	<p>Do not use preharvest-treated wheat for seed unless a germination test is performed on the seed with an acceptable result of 95% germination or better.</p> <p>Do not graze or harvest for livestock feed prior to crop maturity. Do not use product in wheat under seeded with legumes. For crops grown for pasture or hay only: refer to Pastures, Rangeland and Grass portion of the label.</p>

MOA Group Tables start on page 46 of the handbook.

SMALL GRAIN DISEASES CONTROL GUIDE

DISEASE	SYMPTOMS	CONTROL
BARLEY		
Seedling Blights and Seed Rots (<i>Helminthosporium</i> spp. <i>Fusarium</i> spp. <i>Rhizoctonia</i> spp. <i>Pythium</i> spp.)	Poor stand - seed rot, pre- or postemergence death of seedling. Stunted plants.	See supplement on seed treatments.
Covered Smut (<i>Ustilago hordei</i>)	Covered smut becomes noticeable at heading time when smutted heads emerge from the boot. Hard, black masses of smut, each covered with a grayish membrane, are found in place of kernels in infected heads.	Treat with certain fungicides. See supplement on seed treatments.
Common Dryland Root or Crown Rot	Areas of sterile heads found at maturity.	Treat with certain fungicides. See supplement on seed treatments.
Loose Smut (<i>Ustilago nuda</i>)	Loose Smut is first noticed at heading time when dark smutted heads appear. Infected heads contain millions of loosely held black microscopic spores that are scattered by the wind. All parts of the head are destroyed leaving only the naked rachis.	Plant certified seed free from the fungus. Treat with certain fungicides. See supplement on seed treatments.
OATS		
Seedling Blights and Seed Rots (<i>Helminthosporium</i> spp. <i>Fusarium</i> spp. <i>Rhizoctonia</i> spp. <i>Pythium</i> spp.)	Poor stand, seed rot, pre- or postemergence death of seedling, stunted plants.	See supplement on seed treatments.
Smut, Covered and Loose (<i>Ustilago kollerii</i> , <i>Ustilago avenae</i>)	Black smut spores replace kernels in infected panicles, covered smut spores are enclosed within a grayish membrane. The two smuts cannot be clearly differentiated in the field.	Treat with certain fungicides. See supplement on seed treatments.
WHEAT		
Seedling Blights and Seed Rots <i>Bipolaris</i> spp., <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., <i>Pythium</i> spp.)	Poor stand, seed rot, pre- or postemergence death of seedling, stunted plants.	See supplement on seed treatment.
Common Rot Root/Dryland Root Rot (<i>Bipolaris sorokiniana</i>) (<i>Fusarium</i> spp.)	Chocolate brown to grey discoloration at base of wheat seedlings. Presence of a reddish/purple color indicates <i>Fusarium</i> . At crop maturity, patches of sterile plants can be found.	Clean cultivation. Late planting date (after Oct. 1 for northern Oklahoma and after Oct. 15 for southern Oklahoma). Seed treatments (see supplement) also may provide some protection.
Common Bunt or Stinking Smut (<i>Tilletia tritici caries</i>) (<i>Tilletia laevis</i>)	Common Bunt or Stinking Smut is generally not apparent until 10 to 20 days after heading. The infected plants are stunted, being about three-fourths as tall as healthy plants. The heads have a characteristic bluish green color. The smut balls replace the kernels of wheat. These smut spore filled kernels have a distinct fishy odor.	See supplement on seed treatments.

SMALL GRAIN DISEASES CONTROL GUIDE (CONT'D)

DISEASE	SYMPTOMS	CONTROL
WHEAT (cont'd)		
<p>Common Bunt or Stinking Smut (<i>Tilletia tritici caries</i>) (<i>Tilletia laevis</i>)</p> <p>Fusarium head blight (scab) (<i>Fusarium spp.</i>)</p>	<p>Common Bunt or Stinking Smut is generally not apparent until 10 to 20 days after heading. The infected plants are stunted, being about three-fourths as tall as healthy plants. The heads have a characteristic bluish green color. The smut balls replace the kernels of wheat. These smut spore filled kernels have a distinct fishy odor.</p> <p>After flowering (anthesis), wheat heads prematurely appear totally or partially tan in color and are either sterile or produce shriveled seeds that are chalky in appearance. Often a purplish-red or pink color can be seen in florets or on seeds.</p>	<p>See supplement on seed treatments.</p> <p>Spores of the fungus <i>Fusarium</i> infect heads primarily during flowering causing sterility and/or shriveled seed. Toxins produced by <i>Fusarium</i> can also cause problems with marketing wheat after harvest. Head scab is usually most severe in no-till fields where the previous crop was corn. Typically the environment in eastern Oklahoma is more conducive to head blight development than is the environment in central and western Oklahoma. Chemicals labeled for use to suppress head blight (scab) include Propimax (propiconazole), Folicur (tebuconazole), Proline (prothioconazole), Prosaro (prothioconazole + tebuconazole), Caramba (metconazole), TwinLine (pyraclostrobin + metconazole), and Orius (tebuconazole) For more information, see OCES PSS-2136, "Considerations When Rotating Wheat Behind Corn."</p>
<p>Karnal Bunt (<i>Tilletia indica</i>)</p>	<p>Although Karnal bunt has not been reported in Oklahoma as of September, 2008, wheat seed can be treated to help control Karnal bunt. Wheat seed infected by Karnal bunt has a similar appearance and the same fishy odor as wheat seed infected with common bunt except that only a small portion of the seed is usually bunted.</p>	<p>See supplement on seed treatments.</p>
<p>Loose Smut (<i>Ustilago tritici</i>)</p>	<p>Loose Smut is noticeable as soon as wheat heads. All parts of the head are completely replaced by masses of black smut spores. The smut spores soon disperse, leaving only the naked rachis.</p>	<p>Treat seed with a systemic fungicide. See supplement on seed treatments.</p>

SMALL GRAIN DISEASES CONTROL GUIDE (CONT'D)

DISEASE	SYMPTOMS	CONTROL
<p>Leaf Rust (<i>Puccinia triticina</i>)</p> <p>Stripe Rust (<i>Puccinia striiformis</i> f. sp. <i>tritici</i>)</p>	<p>Green wheat leaves and leaf sheaths become covered with small, round or oval bright-to-reddish-orange pustules.</p> <p>Green wheat leaves, leaf sheaths and heads are covered with small, round or oval pustules arranged in “stripes” on leaves. Pustules are yellowish-orange in color.</p>	<p>Plant resistant varieties. Chemicals labeled for use to control leaf rust and stripe rust include Tilt (propiconazole), Propimax (propiconazole), Bumper (propiconazole), Quadris (azoxystrobin), Quilt (azoxystrobin + propiconazole), Stratego (trifloxystrobin + propiconazole), Folicur (tebuconazole), Proline (prothioconazole), Prosaro (prothioconazole + tebuconazole), Headline (pyraclostrobin), Caramba (metconazole), TwinLine (pyraclostrobin + metconazole), Orius (tebuconazole) See Fact Sheet 7609 - Leaf Rust and Stem Rust of Wheat. See labels for approved tank mixtures. For fall infection see supplement on seed treatments.</p>
<p>Septoria Leaf Blotch (<i>Septoria tritici</i>)</p> <p>Glume Blotch (<i>Stagonospora nodorum</i>)</p>	<p>Infected plants show oval, light brown spots on leaves, speckled with minute, dark brown fungus fruiting bodies. As the spots increase in number the entire leaf can be killed</p> <p>This disease is most conspicuous on the glumes. The lesions are irregular chocolate-brown spots, sprinkled with tiny, black fruiting bodies.</p>	<p>Chemicals labeled for use to control leaf and glume blotch include Tilt (propiconazole), Propimax (propiconazole), Bumper (propiconazole), Quadris (azoxystrobin), Quilt (azoxystrobin + propiconazole), and Stratego (trifloxystrobin + propiconazole), Proline (prothioconazole), Prosaro (prothioconazole + tebuconazole), Headline (pyraclostrobin) Caramba (metconazole), TwinLine (pyraclostrobin + metconazole) See Fact Sheet 7613 - Septoria Leaf Blotch and Glume Blotch of Wheat. See labels for approved tank mixtures. For fall infection see supplement on seed treatment.</p>

SMALL GRAIN DISEASES CONTROL GUIDE (CONT'D)

DISEASE	SYMPTOMS	CONTROL
	WHEAT (cont'd)	
Powdery Mildew (<i>Blumeria graminis</i>)	Powdery Mildew appears as white cotton tufts of fungus mycelium on the surfaces of wheat leaves. The sports from these tufts of mycelium will easily break loose giving the appearance of white powder flying through the air.	Chemicals labeled for use to control powdery mildew include Tilt (propiconazole), Bumper (propiconazole), Quadris (azoxystrobin), Quilt (azoxystrobin + propiconazole), Stratego (trifloxystrobin + propiconazole), Proline (prothioconazole), Prosaro (prothioconazole + tebuconazole), Headline (pyraclostrobin), Caramba (metconazole), TwinLine (pyraclostrobin + metconazole) See labels for approved tank mixtures. For fall infection see supplement on seed treatment. See labels for approved tank mixtures. Plant resistant varieties. See Fact Sheet 7633 - Powdery Mildew of Wheat. For fall infection see supplement on seed treatments.
Tan Spot (<i>Pyrenophora tritici-repentis</i>)	Dark oval lesions on leaves with light to dark brown centers often surrounded by distinct yellow borders.	Use crop rotation, clean tillage, resistant varieties, chemical control or a combination of these to reduce tan spot severity. Chemicals labeled for use to control tan spot include Tilt (propiconazole), Propimax (propiconazole), Bumper (propiconazole), Quadris (azoxystrobin), Quilt (azoxystrobin + propiconazole), Stratego (trifloxystrobin + propiconazole), Proline (prothioconazole), Prosaro (prothioconazole + tebuconazole), Headline (pyraclostrobin), Caramba (metconazole), TwinLine (pyraclostrobin + metconazole) See Fact Sheet 7624 - Tan Spot of Wheat.
Viruses	Yellow streaking or mosaic; purpling or mottled mosaic appearance in new leaves; stunting.	Check Fact Sheets (#7636 and #7629) and Informational Sheets at http://www.entopl.okstate.edu/ddd/hosts/wheat.htm for symptom descriptions and control recommendations for specific viruses including Wheat Soilborne Mosaic Virus, Wheat Spindle Streak Mosaic Virus, Wheat Streak Mosaic Virus, High Plains Virus, and Barley Yellow Dwarf Virus.

SUPPLEMENT FUNGICIDES SUGGESTED FOR WHEAT, OATS, BARLEY AND RYE SEED TREATMENTS

FUNGICIDE TRADE NAME and (Group)	RATE OF FORMULATION	DISEASES CONTROLLED
Apron XL LS- Mefenoxam (4)	<u>WHEAT</u> 0.32 – 0.64 fl oz/100lb.	Specific for root rots caused by <i>Pythium</i> and <i>Phytophthora</i>
Baytan – Triadimenol (3)	0.75-1.5 fl oz/100 lb	Seed Decay, Seedling Blight, Common Bunt and Loose Smut; Also controls fall foliar diseases
Captan - Captan (M)	1.5 – 4.0 fl oz/100 lb	Seed Decay, Seedling Blight
Charter		
Charter PB		
Cruiser - Thiamethoxam (4A) <i>This is an insecticide.</i>	.75 – 1.33 fl oz/100lb	Controls many aphids, which can spread barely yellow dwarf viruses, wireworms and Hessian fly
Dividend-Difenoconazole (3)	1.0 fl oz/100 lb	Control of loose smut and common bunt (stinking smut). Control during the fall of wheat leaf rust, powdery mildew, and septoria leaf blotch. Partial control of common root rot, Fusarium root rot, Fusarium crown rot, take-all, and Karnal bunt
Dividend Extreme Difenoconazole (3) Mefenoxam (4) Dividend XL RTA Difenoconazole (3) Mefenoxam (4)	1.0-4.0 fl. oz/100 lb	Control of loose smut, common bunt (stinking smut), <i>Pythium</i> damping-off, seed-borne Fusarium scab, septoria seedling blight, and seed rots. Partial control of common root rot and Karnal bunt. Control of fall foliar diseases
Nu-Zone – Imazalil (3)	0.8-1.5 fl oz/bu	Specific for Common (Dryland) Root Rot
Agsco RR – Imazalil (3)	0.8-1.5 fl oz/bu	Specific for Common and Dryland Root Rot
Fecundal - Imazalil (3)	0.8-1.5 fl oz/100 lb	Specific for Common and Dryland Root Rot
Flo-Pro-IMZ - Imazalil (3)	0.5-0.8 fl oz/bu	Specific for Common (Dryland) Root Rot
Gaucho 480 - Imidacloprid (4A) <i>This is an insecticide.</i> Gaucho 600 – Imidacloprid (4A) <i>This is an insecticide</i>	1 to 3 fl oz/100 lb	Lower rates (1-1.5 fl oz) control aphids (Bird Cherry-Oat, English Grain, Greenbug, and Russian Wheat), Hessian Fly, and Wireworms. Higher rates (2-3 oz) reduce the potential spread of Barley Yellow Dwarf Virus due to aphid vectors and damage from grasshoppers
Gaucho XT <i>(This is a combination of insecticide + two fungicides)</i> Imidacloprid (4A) Metalaxyl (4) Tebuconazole (3)	3.4 fl oz/100 lb	Activity against aphid/BYDV complex, smuts and bunts, early season (fall) root rots, early season (fall) damping-off, and early season (fall) foliar diseases such as rusts, powdery mildew, and the septoria complex
PCNB Pentachloronitrobenzene (14)	3 fl oz/100 lb	Common Bunt (Stinking Smut) and Karnal Bunt (partial control), Rhizoctonia, Fusarium
Raxil-MD Tebuconazole (3) Metalaxyl (4)	5 to 6.5 fl oz per 100 lb	Common Bunt or Stinking Smut, loose smut; early season Septoria complex; general seed rots; <i>Pythium</i> damping-off; early season Rhizoctonia and common root rots; seedborne Fusarium scab; early season Fusarium foot rot; and early season suppression of powdery mildew and rust.

SUPPLEMENT FUNGICIDES SUGGESTED FOR WHEAT, OATS, BARLEY AND RYE SEED TREATMENTS (CONT'D)

FUNGICIDE TRADE NAME and (Group)	RATE OF FORMULATION	DISEASES CONTROLLED
WHEAT (cont'd)		
Raxil-MD Extra Tebuxonazole (3) Metalaxyl (4) Imazalil (3)	5 fl oz per 100 lb	Control or suppression of stinking smut, (common bunt), Flag smut, loose smut; early season Septoria complex; general seed rots; <i>Pythium</i> damping-off; early season Rhizoctonia and common root rots; seedborne Fusarium scab; early season Fusarium foot rot; and early season suppression of powdery mildew, wheat leaf rust and barley stripe.
Raxil MD-W <i>(This is a combination of insecticide + two fungicides)</i> Imidacloprid (4A) Tebuconazole (3) Metalaxyl (4)	5 fl oz per 100 lb seed	Common bunt or stinking smut, flag smut, loose smut; early season Septoria complex; general seed rots; <i>Pythium</i> damping-off; early season Rhizoctonia and common root rots; seedborne Fusarium scab; early season Fusarium foot rot; early season suppression of powdery mildew and rust; suppression of wireworm activity on seed and young seedlings
RTU Vitavax Thiram Carboxin – (7) Thiram (M)	5-6.8 oz/100 lb	Rhizoctonia, Helminthosporium, Fusarium, <i>Pythium</i> , Common bunt (Stinking Smut), Loose Smut, Karnal Bunt (partial control)
Vitavax- Carboxin (7)	2-3 oz/100 lb	Specific for Loose Smut
Vitavax-Thiram-Lindane Carboxin (7) Thiram (M) Lindane (2A)	5 fl oz/100 lb	Common Bunt or Stinking Smut, Loose Smut, Covered Smut, Seedling Blight, Seed Decay, Wireworms, Seed Corn Maggots
Dry Powder Formulations that can be used as Drill Box Treatments:		
Agasco DB-Green + Vitavax Lindane (2A) Maneb (M) Carboxin (7)	2 oz/bu	Seed Decay, Seedling Blight, Bunt and Wireworm
Enhance Captan (M) Carboxin (7)	4 oz/100 lb	Seed Decay, Seedling Blight, Bunt and Wireworm
Enhance Plus Carboxin (7) Lindane (2A) Maneb (M)	2 oz/bu	Seedling Blight, Bunt and Wireworms
Vitavax - Captan Carboxin (7) Captan (M)	4 oz/100 lb	Seed Decay, Seedling Blight and Bunt
OATS		
Captan Captan (M)	2 fl oz/100 lb	Seed Decay and Seedling Blight
RTU Vitavax Thiram Carboxin (7) Thiram (M)	5 - 6.8 fl oz/100 lb	Seed Decay and Seedling Blight
Baytan Triadimenol (3)	0.75 - 1.5 fl oz/100 lb	Seed Decay, Seedling Blight, Covered and Loose Smut
Apron XL LS Metalaxyl (4)	0.32 – 0.64 fl oz/100 lb	Specific for root rots caused by <i>Pythium</i> and <i>Phytophthora</i> .
Vitavax-Captan Carboxin (7) Captan (M)	4 oz/100 lb	Seed Decay, Seedling Blight, Covered and Loose Smut
Terra-Coat LT-2N Pentachloronitrobenzene (14)	2-4 oz/bu	Seed Decay, Seedling Blight, and Covered Smut
-PCNB Pentachloronitrobenzene (14)	5.5 - 11 fl oz/100 lb	Oat Smut

SUPPLEMENT FUNGICIDES SUGGESTED FOR WHEAT, OATS, BARLEY AND RYE SEED TREATMENTS (CONT'D)

FUNGICIDE TRADE NAME and (Group)	RATE OF FORMULATION	DISEASES CONTROLLED
OATS (cont'd)		
Raxil --Thiram Tebuconazole (3) Thiram (M)	3.5 to 4.6 fl oz per 100 lb	Stinking, flag & loose smut; early season Septoria complex; general seed rots; <i>Pythium</i> damping-off; early season Rhizoctonia and common root rots; seedborne Fusarium scab; early season Fusarium foot rot; and early season suppression of powdery mildew and leaf rust. Dilute product with sufficient water to apply at 9 to 20 fl oz per 100 lb seed.
Raxil MD Tebuconazole (3) Metalaxyl (4)	5-6.5 fl oz/100 lb	Common Bunt or Stinking Smut, loose smut; early season Septoria complex; general seed rots; <i>Pythium</i> damping-off; early season Rhizoctonia and common root rots; seedborne Fusarium scab; early season Fusarium foot rot; early season suppression of powdery mildew and rust; suppression of wireworm activity on seed and young seedlings.
Drill Box Seed Treatments for Oats:		
Enhance Captan (M) Carboxin (7)	4 oz/100 lb	Seed Decay, Seedling Blight, Covered and Loose Smut
Enhance Plus Carboxin (7) Lindane (2A) Maneb (M)	2 oz/bu	Seed Decay, Seedling Blight, Loose Smut, and Wireworms
BARLEY		
Agsco - RR - Imazalil (3)	0.5-0.8 fl oz/bu	Specific for Common Root Rot
Apron XL LS- Metalaxyl (4)	0.32 – 0.64 fl oz/100 lb	Specific for root rots caused by <i>Pythium</i> and <i>Phytophthora</i>
Baytan -Triadimenol (3)	0.75-1.5 fl oz/100 lb	Seed Decay, Seedling Blight, Covered Smut
Captan - (1:5 dilution)	320 cc/100 lb	Seed Decay and Seedling Blight
Charter		
Charter PB		
Cruiser - Thiamethoxam (4?) <i>This is an insecticide.</i>	.75 – 1.33 fl oz/100lb	Controls many aphids, which can spread barley yellow dwarf viruses, wireworms and Hessian fly.
Fecundal – Imazalil (3)	0.5-0.8 fl oz/100 lb	Common Root Rot, Seedling Blight, Seedborne Net Blotch
Flo-Pro-IMZ - Imazalil (3)	0.5-0.8 fl oz/bu	Specific for Common Root Rot
Gaicho - Imidacloprid (4A) <i>This is an insecticide.</i>	1 to 3 fl oz/100 lb	Lower rates (1-1.5 fl oz) controls aphids (Bird Cherry-Oat, English Grain, Greenbug, and Russian Wheat), Hessian Fly, and Wireworms. Higher rates (2-3 oz) reduce the potential spread of Barley Yellow Drawf Virus due to aphid vectors

SUPPLEMENT FUNGICIDES SUGGESTED FOR WHEAT, OATS, BARLEY AND RYE SEED TREATMENTS (CONT'D)

FUNGICIDE TRADE NAME and (Group)	RATE OF FORMULATION	DISEASES CONTROLLED
	BARLEY (cont'd)	
Gaucht XT <i>(This is a combination of an insecticide + two fungicides)</i> Imidacloprid (4A) Metalaxyl (4) Tebuconazole (3)	3.4 fl oz/100 lb seed	Activity against aphid/BYDV complex, wireworms, barley stripe (suppression), smuts and bunts, early season (fall) root rots, early season (fall) damping-off, and early season (fall) barley leaf rust
Nu-Zone - Imazalil (3)	0.8-1.5 fl oz/bu	Specific for Common Root Rot
Raxil MD-W <i>(This is a combination of insecticide + two fungicides)</i> Imidacloprid (4A) Tebuconazole (3) Metalaxyl (4)	5 fl oz per 100 lb seed	Common Bunt or Stinking Smut, loose smut; early season Septoria complex; general seed rots; <i>Pythium</i> damping-off; early season Rhizoctonia and common root rots; seedborne Fusarium scab; early season Fusarium foot rot; early season suppression of powdery mildew and rust; suppression of wireworm activity on seed and young seedlings.
Raxil MD Tebuconazole (3) Metalaxyl (4)	5-6.5 fl oz/100 lb	Common Bunt or Stinking Smut, loose smut; early season Septoria complex; general seed rots; <i>Pythium</i> damping-off; early season Rhizoctonia and common root rots; seedborne Fusarium scab; early season Fusarium foot rot; and early season suppression of powdery mildew and leaf rust and suppression of wireworm activity on seed and young seedlings.
Vitavax Thiram Carboxin (7) Thiram (M)	5.0-6.8 fl oz/100 lb	Loose Smut, Covered Smut, Common Bunt
Terra-Coat LT-2N Pentachloronitrobenzene (14)	2-4 oz/bu	Seed Decay, Seedling Blight, Covered Smut
Vitavax-Captan Carboxin (7) Captan (M)	4 oz/100 lb	Seed Decay, Seedling Blight, Covered and Loose Smut
Vitavax Thiram Lindane Carboxin (7) Thiram (M) Lindane (2A)	6.0 fl oz/100 lb	Loose Smut, Covered Smut, Common Bunt

SUPPLEMENT FUNGICIDES SUGGESTED FOR WHEAT, OATS, BARLEY AND RYE SEED TREATMENTS (CONT'D)

FUNGICIDE TRADE NAME and (Group)	RATE OF FORMULATION	DISEASES CONTROLLED
Drill Box Seed Treatments for Barley:		
Agsco DB-Green + Vitavax Lindane (2A) Maneb (M) Carboxin (7)	2 oz/bu	Seed Decay, Seedling Blight, Covered Smut, Loose Smut and Wireworms
Enhance Captan (M) Carboxin (7)	4 oz/100 lb	Seed Decay, Seedling Blight, Covered Smut and Loose Smut
Enhance Plus Carboxin (7) Lindane (2A) Maneb (M)	2 oz/bu	Covered Smut, Seed Decay, Seedling Blight and Wireworms
Vitavax – Thiram Carboxin (7) Thiram (M)	4 oz/100 lb	Seed Decay, Seedling Blight, Covered Smut and Loose Smut

MOA Group Tables start on page 46 of the handbook.

All seed treatment materials are toxic. Mark treated seed and do not use for feed or food. Avoid inhaling dusts or fumes when treating and always read the product label before applying the chemical.

STORED GRAIN INSECT CONTROL SUGGESTIONS

INSECTS	COMMENTS (INSECTICIDE AND RATE)
<p>Internal-Feeding Grain Insects (develop inside kernel; cause IDK, Insect Damaged Kernels) Lesser grain borer (serious and common) Rice weevil (on older or high moisture wheat) Granary weevil (rare in OK) Maize weevil (on corn, not common in OK)</p> <p>External-Feeding Grain Insects (feed on cracked kernels, fine material, dust, or fungi) Indianmeal moth¹ Rusty grain beetle Flour beetles Sawtoothed grain beetle</p> <p>¹ Indianmeal moth adults may be controlled by hanging DDVP Resin strips (Vapona) in the head space over the grain mass. Use 1 strip for each 1,000 cu ft air space over the grain. One treatment usually lasts 3 months.</p> <p>To protect grain specifically from Indianmeal moth larval infestation, apply a top-dressing of the biological insecticide <i>Bacillus thuringiensis</i> (Bt) after binning. Bt is sold under the trade names "Dipel," "Thuricide," "Bactospeine" or "Top-Side." Follow label directions when applying these materials.</p>	<p>PRESTORAGE SUGGESTIONS: <u>Storage Bin Cleanup</u> - Remove all grain and debris from bin by sweeping and vacuuming.</p> <p><u>Clean-out Fumigant</u> - Phosphine fumigants can be used as a clean-out fumigant, but they are not significantly heavier than air so thorough sealing of the structure is critical. Sulfuryl fluoride, which is heavier than air, can also be used. Fumigants can be used only by applicators holding the Fumigation certification.</p> <p><u>Residual Bin Spray</u> - Spray inside surface with one of the following formulations:</p> <p>Tempo 20WP – 10-20 grams /1,000 ft². (This formulation is preferred for concrete surfaces) Tempo Ultra WP – 10-20 grams /1,000 ft². Tempo SC Ultra – 8-16 ml/gal/1,000 ft². Diatomaceous earth - 0.4-1.0 lb (depending upon formulation)/1000 ft². Storcide II- Mix 1.8 fl oz into 1 gal water and spray 1000 ft². You must apply from outside the structure.</p> <p><u>GRAIN TREATMENT</u>: Harvest-time storage treatment, referred to as grain protectants. Apply to the grain as it is being put into storage.</p> <p>Storcide II - Mix 12.4 fl oz in 5 gal water/1000 bu wheat. . Also labeled for oats, barley, sorghum, and rice (not on corn) at various rates. Actellic 5E - Labeled for use on stored corn and grain sorghum (not on wheat). Use at rate of 9.2 to 12.3 fl oz/5 gal water. This will treat 30 tons of grain (1071) bu. Label states that Actellic "aids in suppression" of lesser grain borer.</p> <p>Pyrethrins. Use at rate of 1 part to 29 parts water up to 1 part to 11 part water. Apply 4-5 gal/1000 bushels. Gives only short-term knockdown; not highly recommended. Diacon II – is an insect growth regulator that will not kill adults, but stops reproduction because immature stages of insects do not develop fully. Various rates are available on the label for barley, corn, oats, peanuts, rice, sorghum, sunflower, and wheat. Apply to entire grain mass or as a top-dress. Diatomaceous earth (DE) - 0.4 to 2 lb/ton of grain and 1-3 lb/1000 ft² as a top-dress. Formulations vary in rates, read labels carefully. Distribution is critical and grain should be less than 13% moisture. A dust mask or other respiratory protection is important when applying product. Treatment of entire grain mass may lower test weight and not be cost-effective. Top and bottom dressing with DE preceded by an empty bin treatment are recommended. Check label directions of the product used. <i>Bacillus thuringiensis</i> (DiPel DF) - 0.5 lb/5-10 gal of water/ 500 ft²; apply as a top- dress and mix into the top 4 inches. Agitation is important. Only works on moths.</p>

STORED GRAIN INSECT CONTROL SUGGESTIONS (CONT'D)

INSECTS	COMMENTS (INSECTICIDE AND RATE)																														
All stored grain insects.	<p>*****Fumigation may only be conducted by commercial applicators or private applicators who are certified in the fumigation category. Farmers or others who possess only a Private Applicator certification ARE NOT ALLOWED to purchase or apply fumigant pesticides.*****</p> <p>GRAIN FUMIGANTS: If insects are found above thresholds of (1/qt) rice weevil or lesser grain borer; red flour beetle, rusty grain beetle and other bran bugs (5/qt), fumigants would be profitable. Solid fumigants which produce phosphine gas are readily available under several trade names including Phostoxin, Fumitoxin, etc. Labels vary significantly, but the following is a guideline for pellets and tablets of phosphine products. All grain fumigants are restricted use pesticides.</p> <table border="1" style="width: 100%; margin: 10px 0;"> <thead> <tr> <th></th> <th style="text-align: center;">Pellets/1000 bu</th> <th style="text-align: center;">Tablets/1000 bu</th> </tr> </thead> <tbody> <tr> <td>Farm bins</td> <td style="text-align: center;">450-900</td> <td style="text-align: center;">90-180</td> </tr> <tr> <td>Flat storage</td> <td style="text-align: center;">300-900</td> <td style="text-align: center;">60-180</td> </tr> <tr> <td>Vertical concrete</td> <td style="text-align: center;">200-375</td> <td style="text-align: center;">40-75</td> </tr> </tbody> </table> <p>Phosphine gas is released from solid metallic phosphide formulations when they react with moisture in the air. Phosphine release varies significantly with temperature and moisture. The cooler the temperature and drier the grain, the longer the release, so longer exposure times are required at cooler grain temperatures and/or under dry grain conditions.</p> <table border="1" style="width: 100%; margin: 10px 0;"> <thead> <tr> <th style="text-align: left;">Grain Temperature</th> <th style="text-align: left;">Pellets</th> <th style="text-align: left;">Tablets</th> </tr> </thead> <tbody> <tr> <td>Below 40 F (5 C)</td> <td>Do not fumigate</td> <td>Do not fumigate</td> </tr> <tr> <td>40-53 F (5-12 C)</td> <td>8 days (192 hrs)</td> <td>10 days (240 hrs)</td> </tr> <tr> <td>54-59 F (12-15 C)</td> <td>4 days (96 hrs)</td> <td>5 days (120 hrs)</td> </tr> <tr> <td>60-68 F (15-20 C)</td> <td>3 days (72 hrs)</td> <td>4 days (96 hrs)</td> </tr> <tr> <td>Above 68 F (20 C)</td> <td>2 days (48 hrs)</td> <td>3 days (72 hrs)</td> </tr> </tbody> </table> <p>There are several safety requirements for using fumigants including:</p> <ul style="list-style-type: none"> Placarding Respiratory protection Air monitoring Notification and denotification of local police and fire departments. Two or more people present <p>Sulfuryl fluoride is a gas and is available in pressurized containers. Specialized equipment is needed to apply this product and monitor gas levels. There is no dosage rate on the label. You must use the software program provided to determine how much to apply.</p> <p>When label directions are followed and the application is made correctly, phosphine fumigants and sulfuryl fluoride should give satisfactory results. The storage facility must be sealed for best results. NEVER FUMIGATE A BIN BY YOURSELF. Follow all safety rules, including the use of an approved respirator.</p>		Pellets/1000 bu	Tablets/1000 bu	Farm bins	450-900	90-180	Flat storage	300-900	60-180	Vertical concrete	200-375	40-75	Grain Temperature	Pellets	Tablets	Below 40 F (5 C)	Do not fumigate	Do not fumigate	40-53 F (5-12 C)	8 days (192 hrs)	10 days (240 hrs)	54-59 F (12-15 C)	4 days (96 hrs)	5 days (120 hrs)	60-68 F (15-20 C)	3 days (72 hrs)	4 days (96 hrs)	Above 68 F (20 C)	2 days (48 hrs)	3 days (72 hrs)
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STORED GRAIN INSECT CONTROL SUGGESTIONS (CONT'D)

Notes on Grain Fumigation

Besides the traditional phosphine pellets and tablets, there are cylinderized fumigants. These include a product called ECO₂FUME, which is phosphine mixed with carbon dioxide gas dispensed from gas cylinders, and pure phosphine in cylinders, called VaporPH₃os, that is blended with air or carbon dioxide by a special gas regulator. Methods and equipment for phosphine gas released from generating machines have also been registered. A new grain fumigant chemical called sulfuryl fluoride was registered under the name Profume. These new fumigants may offer advantages to some grain and processed food managers, either for more efficient bulk fumigation or as methyl bromide replacements in structural treatments.

When using fumigants, respiratory protection is critical. Before using fumigants you must be a certified applicator in category 7c fumigation.

Notes on Resistance of Certain Stored Grain Insects to Insecticides

Malathion is still registered for use as an empty bin spray and as a grain protectant, but its use is not recommended. Malathion resistance is heavy in case of the red flour beetle and moderate to heavy by the lesser grain borer, and due to product degradation, Malathion is not recommended. All organophosphates, such as malathion and Actellic, break down with high harvest temperatures and with time while on warm grain.

Farmers and elevator operators are applying too much malathion on grain and empty grain facilities. Malathion simply does not work and its overuse leads to evolution of resistance. Research in Kansas and Oklahoma showed that insect populations became higher in grain treated with malathion than in the untreated grain. The surprising result was probably due to natural enemies of grain pests, such as parasites and predators, being killed by the malathion and thus allowing more pest insect to develop. Overuse of malathion has also led to unacceptably high levels of malathion residues being detected on grain destined for export.

Several years ago samples of red flour beetle and lesser grain borer taken from 10 counties were subjected to phosphine resistance studies. Essentially no resistance by the red flour beetle to phosphine gas was found, while a light to moderate resistance existed in the lesser grain borers collected.

The tolerance to phosphine is due more to inefficient fumigation practices such as inadequate sealing of the bin and/or repeated fumigations throughout the season, than to resistance. Producers are encouraged to apply the fumigant according to label instructions, especially being sure that adequate sealing is done. Also, be careful that you allow the fumigant adequate time to work under existing temperature and grain moisture conditions. Ideally, grain should be under fumigation at a minimum of 200 ppm for 100 hours to kill all insect life stages.

SORGHUM INSECT CONTROL SUGGESTIONS

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)	Rate of Product per Acre	Comments	
<p>Chinch bug Adults are 1/8 inch long, black with white wings that are folded over the back into an “hour glass” shape. Nymphs are reddish to brown, with a white stripe across their “shoulders.”</p> <p><u>Damage:</u> Feed at base of plants, in between leaf sheath and stem. Chinch bugs often migrate from small grains to sorghum. Feeding may kill small seedlings.</p> <p><u>Threshold:</u> 2-3 bugs per plant on seedlings. Treat if large numbers are moving in to sorghum from grain. A border spray 30-60 feet wide on the margins of the field may be of value if chinch bug numbers are high in an adjacent wheat field. In areas with heavy, consistent numbers, consider planting a trap crop of sorghum/sudangrass in a 30-60 ft barrier strip around the field, which can be sprayed if migrating numbers are high.</p>	<u>Planting Time</u>			
		Cruiser 5FS (4A) Gaucho 480 (4A) Poncho 600 (4A)	5.1 fl oz/cwt seed 8 fl oz/cwt seed 5.1-6.4 fl oz/cwt seed	Seed treatments will generally provide 3 weeks of suppression. Use seed treatment if sorghum has suffered regular losses from chinch bug infestations.
	<u>Post-Plant</u>			
		Asana ^f XL (3)	5.8 to 9.6 fl oz	Best control with post-plant applications is obtained when insecticide is applied by ground, with nozzles directed at the base of the plants using a minimum of 20-30 gallons of water. Do not apply more than 0.15 lb ai/season. 21 day waiting period for grazing or harvest.
		Baythroid ^f XL (3)	2.0 to 2.8 fl oz	14 day waiting period for grazing or harvest.
		Cobalt ^f (3)	13-38 fl oz	30 day wait for applications of 26 fl oz/A or less, 60 day wait for applications over 26 fl oz/Acre
		Furadan ^f 4F (1A)	0.5 to 1 pt	Check table on last page for grazing and harvest restrictions.
		Karate ^f with Zeon (3) Warrior ^f with Zeon (3)	1.92 fl oz 3.84 fl oz	30 day wait for harvest or grazing.
		Lorsban ^f 4E (1B) (Warhawk, Whirlwind)	1 to 2 pt	30-60 day waiting period for grazing or harvest
		Mustang MAX ^f (3)	3.2 to 4.0 fl oz	14 day waiting period for harvest, 45 days for grazing.
	Proaxis ^f 0.5 CS (3) Prolex ^f 1.25 CS (3)	3.84 fl oz 1.54 fl oz	30 day waiting period for grazing or harvest.	
	Sevin XLR (1A)	1 to 2 qt	Sevin may cause mite buildup	
<p>Corn earworm (Headworm) Up to 1 inch. Color varies from green, to brown to yellow and pink.</p> <p><u>Damage:</u> Feed in whorl and ripening seed in head. Yield loss from whorl feeding is negligible. Are capable of causing damage to seed in head until grain reaches soft dough stage.</p> <p><u>Threshold:</u> Two or more larvae per head before hard dough.</p>		Asana ^f XL (3)	5.8 to 9.6 fl oz	Do not apply more than 0.15 lb ai/season. 21 day waiting period for grazing or harvest.
		Baythroid ^f XL (3)	1.3 to 2.8 fl oz	14 day waiting period for grazing or harvest.
		Cobalt ^f (3)	19-38 fl oz	30 day wait for applications of 26 fl oz/A or less, 60 day wait for applications over 26 fl oz/Acre
		Karate ^f with Zeon (3) Warrior ^f with Zeon (3)	1.28 to 1.92 fl oz 2.56 to 3.84 fl oz	30 day waiting period for grazing or harvest.
		Lorsban ^f 4E (1B) (Warhawk, Whirlwind)	2 pt	30-60 day waiting period for grazing or harvest.
		Methomyl ^f (1A)	0.75 to 1.5 pt	14 day waiting period for grazing or harvest.
		Mustang MAX ^f (3)	1.76 to 4.0 fl oz	14 day waiting period for harvest, 45 days for grazing.
		Proaxis ^f 0.5 CS (3) Prolex ^f 1.25 CS (3)	2.56 to 3.84 fl oz 1.02 to 1.54 fl oz	30 day waiting period for grazing or harvest.
		Sevin XLR (1A)	1 to 2 qt	0 day waiting period for grazing, 21 days for harvest.
		Tracer (5)	1.5 to 3 fl oz	14 day waiting period for grazing, 7 days for harvest.

SORGHUM INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)	Rate of Product per Acre	Comments
<p>Corn leaf aphid Bluish-green, soft bodied aphid with black legs, antennae and cornicles. Typically found in whorl.</p> <p><u>Damage:</u> Feed in whorl; may cause some delay of whorl emergence if numbers are high. Can mechanically transmit Maize Dwarf Mosaic virus disease.</p> <p><u>Threshold:</u> Corn leaf aphids rarely cause significant yield loss, so no thresholds have been established.</p>	<p><u>Planting Time</u></p> <p>Cruiser 5FS (4A) Gaucho 480 (4A) Poncho 600 (4A)</p> <p><u>Post-Plant</u></p> <p>Cobalt^r (3) Dimethoate 4E (1B) Lorsban^r 4E (1B) (Warhawk, Whirlwind) Mustang MAX^r (3)</p>	<p>5.1 fl oz/cwt seed 8 fl oz/cwt seed 5.1-6.4 fl oz/cwt seed</p> <p>7-13 fl oz acre 0.5 to 1 pt 0.5 to 1 pt 3.2 to 4.0 fl oz</p>	<p>Check table on last page for grazing and harvest restrictions.</p> <p>Research indicates that yield losses occur only where corn leaf aphids cause stand loss on seedling plants. Chemical treatments, including seed treatments, are not likely to reduce potential for infection by Maize Dwarf Mosaic Virus, because it can be transmitted within 30 seconds after an aphid begins feeding. Texas research suggests that corn leaf aphids serve as a food source for lady beetles which can help prevent greenbug outbreaks.</p>
<p>Cutworms Robust caterpillars that “roll” up when disturbed, and prefer to live under ground.</p> <p><u>Damage:</u> Cutworms generally feed at night, and live under the soil during the day. Plants will be cut at or slightly above the soil level.</p> <p><u>Threshold:</u> Scout fields at seedling emergence. Treat when worms are less than ½ inch long, and skips are noticed.</p>	<p>Asana^r XL (3) Baythroid^r XL (3) Cobalt^r (3) Karate^r with Zeon (3) Warrior^r with Zeon (3) Lorsban^r 4E (1B) (Warhawk, Whirlwind) Mustang MAX^r (3) Proaxis^r 0.5 CS (3) Prolex^r 1.25 CS (3)</p>	<p>5.8 to 9.6 fl oz 1 to 1.3 fl oz 13-38 fl oz 0.96 to 1.28 fl oz 1.92 to 2.56 fl oz 1 to 2 pt 1.3 to 4.0 fl oz 1.92 to 2.56 fl oz 0.77 to 1.02 fl oz</p>	<p>Do not apply more than 0.15 lb ai/season. 21 day waiting period for grazing or harvest.</p> <p>14 day waiting period for grazing or harvest.</p> <p>30 day wait for applications of 26 fl oz/A or less, 60 day wait for applications over 26 fl oz/Acre</p> <p>30 day waiting period for grazing or harvest.</p> <p>30-60 day waiting period for grazing or harvest.</p> <p>14 day waiting period for harvest, 45 days for grazing.</p> <p>30 day waiting period for grazing or harvest</p>
<p>Fall armyworm (Headworm) Large, striped, non-bristled caterpillar up to 1.5 inches. Has a light colored, inverted “Y” on head.</p> <p><u>Damage:</u> Feed in whorl, and ripening seed in head. Yield loss from whorl feeding is negligible. Can damage seed in head until grain reaches soft dough stage.</p> <p><u>Threshold:</u> Two or more larvae per head before hard dough stage. Open-headed varieties are less susceptible to attack than tight-headed varieties.</p>	<p>Cobalt^r (3) Karate^r with Zeon (3) Warrior^r with Zeon (3) Lorsban^r 4E (1B) (Warhawk, Whirlwind) Methomyl^r (1A) Mustang MAX^r (3) Proaxis^r 0.5 CS (3) Prolex^r 1.25 CS (3) Sevin XLR (1A) Tracer (5)</p>	<p>13-38 fl oz 1.28 to 1.92 fl oz 2.56 to 3.84 fl oz 1 to 2 pt 0.75 to 1.5 pt 1.8 to 4.0 fl oz 2.56 to 3.84 fl oz 1.02 to 1.54 fl oz 1 to 2 qt 1.5 to 3 fl oz</p>	<p>Check labels, some state that product is only effective on very small (1st and 2nd instars) caterpillars</p> <p>30 day wait for applications of 26 fl oz/A or less, 60 day wait for applications over 26 fl oz/Acre</p> <p>30 day waiting period for grazing or harvest.</p> <p>30-60 day waiting period for grazing or harvest.</p> <p>14 day waiting period for grazing or harvest.</p> <p>14 day waiting period for harvest, 45 days for grazing.</p> <p>30 day waiting period for grazing or harvest.</p> <p>No waiting period for grazing, 21 days for harvest.</p> <p>14 day waiting period for grazing, 7 days for harvest.</p>

SORGHUM INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)	Rate of Product per Acre	Comments
<p>False chinch bug Adults 1/8 inch, long dirty gray, with brown or black markings, piercing mouthparts.</p> <p><u>Damage:</u> Feed in groups. Large numbers may cause wilting of heads or small plants.</p> <p><u>Threshold:</u> 140 or more per head.</p>	<p>Baythroid^f XL (3)</p> <p>Mustang MAX^f (3)</p>	<p>1.3 to 2.8 fl oz</p> <p>3.2 to 4.0 fl oz</p>	<p>14 day waiting period for grazing or harvest.</p> <p>14 day waiting period for harvest, 45 days for grazing.</p>
<p>Grasshopper 1-2 inches, outer wings leathery, inner wings clear or colored. Enlarged hind legs designed for jumping.</p> <p><u>Damage:</u> Chew leaves, leaving ragged edges, or completely chewing leaf blade. Damage emerging seed heads, causing yield loss.</p> <p><u>Threshold:</u> 15-20 per square yard. If nymph populations exceed threshold field borders (25-40 per square yard), treat before they move into sorghum.</p>	<p>Baythroid^f XL (3)</p> <p>Cobalt^f (3)</p> <p>Dimethoate 4E (1B)</p> <p>Karate^f with Zeon (3)</p> <p>Warrior^f with Zeon (3)</p> <p>Lorsban^f 4E (1B) (Warhawk, Whirlwind)</p> <p>Mustang MAX^f (3)</p> <p>Proaxis^f 0.5 CS (3)</p> <p>Prolex^f 1.25 CS (3)</p> <p>Sevin XLR (1B)</p>	<p>2 to 2.8 fl oz</p> <p>7-13 fl oz</p> <p>1 pt</p> <p>1.28 to 1.92 fl oz</p> <p>2.56 to 3.84 fl oz</p> <p>0.5 to 1 pt</p> <p>3.2 to 4.0 fl oz</p> <p>2.56 to 3.84 fl oz</p> <p>1.02 to 1.54 fl oz</p> <p>0.5 to 1.5 qt</p>	<p>14 day waiting period for grazing or harvest.</p> <p>30 day wait for applications of 26 fl oz/A or less, 60 day wait for applications over 26 fl oz/Acre</p> <p>Only one post-plant application per season.</p> <p>30 day waiting period for grazing or harvest.</p> <p>30-60 day waiting period for grazing or harvest.</p> <p>14 day waiting period for harvest, 45 days for grazing.</p> <p>30 day waiting period for grazing or harvest.</p> <p>No waiting period for grazing, 21 days for harvest.</p>

SORGHUM INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)	Rate of Product per Acre	Comments
<p>Greenbug Lime-green, soft bodied aphid with darker green stripe down back. Tips of legs, cornicles and most of antennae are black.</p> <p><u>Damage:</u> Injury can occur at anytime from seedling emergence through soft dough stage. Greenbug feeding causes reddening of leaves, leaves die as populations increase.</p> <p><u>Threshold:</u> See Thresholds listed at end of publication. Need to treat is dependent upon greenbug numbers, plant size, variety, growing conditions, and the presence of predators and parasites. It is better to base treatment decision on presence of plant damage than on greenbug numbers alone.</p>	<p><u>Seed Treatment</u></p> <p>Cruiser 5FS (4A) Gaucho 480 (4A) Poncho 600 (4A)</p> <p><u>Planting Time</u></p> <p>Counter^r CR (1B)</p> <p><u>Post-Plant</u></p> <p>Dimethoate 4E (1B)</p> <p>Cobalt^r (3)</p> <p>Furadan^r 4F (1A)</p> <p>Lorsban^r 4E (1B)</p> <p>Malathion 5E (1B)</p> <p>Supracide 2E (1B)</p>	<p>5.1 fl oz/cwt seed 8 fl oz/cwt seed 5.1-6.4 fl oz/cwt seed</p> <p>"Lock 'n Load" applicator needed</p> <p>1 pt</p> <p>13-38 fl oz</p> <p>1 pt</p> <p>0.5 to 2 pt</p> <p>1.5 pt</p> <p>2 pt</p>	<p>No waiting period for grazing or harvest. 45 day waiting period for grazing or harvest. Follow all label directions. No waiting period listed.</p> <p>Do not place granules in contact with seed. 50 day waiting period for grazing, 100 days for harvest.</p> <p>Broadcast directly over whorl. Only one post-plant application per season.</p> <p>30 day wait for applications of 26 fl oz/A or less, 60 day wait for applications over 26 fl oz/Acre. See additional instructions on label.</p> <p>Do not feed or graze forage hay or straw to livestock.</p> <p>Greenbug resistant varieties are available.</p> <p>7 day PHI for grain. Do not feed or graze forage, hay or straw to livestock.</p> <p>30 day waiting period for grazing or harvest (24C label)</p>
<p>Lesser cornstalk borer Caterpillar ¾ inches when mature. Slender, blue-green with brown bands around each body segment. Make silken tunnels at feeding site.</p> <p><u>Damage</u> Tunnels in roots and stems. Occurs in May through June.</p> <p><u>Threshold</u> Treat before larva bore into stalk.</p>	<p>Karate^r with Zeon (3) Warrior^r with Zeon (3)</p> <p>Cobalt^r (3)</p> <p>Lorsban^r 4E (1B) (Warhawk, Whirlwind)</p> <p>Mustang MAX^r (3)</p> <p>Proaxis^r 0.5 CS (3) Prolex^r 1.25 CS (3)</p>	<p>1.28 to 1.92 fl oz 2.56 to 3.84 fl oz</p> <p>13-38 fl oz</p> <p>1 to 2 pt</p> <p>3.2 to 4.0 fl oz</p> <p>2.56 to 3.84 fl oz 1.02 to 1.54 fl oz</p>	<p>30 day waiting period for grazing or harvest.</p> <p>30 day wait for applications of 26 fl oz/A or less, 60 day wait for applications over 26 fl oz/Acre. See additional instructions on lable.</p> <p>30-60 day waiting period for grazing or harvest.</p> <p>14 day waiting period for harvest, 45 days for grazing.</p> <p>30 day waiting period for grazing or harvest.</p>

SORGHUM INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)	Rate of Product per Acre	Comments
<p>Mites Small, less than 1/100 inches. Cause brown stippling of leaves.</p> <p><u>Damage:</u> Causes stippling of leaves, severe infestations can kill leaves.</p> <p><u>Threshold:</u> No threshold established. Treat if majority of plants are infested with large, increasing mite infestations. Control is not be justified after head reaches hard dough stage</p>	<p><u>Planting Time</u></p> <p>Phorate 20G (1B)</p> <p><u>Post-Plant</u></p> <p>Comite II (14)</p> <p>Dimethoate 4E (1B)</p> <p>Supracide 2E</p>	<p>6 oz per 1000 ft-row</p> <p>1.5 to 2.25 pt</p> <p>1 pt</p> <p>2 pt</p>	<p>Do not place granules in direct contact with seed. Do not feed foliate before grain harvest.</p> <p>30 day waiting period for grazing, 60 days for harvest.</p> <p>Only one post-plant application per season.</p> <p>30 day waiting period for grazing or harvest. (24C label).</p>
<p>Panicle feeding bugs Include stink bugs and leaf-footed bugs. Stink bugs: shield shaped bugs ranging from ½ to ¾ inches. Leaf-footed bug: Brown, oblong about ¾ inches with each hindleg leaf-like.</p> <p><u>Damage:</u> Feed on seed, causing blasted heads, shrunken damaged seed. Most damage occurs before seed reaches hard dough stage.</p> <p><u>Thresholds:</u> Milk stage: 5 bugs /head. Soft Dough: 9 bugs/head.</p>	<p>Baythroid^f XL (3)</p> <p>Cobalt^f (3)</p> <p>Karate^f with Zeon (3) Warrior^f with Zeon (3)</p> <p>Mustang MAX^f (3)</p> <p>Proaxis^f 0.5 CS (3) Prolex^f 1.25 CS (3)</p> <p>Sevin XLR (1A)</p>	<p>1.3 to 2.8 fl oz</p> <p>19-38 fl oz</p> <p>1.28 to 1.92 fl oz 2.56 to 3.84 fl oz</p> <p>1.8 to 4.0 fl oz</p> <p>2.56 to 3.84 fl oz 1.02 to 1.54 fl oz</p> <p>1 to 2 qt</p>	<p>14 day waiting period for grazing or harvest.</p> <p>30 day wait for applications of 26 fl oz/A or less, 60 day wait for applications over 26 fl oz/Acre</p> <p>30 day waiting period for grazing or harvest.</p> <p>14 day waiting period for harvest, 45 days for grazing.</p> <p>30 day waiting period for grazing or harvest.</p> <p>No waiting period for grazing, 21 days for harvest.</p>

SORGHUM INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)	Rate of Product per Acre	Comments
<p>Sorghum midge Tiny, fragile orange-bodied fly that is active in early to mid morning.</p> <p><u>Damage:</u> Damaged heads appear to be “blasted” or “blighted” from high temperatures, infertility, or drought. Damage from sorghum midge generally restricted to sorghum that blooms after August 15.</p> <p><u>Threshold:</u> Check fields before 11 am, when flies are most active. Treat when 25-30% of heads have begun bloom and adults average one or more per head.</p>	Asana ^r XL (3)	2.9 to 5.8 fl oz	Check labels. May need to apply a second treatment 3-5 days after first. Uniform planting date is an option for management. Do not apply more than 0.15 lb ai/season. 21 day waiting period for grazing or harvest.
	Baythroid ^r XL (3)	0.9 to 1.3 fl oz	14 day waiting period for grazing or harvest.
	Cobalt ^r (3)	7-13 fl oz	30 day wait for applications of 26 fl oz/A or less, 60 day wait for applications over 26 fl oz/Acre
	Karate ^r with Zeon (3) Warrior ^r with Zeon (3)	1.9 to 2.6 fl oz 2.6 to 3.8 fl oz	30 day waiting period for grazing or harvest.
	Lorsban ^r 4E (1B) (Warhawk, Whirlwind)	0.5 pt	30-60 day waiting period for grazing or harvest.
	Methomyl ^r (1A)	0.75 to 1.5 pt	14 day waiting period for grazing or harvest.
	Mustang MAX ^r (3)	1.28 to 4.0 fl oz	14 day waiting period for harvest, 45 days for grazing.
	Proaxis ^r 0.5 CS (3) Prolex ^r 1.25 CS (3)	1.92 to 2.56 fl oz 0.77 to 1.02 fl oz	30 day waiting period for grazing or harvest.
	<p>Sorghum webworm Fuzzy, reddish to brown worms in head.</p> <p><u>Damage:</u> Caterpillars feed on the seed, and hollow it out. Open-headed varieties are less susceptible than tight-headed varieties to attack.</p> <p><u>Threshold:</u> 5 or more larvae per head before hard dough stage.</p>	Baythroid ^r XL (3)	1.3 to 2.8 fl oz
Cobalt ^r (3)		19-38 fl oz	30 day wait for applications of 26 fl oz/A or less, 60 day wait for applications over 26 fl oz/Acre
Karate ^r with Zeon (3) Warrior ^r with Zeon (3)		1.28 to 1.92 fl oz 2.56 to 3.84 fl oz	30 day waiting period for grazing or harvest.
Lorsban ^r 4E (1B) (Warhawk, Whirlwind)		1 pt	30-60 day waiting period for grazing or harvest.
Mustang MAX ^r (3)		1.8 to 4.0 fl oz	14 day waiting period for harvest, 45 days for grazing.
Proaxis ^r 0.5 CS (3) Prolex ^r 1.25 CS (3)		2.56 to 3.84 fl oz 1.02 to 1.54 fl oz	30 day waiting period for grazing or harvest.
Sevin XLR (1A)		1 to 2 pt	No waiting period for grazing, 21 days for harvest.
Tracer (5)		1.5 to 3 fl oz	14 day waiting period for grazing, 7 days for harvest.

SORGHUM INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)	Rate of Product per Acre	Comments
<p>Southwestern corn borer Full grown caterpillars are white with prominent dark spots on body.</p> <p><u>Damage:</u> Tunnels throughout stalk. May girdle mature stalks.</p> <p><u>Threshold:</u> Chemical control usually not warranted.</p>	<p>Baythroid[†] XL (3)</p> <p>Cobalt[†] (3)</p> <p>Karate[†] with Zeon (3) Warrior[†] with Zeon (3)</p> <p>Lorsban[†] 4E (1B) (Warhawk, Whirlwind)</p> <p>Mustang MAX[†] (3)</p> <p>Proaxis[†] 0.5 CS (3) Prolex[†] 1.25 CS (3)</p> <p>Sevin XLR (1A)</p> <p>Tracer (5)</p>	<p>1.3 to 2.8 fl oz</p> <p>19-38 fl oz</p> <p>1.28 to 1.92 fl oz 2.56 to 3.84 fl oz</p> <p>1 pt</p> <p>1.8 to 4.0 fl oz</p> <p>2.56 to 3.84 fl oz 1.02 to 1.54 fl oz</p> <p>1.5 qt</p> <p>1.5 to 3 fl oz</p>	<p>14 day waiting period for grazing or harvest.</p> <p>30 day wait for applications of 26 fl oz/A or less, 60 day wait for applications over 26 fl oz/Acre</p> <p>30 day waiting period for grazing or harvest.</p> <p>30-60 day waiting period for grazing or harvest.</p> <p>14 day waiting period for harvest, 45 days for grazing.</p> <p>30 day waiting period for grazing or harvest.</p> <p>No waiting period for grazing, 21 days for harvest.</p> <p>14 day waiting period for grazing, 7 days for harvest.</p>
<p>White grub Large, "C" shaped grub with a white body and a brown head.</p> <p><u>Damage:</u> Grubs feed on roots of seedling plants. Damage potential is dependent on planting date, and speed of growth of the plant.</p> <p><u>Threshold:</u> No treatment is available. An average of one grub per square foot may cause stand loss.</p>	<p>NA</p>	<p>NA</p>	<p>No insecticide is currently registered for white grub control. Re-planting may be the best option.</p>
<p>Wireworm Hard-shelled, smooth, cylindrical, yellowish to brown worms. 2-6 year life cycle. More common in sorghum planted into a sod or grass pasture.</p> <p><u>Damage:</u> Feed on seed, seedling. Cause stunting and stand loss.</p> <p><u>Threshold:</u> Seed treatments are available. Treat if field history indicates a problem.</p>	<p><u>Seed Treatment</u></p> <p>Cruiser 5FS (4A) Gaucho 480 (4A) Poncho 600(4A)</p> <p><u>Planting Time</u></p> <p>*Counter[†] 15G (1B)</p>	<p>5.1 fl oz/cwt seed 8 fl oz/cwt seed 5.1-6.4 fl oz/cwt seed</p> <p>Apply per label.</p>	<p>Do not feed leftover seed to livestock. Do not feed leftover seed to livestock. Do not feed leftover seed to livestock.</p> <p>* Counter 15 G can be used as a planting time treatment in Oklahoma except in the Panhandle. It requires a "Lock 'n Load" applicator, and has the potential to damage plants, and interact with several ALS-inhibiting herbicides. Check label for restrictions.</p>

[†] Restricted Use Pesticide

MOA Group Tables start on page 46 of the handbook.

SORGHUM INSECT CONTROL SUGGESTIONS (CONT'D)

Pre-harvest Intervals and grazing restrictions

Asana XL	21 day PHI
Baythroid 2	14 day PHI, 14 days grazing
Cobalt	30 day wait if application is 26 fl oz/A or less, 60 day wait for applications over 26 fl oz/A
Comite II	30 day PHI for silage, 60 days for grain harvest.
Counter CR	100 day PHI for grain, 50 days for grazing
Cruiser 5.1FS	No grazing restriction
Dimethoate	28 day PHI for grain or grazing, do not apply after heading or during pollen shed.
Furadan 4F	75 day PHI for harvest or grazing
Gaucho 480	45 day PHI for harvest or grazing
Karate/Warrior	30 day PHI for harvest or grazing
Lorsban 4E	30-60 day PHI for harvest or grazing, depending on rate applied.
Malathion	7 day PHI for grain. Do not feed or graze forage, hay or straw to livestock.
Methomyl	14 day PHI for harvest or grazing
Mustang MAX	14 day PHI for harvest, 45 days for grazing
Poncho 600	Do not feed to livestock
Proaxis	30 Day PHI for harvest or grazing
Prolex	30 Day PHI for harvest or grazing
Sevin XLR	21 day PHI for harvest, 0 days for forage.
Supracide	30 day PHI for harvest or grazing.
Tracer	7 day PHI for harvest, 14 days for grazing
Thimet G	28 day PHI for harvest or grazing

* Numbers in parentheses (#) that follow the insecticide name are used to designate the mode of action of the insecticide according to the classification system developed by the Insecticide Resistance Action Committee, (IRAC) in 2005. It is intended to help in the selection of insecticides for preventative resistance management. If you make multiple applications for a specific pest during a growing season, simply select a registered insecticide with a different number for each application. To further delay resistance from developing, integrate other control methods into your pest management programs.

Treatment Thresholds * For Greenbugs On Sorghum		
<u>When to Treat</u>		
<i>Plant Size</i>	<i>Texas thresholds</i>	<i>Kansas thresholds</i>
0 to 1 leaf stage	20% of plants visibly damaged	25-50 greenbugs per plant
3 leaf stage	20% of plants visibly damaged	50-100 greenbugs per plant
5 leaf stage	Visible damage on leaves, (red spots, yellow leaves) but before any entire leaves are killed on 20% of plants	150-300 greenbugs per plant
Mid-whorl stage	Visible damage on leaves (red spots yellow leaves), but before any entire leaves are killed on 20% of plants	300-600 greenbugs per plant
Boot to heading	Death of one functional leaf	700-1000 greenbugs per plant
Heading through soft dough	Death of two functional leaves	700-1000 greenbugs per plant

This section was not revised in 2008.

SORGHUM WEED CONTROL

Estimated Levels of Weed Control Normally Expected with Grain Sorghum Herbicides ^a															General or Restricted Us											
Herbicide	Winter Weeds					Broadleaf Weeds								Grasses												
	Carolina geranium	Common chickweed	Henbit	Brome grass	Italian ryegrass	Black nightshade	Cocklebur	Common ragweed	Giant ragweed	Jimsonweed	Lambsquarters	Morningglory	Pigweed	Smartweed	Velvetleaf	Barnyardgrass	Fall panicum		Giant foxtail	Johnsongrass (seedling)	Johnsongrass (rhizome)	Large crabgrass	Shattercane	Yellow foxtail	Yellow nutsedge	
<i>Burndown</i>																										
2,4-D	5	7	5	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.
Expert	7	9	8	9	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Res.
Fallow Master	7	9	8	9	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.
Field Master	7	9	8	9	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Res.
glyphosate	6	9	8	9	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.
Gramoxone Max [†]	6	9	7	6	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Res.
RT Master	7	9	8	9	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.
Surefire	6	9	7	6	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Res.
<i>Soil-applied (EPP,PPI, PRE)</i>																										
Atrazine [†]	-	-	-	-	-	9	9	9	8	9	9	9	9	9	8	8	3	7	0	0	5	0	7	7	7	Res.
Bicep II Magnum, Cinch ATZ	-	-	-	-	-	9	9	9	7	8	9	9	9	8	8	9	9	9	6	5	9	6	9	6	Res.	
Bullet [†]	-	-	-	-	-	9	9	9	8	9	9	9	9	8	9	9	9	5	5	9	6	9	8	8	Res.	
Dual II Magnum, Cinch	-	-	-	-	-	8	0	5	5	5	6	0	9	5	0	9	9	9	6	5	9	6	9	8	Gen.	
Guardman Max	-	-	-	-	-	9	8	8	6	8	8	8	9	8	6	9	9	9	6	5	9	5	9	8	Res.	
Lasso, Micro-Tech, Partner	-	-	-	-	-	9	0	5	5	5	7	0	9	5	0	9	9	9	5	5	9	6	9	8	Res.	
Linex	-	-	-	-	-	7	6	8	5	6	9	2	9	9	6	5	5	5	9	9	5	0	5	0	Gen.	
Outlook, Propel	-	-	-	-	-	9	0	6	5	5	7	5	9	5	0	9	9	9	6	5	9	5	9	8	Gen.	
Paramount	-	-	-	-	-	-	4	-	-	-	8	-	0	-	9	7	-	-	0	9	-	-	0	Gen.		
Prowl (PRE only)	-	-	-	-	-	5	5	5	5	5	9	5	9	5	6	9	9	9	8	4	9	8	9	3	Gen.	
Sequence ^b	-	-	-	-	-	8	0	5	5	5	6	0	9	5	0	9	9	9	6	5	9	6	9	8	Gen.	
<i>Post-applied (POST)</i>																										
2,4-D	-	-	-	-	-	8	9	9	9	7	9	9	9	7	8	0	0	0	0	0	0	0	0	0	Gen.	
Aim	-	-	-	-	-	8	7	6	2	6	8	8	8	5	9	0	0	0	0	0	0	0	0	0	Gen.	
Ally + 2,4-D	-	-	-	-	-	9	9	9	9	8	9	9	9	8	8	0	0	0	0	0	0	0	0	0	Gen.	
Atrazine+oil [†]	-	-	-	-	-	9	9	9	8	9	9	9	9	8	8	5	7	0	0	6	0	7	7	Res.		
Banvel, Clarity, Distinct	-	-	-	-	-	9	9	9	9	8	9	9	9	9	0	0	0	0	0	0	0	0	0	Gen.		
Basagran	-	-	-	-	-	5	9	7	8	9	5	7	5	9	9	0	0	0	0	0	0	0	0	8	Gen.	
Buctril, Moxy	-	-	-	-	-	9	9	9	7	9	9	8	7	9	8	0	0	0	0	0	0	0	0	0	Gen.	
Buctril + Atrazine [†]	-	-	-	-	-	9	9	9	8	9	9	9	8	9	8	5	3	4	0	0	3	0	4	4	Res.	
Marksman	-	-	-	-	-	9	9	9	9	8	9	9	9	9	9	8	5	7	0	0	6	0	7	7	Res.	
Peak	-	-	-	-	-	-	9	-	-	-	8	8	9	-	-	0	0	0	0	0	0	0	0	-	Gen.	
Permit	-	-	-	-	-	4	9	8	8	7	4	6	9	7	8	0	0	0	0	0	0	0	0	9	Gen.	
Shotgun [†]	-	-	-	-	-	9	9	9	9	9	9	9	9	9	8	8	5	7	0	0	6	0	7	7	Res.	
Weedmaster	-	-	-	-	-	9	9	9	9	8	9	9	9	9	9	0	0	0	0	0	0	0	0	0	Gen.	
Yukon	-	-	-	-	-	9	9	9	9	8	9	9	9	9	9	0	0	0	0	0	0	0	0	9	Gen.	

^a Rating scale: 0 no control; 5 or less poor; 6 poor-fair; 7 fair; 8 fair-good; 9 good. Ratings assumes the herbicides are applied in the manner suggested in the guidelines and according to the label under optimum growing conditions. This information was compiled from weed control ratings from trials conducted in Oklahoma and from universities ratings of products from across the US.

^b Will also control emerged weeds with better performance than rated here, but cannot be applied POST to grain sorghum or crop injury will occur.

[†] Restricted Use

This section was not revised in 2008.

SORGHUM WEED CONTROL

Rotational Cropping Restrictions in Months with Grain Sorghum Herbicides

Herbicide	Crops							
	Alalfa	Canola	Corn	Cotton	Peanut	G. Sorghum	Soybean	Wheat
<i>Burndown</i>								
2,4-D	1	1	0	1	1	1	1	1
Expert	a	a	0	b	b	b	b	24
Fallow Master	a	a	a	a	a	a	a	a
Field Master	c	c	0	c	c	0	c	c
glyphosate	0	0	0	0	0	0	0	0
Gramoxone Max ^r	0	0	0	0	0	0	0	0
RT Master	1	1	0	1	1	1	0	1
Surefire	a	a	a	a	a	a	a	a
<i>Soil-applied</i> (EPP,PPI, PRE)								
Atrazine ^f	c	c	0	c	c	0	c	c
Bicep II Magnum, Cinch ATZ	a	a	0	b	b	b	b	24
Bullet ^f	a	a	a	a	a	a	a	a
Dual II Magnum, Cinch	4	a	0	0	0	0	0	4.5
Guardsman Max	d	d	0	b	b	0	b	d
Lasso, Micro-Tech, Partner ^f	a	a	a	a	a	a	a	a
Linex	a	a	a	a	a	a	a	a
Outlook, Propel	a	a	0	0	0	0	0	4
Paramount	24 ^f	10	10	10	10	0	10	0
Prowl	b	b	0	0	0	b	0	4
Sequence	4	a	0	0	0	0	0	4.5
<i>Post-applied</i> (POST)								
2,4-D	1	1	0	1	1	1	1	1
Aim	12	12	0	0	12	0	0	0
Ally + 2,4-D	a	a	12 ^h	14 to 22 ^h	a	10 ^h	a	a
Atrazine+oil ^r	c	c	0	c	c	0	c	c
Banvel, Clarity, Distinct	a	a	a	a	a	a	a	a
Basagran	a	a	a	a	a	a	a	a
Buctril, Moxy	1	1	1	1	1	1	1	1
Buctril + Atrazine ^f	b	b	1	b	b	1	1	b
Marksman	c	c	0	c	c	0	c	c
Peak	22	22	1e	22	22	1	22	0
Permit	9	15	1 ^c	4	6	2	9	2
Prowl	b	b	0	0	0	b	0	4
Shotgun ^r	c	c	0	c	c	0	c	c
Weedmaster	4	4	10 days ^g	4	4	10 days ^g	4	10 days ^g
Yukon	9	15	1 ^c	4	6	2	9	2

^a. See label for specific crop rotation restrictions.

^b. May be planted the following cropping season.

^c. If planted the following year, there is a possibility for crop injury.

^d. May be planted after two complete growing seasons.

^e. Clearfield corn hybrids can be planted anytime.

^f. A successful field bioassay must also be conducted.

^g. Per pt/A applied.

^h. Per pt/A applied.

^r. Restricted Use.

This section was not revised in 2008.

SORGHUM WEED SUGGESTIONS

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
2,4-D Amine Various POST applications: 0.5 lb ai /A	Active Ingredients: 2,4-D Similar Products: Many MOA: 4	POST. Apply when sorghum is 6 to 15 inches tall. If sorghum is taller than 8 inches to top of canopy, use drop nozzles and keep spray off the foliage.	Do not treat during the boot, flowering or dough stage. Do not feed or forage fodder for 7 days following application.
Atrazine^r 4L 4 lbs. ai per gallon PRE applications: 0.75 to 1 qt/A POST applications: 2.0 qt/A	Active Ingredients: Atrazine Similar Products: AAtrex 4L AAtrex Nine-O Atra-5 MOA: 5	PRE. Apply to the soil surface after planting and prior to emergence. This is a 24-C recommendation for the use of AAtrex 4-L and AAtrex Nine-O in Oklahoma. POST. Apply when crop is 6-12 inches in height, but before it reaches boot stage.	Do not apply through any type of irrigation system. Do not graze or feed forage from treated areas for 21 days following application. Do not apply more than 5 pts. per acre per year. Do not apply to sand or loamy sand. Refer to label for rotational crop information.
Aim 2 EC POST applications: 0.5 fl. oz.	Active Ingredients: Carfentrazone Similar Products: Avalanche, etc. Aim EW MOA: 14	EPP. Aim may be included with other burndown herbicides like Glyphosate, 2,4-D, to enhance burndown activity and improve control. POST. Apply to emerged and actively growing weeds. Apply from 30 days before planting up through the 6 leaf growth stage. Postemergence broadcast applications with crop oil concentrate are not recommended as increased crop response may occur.	Contact herbicide, coverage is essential for control. Tank mix with other herbicides for broad spectrum control. Apply with NIS at 0.25% v/v. COC is recommended for directed applications only. Do not apply this product through any type of irrigation system. Do not apply more than 1.0 fl oz. per acre per season. Product may be used up to a maximum of 1.0 oz per acre using drop nozzles for control of larger weed sizes. Refer to label for list of affected weeds. Do not apply to sweet sorghum.
Ally + 2,4-D amine 60%DFG (Ally) 3.8 lbs. ai per gallon (2,4-D) POST applications: 1/20 oz. /A Ally plus 1/4 lb ai /A 2,4-D amine	Active Ingredient: Metsulfuron methyl 2,4-D Other Trade Names: None MOA: 2 & 4	POST. Make application when all or a majority of the weeds have germinated and emerged. For best results, spray when weeds are less than 6 inches tall. Make application when crop is 3 to 15 inches in height. If crop is more than 10 inches tall, use drop nozzles and keep spray off the crop foliage. Apply only before the boot stage. Ally must be applied with 2,4-D amine.	Do not use on grain sorghum grown for seed production or syrup. Do not use on forage sorghum. Do not feed forage or silage for 30 days after application. Do not include a surfactant or crop oil in the tank mix. Do not apply this treatment under cold, wet conditions or to crop growing under stress as crop injury may result. Do not apply to long season grain sorghum varieties or crops that are planted after July 1, as crop injury or delayed maturity may occur. Do not exceed one application per year.
Banvel 4 lbs. ai per gallon All applications: 0.5 pt. /A	Active Ingredients: Dicamba Similar Products: Clarity MOA: 4	EPP. May be applied to emerged and actively growing weeds at least 15 days prior to planting. POST. Must be made after the crop is in the first leaf stage but before it is 15 inches tall. For best performance, make applications when crop is in the 3 to 5 leaf stage and weeds are small (less than 3 inches tall). Use drop nozzles if crop is taller than 8".	Do not apply this product through any type of irrigation system. Do not graze or feed treated forage or silage prior to mature grain stage. Do not apply to crops grown for seed production. Do not make more than one application per year. Refer to label for tank mix applications.

^r Restricted Use

This section was not revised in 2008.

SORGHUM WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Basagran 4 lbs. ai per gallon POST applications: 1 to 2 pts /A	Active Ingredients: Bentazon Similar Products: None MOA: 6	POST. Apply to actively growing weeds. Make application early, when weeds are small, for most effectiveness. Refer to label for application rates for specific weed growth stages.	Do not cultivate within 5 days before and 7 days after application. Do not apply to crop that is heading or blooming. Do not graze treated fields for at least 12 days after last treatment. Apply no more than 2 pts /A per season. Do not apply to weeds or crops that are under stress. Refer to label for tank mix applications.
Bicep II Magnum 5.5 lbs. ai per gallon All applications: 1.6-2.1 qts. /A	Active Ingredients: Atrazine Metolachlor Similar Products: Bicep II Magnum FC Bicep Lite II Magnum MOA: 5 & 15	PPI. Apply to the soil and incorporate into the top 2 inches of the soil within 14 days before planting. Use PPI when furrow irrigation is used or when a period of dry weather after application is expected. PRE. Apply to soil surface at planting (behind planter) or after planting, but before weed or crop emergence.	Seed MUST be treated with Concep or Screen by seed company. Do not apply through any type of irrigation system. PPI. & PRE applications. Do not use on coarse soils or medium and fine soils with organic matter content less than 1.0%. Apply at a rate of 1.6-2.1 qts. /A on medium and fine soils with organic matter percent greater than 1.0%
Buctril 2.0 lbs. ai per gallon All applications: 1-2 pts /A	Active Ingredients: Bromoxynil Similar Products: Buctril 4EC Connect 20 WSP MOA: 6	PRE. Apply at a rate of 1-1.5 pts/A before planting until just prior to crop emergence. POST. Apply 1 pt/A between the 3 leaf stage but prior to the preboot stage. Apply 1.5 pts /A between the 4 leaf stage but prior to preboot stage. Apply 2 pts/A only through automated irrigation systems with a mechanical transfer loading system.	Do not apply more than 1.5 pts/A unless using an automated irrigation system. Do not cultivate for 5-7 days after application to ensure best performance. Do not cut crop for feed, fodder, or graze within 45 days after application.
Buctril + Atrazine[†] 3 lbs. ai per gallon All applications: See table.	Active Ingredients: Bromoxynil Atrazine Similar Products: None MOA: 6 & 5	PRE. Apply from before planting to just prior to crop emergence. POST. Apply from the 3 leaf stage to just before the boot stage.	Do not cut crop for feed or graze within 45 days after application. Do not use in sandy or loamy sand soils as excessive crop injury may occur. Do not apply at any rate to crop that has reached the boot stage, severe crop injury or loss in crop yield may occur. Do not apply this product through any type of irrigation system.

Rates and Application Timing for Buctril + Atrazine [†]	
Rate	Application Timing
1.5-3 pts /A	Before planting to just prior to crop emergence.
1.5-2 pts /A	After the 3 leaf stage but prior to preboot, or 12 inches in height.
3 pts /A	After the 4 leaf stage but prior to the preboot, stage, or 12 inches in height.

[†] Restricted Use

This section was not revised in 2008.

SORGHUM WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Bullet[†] 4 lbs. ai per gallon All applications: See table.	Active Ingredients: Alachlor & Atrazine Similar Products: Credit Master Landmaster BW Lariat RT Master MOA: 15 & 5	PPI. Can be applied any time within 7 days prior to planting. PRE. Apply within 5 days of last preplant tillage. All Applications. Must be made only to grain sorghum planted with seed that has been properly treated with seed protectant or a safener.	Do not apply more than 1 application per year. Do not apply this product through any type of irrigation system. Do not graze treated area or feed treated forage to livestock for 70 days following application. Do not use this product for preplant incorporated application in coarse soils. When applied under sprinkler irrigation systems on coarse soils, use a minimum of 3 qts/A.

Bullet [†] Application Rates Per Acre		
Soil Texture Group	Less than 1.5 % organic matter	1.5% or more organic matter
Coarse	2.5 qts.	2.75 qts.
Medium	2.75 qts.	2.75 to 3.75 qts.
Fine	3 qts.	3 to 4 qts.

[†] Restricted Use

Dual II Magnum 7.64 lbs. ai per gallon All applications: 1-1.67 pts /A	Active Ingredients: Metolachlor Similar Products: Cinch MOA: 15	All applications. Broadcast 1.0-1.33 pts/A on coarse soils, 1.33-1.5 pts/A on medium soils, or 1.33-1.67 pts/A on fine soils. PPI. Apply and incorporate into the top 2 inches of soil within 14 days before planting. PRE. Apply during planting (behind the planter) or after planting, but before weeds or crop emerge.	Do not apply unless the seed has been properly treated by the seed company with Concep or Screen seed treatment. Make only one application per year.
Expert 4.88 lbs. ai per gallon All applications: See table.	Active Ingredients: Atrazine Metolachlor Glyphosate Similar Products: None MOA: 5, 15, & 9	PPI. & PRE. May be applied up to 30 days before, during or after planting, and before emergence of crop under no-tillage or other reduced tillage practices.	Do not apply product after crop emerges. Seed must be treated with Concep III . Do not apply through any type of irrigation system. Do not graze or feed forage from treated areas for 60 days after application. Do not apply to crops under stress. Do not apply product on highly alkaline soils with a pH greater than 8.0 or on eroded areas where calcareous subsoils are exposed.

Expert Application Rates Per Acre			
Soil Texture	<i>Less than 1%</i>	1% to 1.5%	<i>Greater than 1.5%</i>
	Organic Matter	Organic Matter	Organic Matter
Coarse	Do not use	Do not use	Do not use
Medium	Do not use	2.5-3 qts./A*	3 qts./A
Fine	Do not use	2.5-3 qts./A*	3-3.75 qts./A*

* Use the higher rate within the range for each soil type when product is applied 14-30 days before planting.

This section was not revised in 2008.

SORGHUM WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Fallow Master 2 lbs. ai per gallon EPP BURNDOWN applications: 32 to 44 oz. /A	Active Ingredients: Glyphosate Dicamba Similar Products: GlyKamba MOA: 9 & 4	EPP BURNDOWN. Product should be applied at least 15 days prior to planting. Refer to label for what weeds are controlled at each rate.	Do not apply this product through any type of irrigation system. Do not feed or forage treated vegetation within 8 weeks after application. Delay planting for 15 days after application of this product.
Gramoxone Max[†] 3 lbs. ai per gallon EPP & PRE applications: 1.3 to 2.7 pts /A POST applications: 0.7 to 1.3 pts /A	Active Ingredients: Paraquat Similar Products: Gramoxone Max Gramoxone Super Tres Cyclone Max MOA: 22	PPB & PRE. Seedbeds should be formed as far ahead of planting as possible to allow maximum weed and grass emergence. Seeding should be done with a minimum of soil disturbance. Refer to label for application rates for specific weed sizes. POST DIRECTED. Apply when weeds are actively growing. Apply by directing spray between the rows and using hooded or shielded sprayers to prevent spray contact with crop plants.	All applications: Do not apply through any type of irrigation system. Always use a nonionic surfactant or crop oil concentrate. POST. Do not exceed 2 postemergence-directed applications, or exceed a total of 5.3 pts /A / season. Some crop injury will occur.
Guardsman Max 5 lb ai per gallon EPP applications: 4.75 to 5 pts/A PPI, PRE, & POST applications: See table.	Active Ingredient: Dimethenamid-P Atrazine Similar Products: None Rates may vary due to formulation MOA: 15 & 5	EPP. May be applied up to 45 days before planting in minimum and no-till production systems. Not recommended for coarse textured soils. PPI. Apply up to 14 days before planting and incorporate 1-2 inches. PRE. Apply after planting but before crop or weed emergence. POST. Apply after crop emergence but before corn exceeds 12 inches in height. Apply before weeds exceed 1.5 inches in height.	Early preplant applications are not recommended for use on coarse-textured soils or in areas where average annual rainfall exceeds 40 inches. Do not apply more than 4.6 pt/A/season. Do not apply more than 2.5 lb atrazine/A in a calendar year. Do not apply more than 1.6 lb atrazine/A/application on highly erodible soils with less than 30% residue cover. Do not apply more than 2 lb atrazine/A/application on non-highly erodible soils or on highly erodible soils with at least 30% residue cover. Do not graze or feed treated plants to livestock within 40 days of treatment. Do not harvest sweet corn within 50 days of application.

[†] Restricted Use

PPI, PRE, & POST Applications	Guardsman Max Use Rate as determined by Soil Texture and Organic Matter Content	
	OM Less than 3%	OM 3% or More
Coarse	2.5 – 3.0 pints	3.0 – 4.0 pints
Medium or Fine	3.0 – 4.0 pints	4.0 – 4.6 pints
a. Reduced rates may be used when a POST herbicide application or cultivation is planned. For reduced rates, use 1.5-2.02.0-2.5, and 2.5-3.0pt/A on coarse, medium, and fine soil, respectively.		
b. For EPP applications use 3.8-4.6pt/A. Do not exceed 3.8 pt/A on highly erodible soils with less than 30% plant residue cover prior to crop emergence.		

This section was not revised in 2008.

SORGHUM WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Glyphosate 4 lb ai per gallon POST applications: 2 qt. /A	Active Ingredient: Glyphosate Other Trade Names: <i>Many</i> MOA: 9	PPB. Apply to actively growing weed at least POST. Apply at 30% grain moisture or less and at least 7 days prior to harvest. Refer to label for weeds controlled and application rates specific to weed types.	Do not apply this product through any type of irrigation system. Do not harvest or feed treated vegetation for 8 weeks following application. Following spot treatment, allow 14 days before grazing or harvesting forage. Do not use roller applicators. Do not feed or graze treated milo fodder. Do not ensile treated vegetation.
Lasso^r 4 lbs. ai per gallon PRE. applications: 2.0 to 3.25 qts /A	Active Ingredients: Alachlor Similar Products: None MOA: 15	PPI. Apply and incorporate any time within 7 days prior to planting. Irrigation within 10 days following planting may improve weed control. PRE. Apply after planting, and within 5 days after last preplant tillage operation. When applied through center pivot irrigation or under sprinkler irrigation on coarse soils, use a minimum of 3 qts /A of product.	If applied through irrigation system, apply only through center pivot irrigation systems. Do not graze or harvest forage for 70 days following application. Refer to label for specific application rates according to soil type and application timing.
Linex 4L 4 lbs. ai per gallon PRE applications: 5/8 to 2 pts /A POST applications: 1 to 3 pts /A	Active Ingredients: Linuron Similar Products: Lorox DF MOA: 7	PRE. Apply 5/8 to 2 pts /A according to type of soil. Refer to label for rates and soil types. POST. Apply 1 to 2 pts /A depending on crop and weed sizes. Refer to label for specific rates and weed sizes.	Do not graze or feed plants to livestock within 3 months after postemergence application. Chemigation: If applied through an irrigation system, apply this product through center pivot, lateral move, end row, side roll, traveler, big gun, solid set, or hand move irrigation systems.
Marksman 3.2 lbs. ai per gallon EPP applications: 2 pts. /A max POST applications: 2 pts. /A max	Active Ingredients: Dicamba Atrazine Similar Products: None MOA: 4 & 5	EPP. Up to 2 pts. /A may be used and must be applied at least 15 days bfore crop planting. POST. For best performance, apply when crop is in the 2-3 leaf stage, but no later than 5 leaf of sorghum. Application during periods of rapid growth may result in temporary leaning of plants.	Do not apply to weeds under stress as unsatisfactory control may result. Do not apply through any type of irrigation system. Do not apply to crops grown for seed. Do not graze or feed forage, or graze livestock in treated areas for 21 days following application. Do not harvest for ensilage or hay for 37 days following application. Do not add crop oil if application is made after crop emergence. Do not add surfactant unless possible crop injury is acceptable. Do not exceed a total of 3.5 pts. per acre, per season.

^r Restricted Use

This section was not revised in 2008.

SORGHUM WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Outlook 6.0 lbs. ai per gallon All applications: 20 to 32 fl. oz /A	Active Ingredients: Dimethenamid Similar Products: Frontier 6.0, Propel MOA: 15	EPP. Apply up to 45 days before planting. Use the highest rate recommended for the specific soil type. PPI. Apply and incorporate into the top 1-2 inches of soil surface up to 2 weeks before planting. PRE. Broadcast after planting and before crop emergence. Rainfall, sprinkler irrigation, or shallow mechanical incorporation is required to move product into the upper soil surface.	Herbigation applications must be applied only through center pivot, lateral move, solid set, or hand move systems. Refer to label for specific herbigation instructions. Do not use on sweet or forage sorghum. Seed must be treated with an approved chloroacetamide herbicide safener (i.e. Concep or Screen). Forage may be grazed or fed to livestock 60 days or more after application. Grain and fodder may be harvested and fed 80 days or more after application. Do not apply to grain sorghum after crop emergence. Refer to label for specific application rates by soil type.

Outlook Application Rates Per Acre		
Soil Texture Group	Less than 3 % organic matter	3% or more organic matter
Coarse	20-24 fl oz	24-28 fl oz
Medium	24-28 fl oz	28-32 fl oz
Fine	28-32 fl oz	32 fl oz

Paramount 75% DF SOIL applications: 5.3 ozs. /A PRE & POST applications: 8.0 ozs. /A	Active Ingredients: Quinclorac Similar Products: None MOA: 4	EPP. Can be applied within 45 days prior to planting. PRE & POST. Apply from preemergence to postemergence for control of annual grasses and broadleaf weeds. When applying POST , apply when weeds are less than 2 inches tall.	Do not apply through any type of irrigation system. Do not allow livestock to graze in treated areas. Do not harvest hay from treated areas within 309 days after application. Do not feed treated grasses, forage, hay, silage, straw, seed nor seed screenings to livestock.
Peak (Accu-Pak) 57% WDG POST applications: 0.5 oz /A	Active Ingredients: Prosulfuron Similar Products: Peak CustomPak Peak 75 WG MOA: 2	POST. Complete all applications before crop exceeds 30 inches in height or before head emergence. It is more important to make applications based on the optimum weed heights listed in the label, rather than crop height. Applications made before crop is 5 inches tall increases the likelihood of crop injury.	Do not graze or feed forage from treated crops to livestock until 30 days after application. Do not harvest silage until 40 days after application. Do not harvest grain until 60 days after application. Do not apply more than 1.0 oz/A in the cropping season. Do not use on sweet sorghum.

This section was not revised in 2008.

SORGHUM WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Permit 75% WSG POST applications: 2/3 oz /A	Active Ingredients: Halosulfuron Similar Products: Sempra Sempra CA MOA: 2	POST. Make application from the 2-leaf through the layby stage but before grain head emergence. Application at early weed stages gives best control. Apply at rate of 2/3 oz /A in a single application per year. 1.0 oz /A may be applied to yellow and purple nutsedge only. Weeds can range in size from 1 to 12 inches in height at application.	Do not apply by air. Do not apply through any type of irrigation system. Do not graze, harvest, harvest forage, or harvest silage for 30 days after application.
Prowl 3.3 EC 3.3 lbs. ai per gallon POST applications: 1.2 to 3.6 pts /A	Active Ingredients: Pendimethalin Similar Products: Pendimax 3.3 MOA: 3	POST. Apply from the 4-inch growth stage to as late as the last cultivation of grain sorghum. Refer to label for special instructions concerning postemergence incorporated applications. Application rates by soil type. Coarse: 1.2 to 1.8 pts /A Medium: 1.8 to 2.4 pts /A Fine: 1.8 to 3.6 pts /A	Do not apply more than once per crop season. Do not graze or harvest forage for 21 days following application. Product will not control established weeds.
Sequence 5.25 lb ai per gallon All applications: 2.5 to 3.5 pt/A	Active Ingredients: Metolachlor & Glyphosate Similar Products: None MOA: 15 & 9	EPP. Apply prior to planting for control of emerged actively growing weeds and soil residual activity. PRE. Apply after planting but before crop emergence for control of emerged actively growing weeds and soil residual activity. Contact of sorghum foliage with the herbicide will result in crop injury/death.	ONLY APPLY IF SEED WAS/WILL BE COMMERCIALLY TREATED WITH CONCEP SAFENER PRIOR TO PLANTING. Do not exceed 3.75 pt/A on medium soils with less than 3% organic matters or 3.5 pt/A on coarse soils. PRE applications must be applied before ground cracking of emerging sorghum plants.
Shotgun[†] 3.25 lbs. ai per gallon POST applications: 2.0 pts /A	Active Ingredients: Atrazine 2,4-D Similar Products: None MOA: 5 & 4	POST. From the spike to 4-leaf stage, apply with over the top broadcast spray. From 5-leaf to 8-12 inches tall, use drop nozzles to keep spray off of cropleaves. Refer to label for application rates for specific soil types.	Do not apply this product through any type of irrigation system. Do not exceed maximum yearly amount of atrazine use. Do not graze or feed forage from treated areas for 21 days following application. Do not make more than one application per growing season.
Weedmaster 3.87 ai per gallon POST applications: 1 pt /A	Active Ingredients: Dicamba 2,4-D Similar Products: Brash Banvel + 2,4-D MOA: 4 & 4	POST. Apply 1 pt/A in the 3-5 leaf stage (4-8" tall). For best performance apply when weeds are small.	Do not apply to crops grown for seed production. Do not use surfactants or crop oils for application. Do not use if the potential for crop injury is not acceptable. Do not make more than one application per growing season. Do not apply through any type of irrigation system. Do not allow animals being finished for slaughter to graze treated fields within 30 days of slaughter. Do not graze lactating dairy animals within 7 days of treatment. Do not harvest for hay or silage within 37 days of treatment.
Yukon 67.5% WDG POST applications: 4 to 6 oz. /A	Active Ingredients: Halosulfuron Dicamba Similar Products: None MOA: 2 & 4	POST. Apply from the 2-leaf stage through 15 inch crop height. Application made when the crop is in the 3 to 5-leaf stage and weeds are small will result in best performance. Use 6 oz /A on Honeyvine Milkweed and Nutsedge for best results. For all other weeds use 6 oz /A for heavy weed infestation.	Do not graze or feed treated forage or silage prior to mature grain stage. Do not apply to sorghum grown for seed production. Do not make more than one application per year.

[†] Restricted Use

MOA Group Tables start on page 46 of the handbook.

SUGGESTIONS FOR SOYBEAN INSECT CONTROL

I. STEM AND SEEDLING FEEDERS. For the most part, these insects are not a problem if the grower gets a good stand of beans. Stem and seedling feeders will generally do most of their damage before the soybeans are 12" tall. Thus, growers must be ready to make well-timed applications of insecticides. Isolated infestations can normally be tolerated because soybeans usually compensate if there are at least four plants per row-foot.

Insect	Damage	Insecticide (MOA Group) and Rate Per Acre		Comments
Threecornered Alfalfa Hopper	Adults and nymphs feed on stems. May girdle stems at or above soil level. This frequently causes lodging when the plants get larger.	Adjourn ^r (3) Asana ^r XL (3) Battalion 0.2 EC ^r (3) BaythroidXL ^r (3) Cobalt ^r (1B +3) Sevin XLR+ (1A) Dimethoate4.0 EC (1B) EndigoZC ^r (3/4) Larvin ^r (1A) (suppression) Methyl Parathion ^r (1B) Prolex ^r (3) Sevin80S (1A) Silencer ^r (3) Warrior ^r (3)	5.8-9.6oz 5.8-9.6 oz 7.7 – 11.5 oz 1.6-2.8oz 19-38 oz 1.0 qt 1 pt 2.5-3.5oz 18.0-30.0 oz 0.75-2.0 pt 0.77-1.28 oz 1.25 lbs 1.92-3.20oz 1.92-3.2 oz	Before bloom treatment is suggested if 10-15% of plants are girdled and nymphs are still present. See restrictions at end of section.
Lesser Cornstalk Borer	Girdle stems/roots. Bluish-green worm found at the soil surface or beneath the surface in tubes or sacs that are made of soil particles woven together with silken material.	BaythroidXL ^r (3) EndigoZC ^r (3/4) Lorsban ^r 4E (1B) Lorsban15G ^r (1B) Prolex ^r (3) Silencer ^r (3) Warrior ^r (3) Cobalt ^r (1B+3)	3.84oz 4.0-4.5oz 1.0-2.0 pts 0.5lb/1000 ft. of row 3.84 oz 1.54 oz 2.8oz	This pest can be difficult to control. A second application in 5 days may be necessary for satisfactory control. Suppression only. Do not make more than 1 application per season. Suppression only. See restrictions at end of section.

II. FOLIAGE FEEDERS. The economic threshold level or criteria for treatment of defoliators is considered as a group. In sampling populations of these insects, an estimate of percent leaf loss is the best way to assess the damage as a basis for initiating control of defoliators. Research in various states has shown that soybean plants can withstand 35 percent foliage loss up to one week before blooming. After blooming and during pod fill, no more than 15 to 20 percent defoliation should be allowed. After full pod, defoliation of 35 to 40 percent can be tolerated.

Insect	Damage	Insecticide (MOA Group) and Rate Per Acre		Comments
Aphids	Suck plant juices, causes yellowing of leaves and produces sticky honeydew	Methyl Parathion 4EC (1B) Adjourn ^r (3) Battalion 0.2 EC ^r (3) BaythroidXL ^r (3) EndigoZC ^r (3/4) Proaxis ^r (3) Silencer ^r (3)	0.75-2.0 pts 5.8-9.6oz 11.5 – 14.1 oz 2.5-3.02oz 2.0-2.8oz 1.92-3.2 oz 1.92-3.20oz	Soybean aphid only. Currently, no soybean aphids have been recovered in Oklahoma.
Bean Leaf Beetle	Adults eat round holes in leaves and often feed on small pods.	Adjourn ^r (3) Ambush ^r 25W (3) Asana ^r XL (3) Battalion 0.2 EC ^r (3) Cobalt ^r (1B+3) Baythroid 2E ^r (3) Decis 1.5EC ^r (3) Dimethoate (Cygon) (1B) EndigoZC ^r (3/4) Lannate ^r LV (1A) Larvin ^r (1A) Lorsban ^r 4E (1B) Mustang-MAX ^r (3) PennCap-M ^r (1B) Pounce ^r 3.2EC (3) Proaxis ^r (3) Prolex ^r (3) Sevin80S (1A) Sevin XLR+ (1A) Silencer ^r (3) Warrior ^r (3)	5.8-9.6oz 3.2-6.4 oz 5.8-9.6 oz 11.5-14.1 oz 19-38 oz 1.6-2.8 oz 1.5-1.9 oz 1 pt 3.5-4.5oz 0.75-1.5 pt 18.0-30.0 oz 1.0-2.0 pt 2.8-4.0 oz 2-3 pts 2.0-4.0 oz 1.92-3.2 oz 0.77-1.28 oz 0.625-1.25 lb 0.5-1.0 qt 1.92-3.20oz 1.92-3.2 oz	Control is suggested if feeding damage is found on 10% of pods. See restrictions at end of section.

SUGGESTIONS FOR SOYBEAN INSECT CONTROL (CONT'D)

Insect	Damage	Insecticide (MOA Group) and Rate Per Acre	Comments
Blister Beetles	Usually infest isolated parts of the field.	Baythroid XL ^r (3) 1.6-2.8 oz Cobalt ^r (1B+3) 13-26 oz EndigoZC ^r (3/4) 3.5-4.5oz Proaxis ^r (3) 3.2-3.84 oz Prolex ^r (3) 1.28-1.54 oz Sevin80S (1A) 0.625-1.25 lb Sevin XLR+ (1A) 0.5-1.0 qt Methyl Parathion 4EC (1B) 0.75-2.0 pt Mustang-MAX ^r (3) 2.8-4.0 oz Warrior ^r (3). 3.2-3.84 oz	Beetles are generally localized within the field. See restrictions at end of section.
Fall Armyworm	Infestations may occur from July through September. Identified by inverted "Y" on head capsule.	Battalion 0.2 EC ^r (3) 11.5-14.1 oz BaythroidXL ^r (3) 1.6-2.8oz Dimilin2L ^r (15) 4 oz EndigoZC ^r (3/4) 3.5-4.5oz Intrepid 2F (18) 4.0-8.0 oz Lannate ^r LV (1A) 0.75-1.5 pt Larvin ^r (1A) 10.0-30.0 oz Methyl Parathion ^r 4EC (1B) 2.0 pt Mustang-MAX ^r (3) 2.8-4.0 oz Proaxis ^r (3) 3.2-3.84 oz Prolex ^r (3) 1.28-1.54 oz Sevin80S (1A) 1.25-1.875 lb Sevin XLR+ (1A) 1.0-1.5 qt Silencer ^r (3) 3.20-3.84oz Steward 1.25SC (22) 9.2 oz Tracer (5) 1.5-2.0 oz Warrior ^r (3) 3.2-3.84 oz	During late season can be very damaging.
Garden Webworms	Usually occur from July through August on late planted soybeans. They cause webbing on the leaves, terminals, and the worms feed inside the web.	Battalion 0.2 EC ^r (3) 11.5-14.1 oz BaythroidXL ^r (3) 1.6-2.8oz Cobalt ^r (1B+3) 13-26 oz EndigoZC ^r (3/4) 3.5-4.5oz Methyl Parathion ^r 4EC (1B) 0.75-2 pt Pounce ^r (3) 4.0-8.0 oz Proaxis ^r (3) 3.2-3.84 oz Prolex ^r (3) 1.28-1.54 oz Silencer ^r (3) 3.20-3.84oz Warrior ^r (3) 3.2-3.84 oz	Severe infestations may cause stand loss if early infestations occur. See restrictions at end of section.
Beet Armyworm	Striped green caterpillar, with a black spot above second pair of true legs.	Adjourn ^r (3) 5.8-9.6oz BaythroidXL ^r (3) 1.6-2.8oz Cobalt ^r (1B+3) 13-26 oz Larvin 3.2F ^r (1A) 1.5 pt Lannate 2.4LV ^r (1A) 1.5 pt Prolex ^r (3) 1.54 oz Silencer ^r (3) 3.84 oz Steward 1.25SC (22) 9.2 oz Tracer 4SC (5) 1.5-2.0 oz	See restrictions at end of section. See restrictions at end of section.
Green Cloverworm	May be found feeding on leaves in June or July, but the biggest population usually occurs in mid-August. Consumes whole leaves.	Adjourn ^r (3) Ambush ^r 25W (3) Asana ^r XL (3) <i>Bacillus thuringiensis</i> (e.g. Bactur, Biobit, BaythroidXL ^r (3) Biobit, Dipel Javelin, Thuricide, etc.) 11B2 Battalion 0.2 EC ^r (3) Cobalt ^r (1B+3) Dimilin2L ^r (15) EndigoZC ^r (3/4) Intrepid 2F (18) Lannate ^r LV (1A) Larvin ^r (1A) Methyl Parathion ^r 4EC Pounce ^r 3.2 EC (3) Proaxis ^r (3) Prolex ^r (3) Sevin 80S (1A) Sevin XLR+ (1A) Silencer ^r (3) Tracer (5) Warrior ^r (3)	

SUGGESTIONS FOR SOYBEAN INSECT CONTROL (CONT'D)

Insect	Damage	Insecticide (MOA Group) and Rate Per Acre		Comments
Loopers	Mid-late season pests. Long green worms that move with a looping action.	Adjourn ^r (3) Ambush ^r 25W (3) Asana ^r XL (3) <i>Bacillus thuringiensis</i> (e.g. Bactur, Biobit, BaythroidXL ^r (3) Dipel, Javelin, EndigoZC ^r (3/4) <i>Bacillus thuringiensis</i> (e.g. Bactur, Biobit, BaythroidXL ^r (3) Pounce ^r 3.2 EC (3) Proaxis ^r (3) Prolex ^r (3) Silencer ^r (3) Warrior ^r (3)	5.8-9.6oz 3.2-12.8 oz 5.8-9.6 oz 2.8oz 4.0-4.5oz 11.5-14.1 oz 13-26 oz 4.0 oz 4.0-8.0 oz 18.0-30.0 oz 2.0-8.0 oz 1.92-3.84 oz 0.77-1.54 oz 3.84oz 1.92-3.84 oz	Control suggested when 8 worms (1/2") in length) are found per foot of row or when 150 larvae are collected from 100 sweeps. Soybean looper only. Soybean looper only Cabbage looper only. See restrictions at end of section. Soybean looper only Soybean looper only.
Grasshoppers	Threat more pronounced during hot, dry weather	Adjourn ^r (3) Battalion 0.2 EC ^r (3) Cobalt ^r (1B+3) Baythroid XL ^r (3) Decis 1.5EC ^r (3) Asana ^r XL (3) Dimethoate 4EC (1B) Dimilin ^r 2L (15) Lorsban 4E ^r (1B) Mustang-MAX ^r (3) PennCap-M ^r (1B) Proaxis ^r (3) Prolex ^r (3) Warrior ^r (3)	5.8-9.6oz 11.5-14.1 oz 13-38 oz 2.1-2.8 oz 1.5-1.9 oz 5.8-9.6 oz 1 pt 2.0 oz 0.5-1.0 pt 3.2-4.0 oz 2-3 pts 3.2-3.84 oz 1.28-1.54 oz 3.2-3.84 oz	Treat border areas for small nymphs before adults migrate into fields. Cobalt--See restrictions at end of section. Dimilin for nymphs only.
Velvetbean Caterpillar	Mid-to late-season pest. Long green to brown caterpillar, with light and dark stripes along their backs and sides. They thrash vigorously when disturbed.	Adjourn ^r (3) Ambush ^r 25W (3) Asana ^r XL (3) Battalion 0.2 EC ^r (3) Baythroid XL ^r (3) Cobalt ^r (1B+3) Dimilin ^r 2L (15) EndigoZC ^r (3/4) Intrepid 2F ^r (18) Larvin ^r (1A) Lorsban 4E ^r (1B) Lannate LV (1A) Pounce ^r 3.2 EC (3) Proaxis ^r (3) Prolex ^r (3) Sevin 80S (1A) Silencer ^r (3) Warrior ^r (3)	5.8-9.6oz 3.2-6.4 oz 2.9-5.8 oz 7.7-11.5 oz 1.6-2.8oz 7-13 oz 2.0-4.0 oz 2.5-3.5oz 4.0-8.0 oz 10.0-30.0 oz 0.5-1.0 pt 0.4-1.5 pt 2.0-4.0 oz 1.92-3.2 oz 0.77-1.28 oz 0.625-1.25 lb 1.92-3.20oz 1.92-3.2 oz	Threshold: 3 per sweep or 8/row foot See restrictions at end of section.

SUGGESTIONS FOR SOYBEAN INSECT CONTROL (CONT'D)

II. **POD FEEDERS** The greatest loss to soybeans is caused by insects that attack pods. Control of corn earworms is suggested if you find two or more per row-foot. Control of stink bugs is suggested when one or more per row-foot is found.

Insect	Damage	Insecticide (MOA Group) and Rate Per Acre	Comments	
Corn Earworm(also called the soybean podworm and the cotton bollworm)	Moths usually fly into soybean fields and lay eggs in August. Peak populations generally occur in mid-August. Small worms hatch and start feeding on foliage, later moving to pods. Research has found that one worm will average damaging 20 pods.	Adjourn [†] (3) Ambush [†] 25W(3) Asana [†] XL (3) Baythroid XL [†] (3) Cobalt [†] (1B+3) EndigoZC [†] (3/4) Lannate LV [†] (1A) Larvin [†] (1A) Lorsban 4E [†] (1B) Methyl Parathion [†] 4EC (1B) Pounce [†] 3.2EC (3) Proaxis [†] (3) Prolex [†] (3) Sevin XLR+(1A) Sevin 80S (1A) Silencer [†] (3) Tracer (5) Warrior [†] (3)	5.8-9.6oz 6.4-12.8 oz 5.8-9.6 oz 1.6-2.8oz 19-38 oz 2.5-3.5oz 0.4-1.5 oz 10.0-30.0 oz 1.0-2.0 pt 2 pt 4.0-8.0 oz 1.92-3.2 oz 0.77-1.28 oz 0.5-1.5 qt 0.625-1.875 lb 5.8-9.6oz 1.5-2.0 oz 1.92-3.2 oz	Probably most destructive pest of soybeans because of direct yield losses. See restrictions at end of section.
Stink Bugs	Lower quality results from nymphs and adults sucking sap from bean pods and the insertion of digestive juices into the bean which causes deterioration.	Adjourn [†] (3) Asana [†] XL (3) Baythroid 2E [†] (3) Cobalt [†] (1B+3) Decis 1.5EC [†] (3) EndigoZC [†] (3/4) Larvin [†] (1A) (suppression) Lorsban 4E [†] (1B) Methyl Parathion 4EC [†] (1B) Mustang-MAX [†] (3) PennCap-M [†] (1B) Proaxis [†] (3) Prolex [†] (3) Sevin XLR+ (1A) Sevin 80S (1A) Silencer [†] (3) Warrior [†] (3)	5.8-9.6oz 5.8-9.6 oz 1.6-2.8 oz 19-38 oz 1.5-1.9 oz 3.5-4.5oz 18.0-30.0 oz 2 pt 0.75-2.0 pt 3.2-4.0 oz 1-3 pts 3.2-3.84 oz 1.28-1.54 oz 1.0-1.5 qt 1.25-1.875 lb 5.8-9.6oz 3.2-3.84 oz	Susceptible until maturity. See restrictions at end of section. Southern green stink bug
Spider Mites		Lorsban 4E [†] (1B) Dimethoate 4EC (1B) EndigoZC [†] (3/4) Silencer [†] (3)	1 pt 1 pt 4.0-4.5oz 3.84oz	Suppression only.

[†] Restricted Use Pesticide

MOA Group Tables start on page 46 of the handbook.

SUGGESTIONS FOR SOYBEAN INSECT CONTROL (CONT'D)

- NOTE: **Adjuorn^r** - Do not apply more than 38.6 oz. per acre per season. Do not feed or graze livestock on treated fields. 21 days to harvest.
- Ambush^r** - Do not make more than two, 12.8-oz applications per season. Can be applied up to 60 days before harvest. Do not graze treated areas or harvest for forage or hay.
- Asana^r XL** - 21 days to harvest. Do not feed or graze livestock on treated plants. Do not exceed 0.20 lb. ai/A per season.
- Baythroid^r** - 45 days to harvest. Maximum of 4 applications per season. Maximum of 2.8 ounces per 7-day interval or 11.2 ounces per crop season.
- Battalion^r** - 21 days to harvest. Do not allow livestock to graze treated forage, or feed treated hay to livestock. Do not exceed more than 64 ounces per acre in one growing season.
- Cobalt^r** - 30 days to harvest. On determinant soybeans, do not make more than 1 application after pod set. Do not apply more than 85 ounces per acre per season. Do not feed or graze livestock in treated areas. Do not make more than 3 applications per year.
- Carbaryl (Sevin)** - No waiting period before harvest. Possible injury to young foliage may occur if Sevin is applied when foliage is wet, or rain or high humidity is expected.
- Decis^r** - 21 days to harvest. Do not apply more than 8.5 ounces per growing season. Do not graze or feed treated hay to livestock.
- Dimethoate** - 21 days to harvest and 5 days wait to grazing.
- Dimilin^r** - 21 days to harvest. No more than 2 applications per season. Do not cut for hay or allow milk or meat animals to graze fields. Do not rotate crops other than soybeans or cotton until 6 months following last application.
- EndigoZC^r** - 30 days to harvest. Do not graze or harvest treated soybean forage, straw or hay for livestock feed. If seed was treated with a neonicotinoid product within 4 days of planting.
- Ethyl parathion** - 15 day waiting period before harvest.
- Intrepid** - Do not apply more than 64 fluid ounces (1 lb a.i./acre) per acre per season or make more than 4 applications per season. Do not apply within 7 days of harvest of hay or forage or within 14 days of harvest of seed. Do not apply through any type of irrigation system.
- Lannate^r (WSP, L, LV)** - 14 day waiting period before harvest. Under 0.45 ai/A applied, allow 3 days before grazing forage and 7 days before feeding hay. At 0.45-0.90 lb ai/A applied, allow 10 days before grazing forage and 12 days before feeding hay.
- Larvin^r** - Do not feed forage, hay, or straw to livestock. Do not apply less than 28 days before harvest.
- Lorsban^r** - Do not apply more than 3 lb. of AI per acre per season. Wait 28 days to harvest. Do not graze treated areas or feed forage to meat or dairy animals within 14 days of treatment.
- Lannate^r** - Pre-harvest interval 14 days for soybeans, 3 days for forage and 12 days for hay. Do not apply more than 4.5 pts/per acre per season. Do not make more than 3 applications per season.
- Methyl parathion^r** - 20 day waiting period to harvest or grazing.
- Mustang-MAX^r** - 21 days to harvest. Do not make applications less than 7 days apart. Do not graze or harvest forage, straw or hay for livestock feed. Do not apply more than 24 ounces per season.
- Penncap-M^r** - 21 days to harvest. Do not make more than 2 applications per season. Do not apply more than 6 pts per acre per year.
- Pounce^r** - Do not make more than two 8.0-oz applications per season. Do not apply within 60 days of harvest. Do not graze or feed soybean forage. Do not plant rotational crops within 60 days of last application.
- Seven XLR +** - 21 days to harvest - 14 days to graze or harvest for forage. Do not apply with 2,4-DB herbicide to avoid crop injury. Do not apply more than a total of 6 quarts per acre per crop.
- Silencer^r** - 30 days to harvest. Do not graze or harvest treated soybean forage, straw or hay for livestock feed.
- Steward** - 21 days to harvest. Minimum interval between treatments is 5 days. Do not apply more than 45 ounces per acre per crop. Do not feed or graze livestock on treated fields.
- Tracer** - 28 days to harvest. Do not apply more than 6 ounces of Tracer per acre per year. Do not feed treated forage or hay to meat or dairy animals.
- Warrior^r** - 45 days to harvest. Do not apply more than 0.48 pts per acre per season. Do not graze or harvest treated soybean forage straw or hay for livestock feed.
- Proaxis^r** - 45 days to harvest. Do not apply more than 0.48 pts per acre per season. Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. This chemical is Gamma-cyhalothrin, if it is used in the same season as lambda-cyhalothrin (Warrior^r), then read the label carefully for use rate limitations.
- Prolex^r** - 45 days to harvest. Do not apply more than 0.19 pts per acre per season. Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. This chemical is Gamma-cyhalothrin, if it is used in the same season as lambda-cyhalothrin (Warrior^r), then read the label carefully for use rate limitations.

This section was not revised in 2008.
SOYBEAN WEED CONTROL

Estimated Levels of Weed Control Normally Expected with Soybean Herbicides ^a																										
Herbicide	Winter Annuals					Summer Broadleaves							Summer Grasses							General or Restricted Use						
	Carolina geranium	Chickweed	Henbit	Brome grass	Italian ryegrass	black nightshade	cocklebur	common ragweed	giant ragweed	jimsonweed	lambquarters	morningglory	pigweed	smartweed	velvetleaf	giant foxtail	yellow foxtail	barnyardgrass	large crabgrass		fall panicum	shattercane	johnsongrass seedling	johnsongrass rhizome	yellow nutsedge	
<i>Burndown</i>																										
2,4-D	5	7	5	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.
Clarity	6	8	6	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.
Field Master	7	9	8	9	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Res.
glyphosate (Many formulations)	6	9	8	9	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.
Gramoxone Max [†]	6	9	7	6	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Res.
RT Master	7	9	8	9	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gen.
<i>Soil-applied (EPP, PPI, & PRE)</i>																										
Authority, Spartan	-	-	-	-	-	8	6	6	5	-	9	9	9	8	7	7	-	-	-	-	-	2	0	4	Gen.	
Domain DF	-	-	-	-	-	7	3	7	3	6	9	3	9	6	7	9	9	9	9	8	5	8	0	5	Gen.	
Boundary	-	-	-	-	-	8	6	8	5	8	8	5	9	8	8	9	9	9	9	9	6	6	0	8	Gen.	
Canopy, Canopy SP	-	-	-	-	-	6	9	9	8	9	9	8	9	9	8	6	6	6	7	7	5	5	0	7	Gen.	
Canopy XL	-	-	-	-	-	9	9	9	8	9	9	9	9	9	8	6	6	6	7	7	5	5	0	5	Gen.	
Command 3ME	-	-	-	-	-	5	6	8	5	7	9	0	5	7	9	9	9	9	9	9	6	7	5	0	Gen.	
Dual II Magnum, Cinch	-	-	-	-	-	8	0	5	5	5	6	0	9	5	0	9	9	9	9	9	6	6	0	8	Gen.	
FirstRate, Amplify	-	-	-	-	-	4	8	9	8	8	9	8	8	7	8	0	0	0	0	0	0	0	0	0	Gen.	
Intro [†]	-	-	-	-	-	9	0	5	5	5	7	0	9	5	0	9	9	9	9	9	6	5	0	8	Res.	
Outlook, Frontier, Propel	-	-	-	-	-	9	0	6	5	5	7	5	9	5	0	9	9	9	9	9	5	6	0	8	Gen.	
Prowl, Pentagon	-	-	-	-	-	5	5	5	5	5	9	5	9	5	6	9	9	9	9	9	9	4	0	0	Gen.	
Scepter	-	-	-	-	-	8	9	9	8	8	9	7	9	9	7	8	8	7	6	6	6	7	4	6	Gen.	
Sencor	-	-	-	-	-	-	6	9	-	8	-	5	9	9	8	-	-	8	8	7	-	5	0	2	Gen.	
Sequence ^b	-	-	-	-	-	8	0	5	5	5	6	0	9	5	0	9	9	9	9	9	6	6	0	8	Gen.	
Squadron (PPI only)	-	-	-	-	-	8	9	9	8	8	9	7	9	9	7	9	9	9	9	9	9	4	6	0	Gen.	
Treflan HFP (PPI only)	-	-	-	-	-	0	0	5	5	5	9	5	9	5	0	9	9	9	9	9	9	6	0	0	Gen.	
Valor WP, Encompass	-	-	-	-	-	7	6	7	-	7	9	8	9	5	7	3	3	4	4	5	0	0	0	5	Gen.	
<i>Post-applied (POST)</i>																										
Aim	-	-	-	-	-	4	1	3	2	1	4	6	5	3	9	0	0	0	0	0	0	0	0	0	Gen.	
Assure II	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0	9	9	9	8	9	9	9	9	0	Gen.	
Backdraft	-	-	-	-	-	8	9	9	9	8	7	9	9	8	9	9	9	9	9	9	9	9	7	Gen.		
Basagran	-	-	-	-	-	5	9	6	8	9	6	6	5	9	9	0	0	0	0	0	0	0	0	8	Gen.	
Classic, Skirmish	-	-	-	-	-	3	9	7	7	9	5	7	9	8	8	0	0	0	0	0	0	0	0	8	Gen.	
Cobra	-	-	-	-	-	9	8	9	8	9	5	8	9	6	7	5	0	0	0	0	0	0	0	0	Gen.	
Conclude Xact	-	-	-	-	-	9	9	8	9	6	9	9	9	9	9	9	9	9	9	8	9	8	8	Gen.		
Extreme	-	-	-	-	-	8	9	9	9	9	8	7	9	9	8	9	9	9	9	9	9	9	9	7	Gen.	
FirstRate, Amplify	-	-	-	-	-	0	9	9	9	9	0	8	0	9	8	0	0	0	0	0	0	0	0	-	Gen.	
FlexStar, Reflex	-	-	-	-	-	9	9	9	9	7	8	9	8	8	6	6	5	5	5	5	5	0	5	Gen.		
Frontrow	-	-	-	-	-	-	9	8	-	-	8	3	-	7	0	0	0	0	0	0	0	0	6	Gen.		
Fusilade DX	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0	8	8	9	8	9	9	9	9	0	Gen.	
Fusion	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0	9	8	9	8	9	9	9	9	0	Gen.	
glyphosate (RR Varieties only)	-	-	-	-	-	8	9	9	9	8	7	9	9	8	9	9	9	9	9	9	9	9	7	Gen.		
Harmony GT	-	-	-	-	-	4	6	4	3	4	8	4	9	8	9	0	0	0	0	0	0	0	0	0	Gen.	
Poast Plus, Poast, Prestige	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0	9	9	9	9	9	8	9	8	0	Gen.	
Pursuit	-	-	-	-	-	9	9	7	8	9	6	7	9	8	8	8	6	7	7	7	9	8	5	5	Gen.	
Pursuit Plus	-	-	-	-	-	9	9	7	8	9	6	7	9	8	8	9	9	9	9	9	9	8	5	5	Gen.	
Raptor	-	-	-	-	-	9	8	7	8	8	8	7	9	8	9	9	8	8	7	8	9	7	6	4	Gen.	
Resource	-	-	-	-	-	4	7	7	5	7	7	5	7	4	9	0	0	0	0	0	0	0	0	0	Gen.	
Scepter	-	-	-	-	-	-	9	6	-	0	-	6	8	7	3	0	0	0	0	0	0	0	0	5	Gen.	
Select, Conclude Xtra G	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0	9	9	9	9	9	9	9	9	0	Gen.	
Sequence (RR Varieties Only)	-	-	-	-	-	8	9	9	9	8	7	9	9	8	9	9	9	9	9	9	9	9	7	Gen.		
Stellar	-	-	-	-	-	8	8	9	7	8	7	7	9	7	9	0	0	0	0	0	0	0	0	0	Gen.	
Storm	-	-	-	-	-	9	9	9	8	9	6	9	9	9	9	7	7	0	5	7	5	5	0	8	Gen.	
Synchrony STS (STS beans only)	-	-	-	-	-	3	9	8	8	8	9	8	-	9	9	0	0	0	0	0	0	0	0	0	Gen.	
Ultra Blazer, Blazer, Status	-	-	-	-	-	9	7	9	8	8	9	5	9	9	9	6	7	7	0	5	7	5	5	0	Gen.	

^a Rating scale: 0 no control; 5 or less poor; 6 poor-fair; 7 fair; 8 fair-good; 9 good. Ratings assumes the herbicides are applied in the manner suggested in the guidelines and according to the label under optimum growing conditions. This information was compiled from weed control ratings from trials conducted in Oklahoma and from control rates borrowed from universities across the US.

^b Will also control emerged weeds with better performance than rated here, but cannot be applied POST to NON-Roundup Ready varieties or injury will occur.

[†] Restricted Use.

This section was not revised in 2007.
SOYBEAN WEED CONTROL (CONT'D)

Rotational Cropping Restrictions in Months with Soybean Herbicides

Herbicide	Crops							
	Alfalfa	Canola	Corn	Cotton	Peanut	G. Sorghum	Soybean	Wheat
<i>Burndown</i>								
2,4-D	1	1	0	1	1	1	1	1
Clarity	a	a	a	a	a	a	a	a
glyphosate (Many formulation)	0	0	0	0	0	0	0	0
Gramoxone Max ^r	0	0	0	0	0	0	0	0
RT Master	1	1	0	1	1	1	0	1
<i>Soil-applied (EPP, PPI, &</i>								
Authority, Spartan	a	24	10	18	12	10	0	4
Domain DF	12	a	1	a	a	12	0	12
Boundary	4.5	12	8	8	12	12	0	4.5
Canopy, Canopy SP	a	a	a	a	a	a	a	a
Canopy XL	12	30	10	12	30	10	0	4
Command 3ME	12	12	9	0	9	9	0	12
Dual II Magnum, Cinch	4	a	0	0	0	0	0	4.5
FirstRate, Amplify	9	30 ^f	9	9	9	9	0	3
Intro ^r	a	a	a	a	a	a	a	a
Outlook, Frontier	a	a	0	0	0	0	0	4
Prowl, Pentagon	h	h	0	0	0	h	0	4
Pursuit	4	b	18.5 ^c	18.5	0	18.5	0	4
Python	4	26 ^d	0	18	4	12	0	4
Scepter	18	a	9.5 ^{ac}	18	11	11	0	3 ^a
Sencor, Lexone	4	a	4	8	a	a	4	4 to 8 ^a
Sequence ^b	4	a	0	0	0	0	0	4.5
Squadron (PPI only)	18	a	9.5 ^{ac}	18	11	11	0	3 ^a
Treflan HFP (PPI only)	0	0	14	0	0	14	0	14
Valor WP	12 ⁱ	12 ⁱ	1/2 ^g	1/2 ^g	0	1/2 ^g	0	1/2 ^g
<i>Post-applied (POST)</i>								
Aim	12	12	0	0	12	0	0	0
Assure II	4	0	4	0	4	4	0	4
Backdraft	18	a	9.5 ^{ac}	18	11	11	0	3 ^a
Basagran	a	a	a	a	a	a	a	a
Classic, Skirmish	9	18	8	8	6	9	0	3
Cobra	a	a	a	a	a	a	a	a
Conclude Xact	a	a	a	a	a	a	a	a
Extreme	4	b	18.5 ^c	18.5	0	18.5	0	4
FirstRate, Amplify	9	30	9	9	9	9	0	3
FlexStar, Reflex	18	18	10	10	10	18 ^a	a	4
Frontrow	30	30	9	9	9	9	0	3
Fusilade DX	0	0	2	0	0	2	0	2
Fusion	0	0	2	0	0	2	0	2
glyphosate (RR Varieties)	0	0	0	0	0	0	0	0
Harmony GT	1.5	1.5	0	1.5	1.5	1.5	0	0
Poast Plus, Poast, Prestige	0	0	4	0	0	4	0	4
Pursuit	4	b	18.5 ^c	18.5	0	18.5	0	4
Pursuit Plus	4	b	18.5 ^c	18.5	0	18.5	0	4
Raptor	-	40	9	18 ^c	0	18	9	4
Resource	1	1	0	1	1	1	0	4
Scepter	18	a	9.5 ^{ac}	18	11	11	0	3 ^a
Select, Conclude Xtra G	1	1	1	1	1	1	1	1
Sequence (RR Varieties)	4	a	0	0	0	0	0	4.5
Stellar	1	1	0	1	1	1	0	4
Storm	a	a	a	a	a	a	a	a
Synchrony STS (STS beans)	9	18	7 or 8 ^a	8	6	9	0	3
Ultra Blazer, Blazer, Status	a	a	a	a	a	a	a	a

^a. See label for specific crop rotation restrictions.

^b. Only Clearfield or Sumner Canola varieties can be planted the year following a Pursuit application.

^c. Clearfield corn hybrids can be planted anytime.

^d. Must conduct a successful bioassay before planting.

^e. The restriction is 18 months if at least 15 inches of rainfall has been received since the time of application and November 1

^f. Must conduct a successful field bioassay.

^g. First listed interval is for up to 2 oz/A rate, second interval is for 2 to 3 oz/A rate.

^h. Can be planted the following growing season.

^r. Restricted Use.

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
<p>2,4-D 3.8 lb ai per gallon</p> <p>30 Day EPP applications: 1 to 2 pt/A 15 Day EPP applications: 0.75 to 1 pt/A</p>	<p>Active Ingredient: 2,4-D</p> <p>Similar Products: Many Rates may vary due to formulation</p> <p>MOA: 4</p>	<p>30 Day EPP. Apply not less than 30 days prior to planting soybeans and when weeds are actively growing 15 Day EPP. Apply not less than 15 days prior to planting soybeans and when weeds are small and actively growing. Use the higher rate on larger weeds and when perennials are present.</p>	<p>Injury to crops from this herbicide may occur, if you are not prepared to accept some degree of crop injury including possible loss of stand and yield, do not use this product. Do not apply directly to, or permit to drift onto desirable crops or ornamental plants that are susceptible to 2,4-D herbicide. Do not apply preplant to soybeans in fields having a coarse-textured soil with less than 1% OM. Do not use in or near a greenhouse. Do not apply more than 2.0 pt/A in one season prior to planting soybeans. Do not plant soybean less than 1.5 inches deep. Insure that planted seed is completely covered with soil. Do not make more than 1 application in a growing season. Do not replant fields treated with 2,4-D in the same growing season with crops other than those labeled for 2,4-D preplant use. Do not mow or cultivate weeds prior to treating as poor control may result. Do not feed treated hay, forage, or fodder or graze treated soybeans.</p>
<p>2,4-DB 2 lb ai per gallon</p> <p>EPP – PRE applications: 0.7 – 0.9 pt/A POST (over the top) applications: 0.7 – 0.9 pt/A POST(directed band) applications: 0.7 – 1.6 pt/A</p>	<p>Active Ingredients: 2,4-DB</p> <p>Similar Products: Many Rates may vary due to formulation</p> <p>MOA: 4</p>	<p>EPP – PRE. Apply before planting or before crop emergence. Must include a non-ionic surfactant at a rate of 0.5% v/v. POST (over the top). Apply only from 7 to 10 days before bloom up to mid-bloom when crop is about knee-high and growing actively. POST (directed band) Apply when crop is 8 or more inches tall with nozzles mounted to insure proper placement of spray on only the lower 1/3 of plants. Do not allow spray to contact growing terminals of beans as excessive crop injury will result.</p>	<p>Do not use on soybeans that show symptoms of disease such as Phytophthora root rot. Do not graze or feed crop hay within 60 days after application. Do not harvest crop within 60 days after spray application. Do not apply more than 1.6 pt/A per season.</p>
<p>Aim 2 EC</p> <p>EPP & PRE applications: 0.5 – 1.6 fl. Oz/A POST-DIRECTED applications: 0.5 – 1.6 fl. Oz/A POST applications: 0.25 – 0.5 fl. Oz</p>	<p>Active Ingredient: Carfentrazone</p> <p>Similar Products: Aim EW Avalanche Bulk Pak (Teamwork is the 40 DF formulation)</p> <p>MOA: 14</p>	<p>EPP. Apply up to 30 days before planting for control of emerged weeds when tank mixed with a nonselective burndown herbicide. PRE. Apply after planting but before crop emergence in no-till system for control of emerged weeds when tank mixed with a nonselective burndown herbicide. POST-DIRECTED. Apply POST-DIRECTED with spray directed toward base of soybean plants. . . Avoid contact of soybean foliage with herbicide spray. POST. Apply broadcast for control of velvetleaf only, or to aid in control of morningglories, lambsquarter, and other weed species. . .</p>	<p>Apply with 0.25% NIS with at least 80% active ingredient strength, or 0.25% NIS plus 0.5 to 1% 28% UAN (or 2 to 4 lb ammonium sulfate) when applied under very dry conditions. Do not apply more than 1.6 fl. Oz/A/season. Do not feed treated soybean forage or soybean hay. Do not spray later than the third trifoliate stage of soybeans</p>

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Assure II 0.88 lb ai per gallon EPP applications: 2 to 5 fl oz/A POST applications: 5 to 12 fl oz/A	Active Ingredients: Quizalofop Similar Products: Matador MOA: 1	EPP. Apply before planting for control of emerged grasses. Will not provide residual control of grass. POST. Apply after crop and weed emergence but before grasses tiller.	Do not apply Assure II within 80 days of harvest. Do not apply to soybeans after pod set. Do not apply more than 18 oz/A per season. Do not feed treated soybean forage or soybean hay. Do not cultivate within 7 days after application. Optimum timing for cultivation is 7-14 days after application of Assure II. Applications must include 1% v/v petroleum based crop oil concentrate. If perennial grasses regrow, reapply Assure II at 6-7 oz/A.
Authority 75% DF SOIL applications: 4 to 5.3 oz/A. Use higher rates when applied EPP, heavy weed pressures, or when soil OM >4%.	Active Ingredients: Sulfentrazone Similar Products: Spartan 75 DF Spartan 4F Sulfentrazone 75DF MOA: 14	EPP. Apply up to 30 days prior to planting. PPI. Apply up to 30 days prior to planting and incorporate 1 to 2 inches deep. PRE. Apply after planting but before crop and weeds emerge.	Do not apply aerially. Do not feed treated soybean forage or soybean hay. Do not apply more than 5.3 oz/A in a season. Do not apply if soybeans have emerged. Do not apply if there are visible signs of soil cracking due to soybean emergence. For improved velvetleaf or prickly sida control use the 5.3 oz/A rate.
Backdraft 1.5 lb ai per gallon EPP BURNDOWN & PRE applications: 1.5 to 2 qt/A POST applications: 1.5 to 2 qt/A	Active Ingredients: Imazaquin Glyphosate Similar Products: Backdraft SL MOA: 2 & 9	EPP BURNDOWN. Apply in no-till or stale seedbed soybeans as a preplant burndown treatment up to 45 days before planting. PRE. Apply after planting but before crop emergence in no-till or stale seedbed soybeans. POST. Apply POST to actively growing weeds in Roundup Ready Soybean varieties.	Apply POST only in Roundup Ready Soybean varieties. Do not apply products containing chlorimuron ethyl, imazaquin, imazethapyr, or flumetsulam the same year as Backdraft or injury to following crops may occur. Do not harvest soybean within 90 days after Backdraft application. Do not apply to soybeans once flowering has begun. Do not apply more than one Backdraft application in a year. Do not graze or feed treated soybean forage, hay, or straw. A nonionic or organo-silicone surfactant and nitrogen-based fertilizer must be used. Avoid drift and contact with desirable plants, because severe injury or plant death may result.
Basagran 4 lb ai per gallon POST applications: 1 to 3 pt/A.	Active Ingredients: Bentazon Similar Products: Rezult B MOA: 6	POST. Apply POST to actively growing weeds within the size limits on the label.	Do not apply more than 2 lb bentazon/A per year. Do not apply to soybeans that are stressed due to environmental and/or previous herbicide applications. Do not graze or cut treated soybean forage for at least 30 days after treatment. Do not cultivate 5 days before or after treatment.

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Boundary 7.8 lb ai per gallon SOIL applications: See tables.	Active Ingredients: Metolachlor Metribuzin Similar Products: None MOA: 15 & 5	EPP. Apply in reduced-till or no-till systems up to 30 days before planting but before soybean emergence. PPI. Apply up to 14 days before planting and incorporate into the top 2 inches of soil. PRE. Apply after planting but before crop or weed emergence.	Do not exceed 3.25 pt/A Boundary per use season. Do not grazed or feed treated soybean forage or hay within 40 days of last application. Injury to soybeans or reduced weed control may occur when Boundary is used under the following conditions; (1) soils have a calcareous surface area or a pH of 7.5 or higher, (2) when applied in conjunction with soil-applied organic phosphate pesticides, (3) uneven application or improper incorporation, (4) when applied to any soil with less than 0.5% organic matter, (5) when soil incorporation is deeper than recommended, (6) when soybeans are planted less than 1 ½" deep. Do not use on sand soils. Do not use on loamy sand soils with less than 2% OM. Do not use rates higher than 1.25 pt/A if soil pH is greater than 7.0. Where a rate range is recommended, the higher rates should be used in fields with a history of severe weed pressure, when the time between EPP and PRE overlay applications approaches the maximum 30 days, when soil OM content is over 3%, and/or when heavy crop residues are present on the soil surface.

EPP, PPI, & PRE Applications	Boundary Use Rates (pt/A) in Conventional Tillage Systems		
	Soil Textural Group	0.5 to 3% OM	Greater than 3% OM ^a
	Coarse	1 to 1.25 pt	1.25 to 1.5 pt
	Medium	1.5 to 1.75 pt	1.75 to 2 pt
	Fine ^b	2 to 2.25 pt	2 to 2.5 pt
a. For PPI applications use the lower rate in the rate range. b. For this herbicide, silty clay loam soils are classified as fine-textured soils.			

EPP & PRE Applications	Boundary Use Rates (pt/A) in Reduced-till or No-till Systems ^a	
	Soil Textural Group	pt/A
	Coarse	1 to 1.75
	Medium	1.75 to 2.5
	Fine ^b	2.25 to 3
a. Use low rate range for low residue level or soils with less than 3% OM. Use the higher rate range for high residue level or soils with greater than 3% OM..		
b. For this herbicide, silty clay loam soils are classified as fine-textured soils.		

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Canopy 75% WDG FALL, EPP, PPI, & PRE applications: See table	Active Ingredients: Chlorimuron Metribuzin Similar Products: Canopy SP <u>Rates may vary due to formulation</u> MOA: 2 & 5	FALL. Apply after harvest but before the ground freezes. For control of winter annual broadleaves and grasses. EPP. Can be applied no more than 45 days prior to planting. PPI. Apply prior to planting and incorporate 1 to 2 inches deep. PRE. Apply after planting but before crop emergence.	Do not apply after crop emergence. Do not apply to soils with pH greater than 6.8. Do not apply if there are visible signs of soil cracking due to soybean emergence. Do not apply within 14 days of an organophosphate insecticide application. Do not apply to metribuzin sensitive varieties. If weeds are emerged at the time of application, 1% v/v COC must be included.

EPP, PPI, & PRE Applications	Canopy Use Rates (oz/A)	
	Soil Textural Group	Soil Organic Matter Content 0.5 to 4%
	Course	4 to 5
	Medium	5 to 6
	Fine	5 to 7

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Canopy XL 56.3% WDG FALL, EPP, PPI, & PRE applications: 2.5 to 7 oz/A	Active Ingredients: Chlorimuron Sulfentrazone Similar Products: None MOA: 2 & 14	FALL. Apply after harvest but before the ground freezes. For control of winter annual broadleaves and grasses. EPP. Can be applied no more than 30 days prior to planting. PPI. Apply prior to planting and incorporate 1 to 2 inches deep. PRE. Apply after planting but before crop emergence.	Do not apply after crop emergence. Do not apply to soils with pH greater than 6.8. Do not apply if there are visible signs of soil cracking due to soybean emergence. Do not apply within 14 days of an organophosphate insecticide application. If weeds are emerged at the time of application, 1% v/v COC must be included.
Clarity 4 lbs ai per gallon EPP applications: 4-16 oz/A PRE HARVEST applications: 8-64 oz/A	Active Ingredients: Dicamba Similar Products: Sulfentrazone 75DF MOA: 4	EPP. A waiting interval of 14 days is required for 8 fl oz/A or less, and 28 days for 16 fl oz/A. These intervals must be observed prior to planting or crop injury may occur. PRE HARVEST. Apply to emerged and actively growing weeds after pods have reached mature brown color and 75% leaf drop has occurred. Crop may be harvested 14 days or more after a preharvest application.	EPP. Do not cultivate within 7 days after application. Do not apply in geographic areas with average annual rainfall less than 25". POST. Do not use preharvest-treated soybean for seed unless a germination test is performed with an acceptable result of 95% germination or better. Do not feed crop fodder or hay following application. All applications. Refer to label for application rates for specific weed problems.

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Classic 25% WDG POST applications: 0.33 to 0.75 oz/A	Active Ingredients: Chlorimuron Similar Products: None MOA: 2	POST. Apply any time after the first trifoliolate has opened but no later than 60 days before soybean maturity.	Do not graze treated fields or harvest for forage or hay. Do not cultivate within 7 days of application. Cultivation approximately 14 days after application will help control suppressed weeds. Do not make more than 2 applications of Classic in a single season. Do not use on soils with a history of nutrient deficiency, since crop injury may occur. Do not tank mix Classic with organophosphate insecticides or apply Classic 14 days before or after an organophosphate insecticide application, as severe crop injury may occur. Applications must include 1% COC or 0.25% NIS. Ammonium nitrogen fertilizer is recommended and required for control of velvetleaf.
Cobra 2 lb ai per gallon POST applications: 6 to 12.5 fl oz/A	Active Ingredients: Lactofen Similar Products: Phoenix MOA: 14	POST. Apply POST to actively growing weeds. Soybean leaves that are open at the time of application will show some burn, bronzing and speckling. Trifoliolate soybean leaves that have emerged but are unopened at the time of application may appear cupped at the tip and/or crinkled along the edges of the leaf.	Do not apply later than 45 days before harvest or after growth stage R6 (full seed). Do not exceed a total of 25 fl oz/A (0.4 lb ai/A) per season. Do not graze green forage or stubble. Do not feed treated soybean silage. Do not cultivate prior to or during application. Good coverage of young, actively growing weeds is essential for maximum weed control. The use of a spray adjuvant is required. Temporary crop response should be expected following application.
Command 3ME 3 lb ai per gallon SOIL applications: 1.3 to 2.67 pt/A	Active Ingredients: Clomazone Similar Products: Command 4EC MOA: 13	EPP. Apply up to 30 days before planting. PPI. Apply before planting and incorporate no deeper than 1.5 to 2 inches. PRE. Apply after planting but before crop and weed emergence.	Do not apply more than 1.25 lb ai/A per season. Do not graze or feed forage, hay, or straw from a treated field. Do not exceed 30 psi spray boom pressure. Do not spray if wind is above 10 mph. Leave a 300 foot buffer zone between treated area and sensitive plants.
Command Xtra 4 lb ai per gallon Sulfentrazone 3 lb ai per gallon Clomazone SOIL applications: See table.	Active Ingredients: Clomazone Sulfentrazone Similar Products: None MOA: 13 & 14	EPP. Apply up to 30 days before planting. PRE. Apply after planting but before crop and weed emergence.	Do not apply more than one application per season. Do not apply to soils classified as sands containing less than 1% organic matter. Do not allow livestock to graze on treated soybean vines, or feed treated soybean vines or vine trash to livestock. Do not apply aerially. Do not apply Command Xtra if soybeans are emerging through the soil surface (cracking) or crop injury will result. Water or fertilizer solutions may be used as a carrier of Command Xtra.

EPP & PRE Applications	Command Xtra Use Rates (fl oz/A)		
	Soil Texture	Rates of Product fl oz/A	
		Command Xtra B	Command Xtra G
	Sand, Loamy Sand, Clay Sand	8	21.3
	Sandy Loam, Loam, Silt Loam, Silty Clay Loam, Clay Loam, Sandy Clay Loam, Silt	9.6	25.6
	Clay, Loamy Clay, Sandy Clay, Silty Clay	12	32

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Conclude Xact 6.0 lb ai per gallon POST applications: 3 pt/A	Active Ingredients: Bentazon Acifluorfen Sethoxydim Similar Products: None MOA: 6, 14, & 1	POST. Apply when crop is in the 2 nd to 3 rd trifoliolate leaf stage of growth. Apply when weeds are small and according to the weed sizes listed in the label.	Do not make more than one application per season. Do not apply within 75 days of harvest. Do not use treated plants for feed or forage. Do not apply if rainfall or overhead irrigation is expected soon after application. Do not apply through any type of irrigation system.
Conclude Xtra G 0.94 lb ai per gallon POST applications: 24 oz/A Conclude Xtra B & 17 oz/A Conclude Xtra G	Active Ingredients: Clethodim Similar Products: None MOA: 1	POST. Apply early when crop is in the 2 nd to 3 rd trifoliolate leaf stage of growth. Apply when weeds are small and according to the weed sizes listed in the label.	Do not make more than one application per season. Do not apply within 60 days of harvest. Do not use treated plants for feed or forage. Do not apply if rainfall or overhead irrigation is expected soon after application. Do not apply through any type of irrigation system.
Domain DF 60% DF SOIL applications: 9 to 16 oz/A	Active Ingredient: Flufenacet Metribuzin Similar Products: Axiom Rates may vary due to formulation MOA: 15 & 5	EPP. May be applied up to 14 days before planting in conservation, minimum or no-tillage crop production systems. If weeds are emerged at application, the addition of COC will provide burndown control of certain broadleaves weeds less than 3 inches in height. PPI. Apply up to 14 days before planting and incorporate into the top 1 to 2 inches of soil. PRE. Apply after planting but before crop and weed emergence.	Do not apply more than 16 ounces of DOMAIN per acre per use season. Do not plant soybean less than 1.5 inches deep. Do not apply aerially. Do not use on cultivars that are sensitive to metribuzin. Injury to soybean varieties may occur when 1) soils have a calcareous surface area or a pH of 7.5 or greater, 2) Domain is applied in conjunction with a soil-applied organophosphate insecticide, 3) Domain is applied unevenly or poorly incorporated into the soil, 4) Domain is applied to soil with less than ½% organic matter, or 5) when heavy rains occur soon after application, especially in poorly drained areas where water may stand for several days. Use of higher rates of Domain is recommended when: 1) weed pressures are heavy, 2) applications are to be made EPP, PPI, and/or 3) on soils with 3% or higher organic matter. Domain is not recommended for use on sand soils with less than 1% organic matter or on peat or muck soils with 20% or greater organic matter.
Dual II Magnum 7.64 lb ai per gallon EPP applications: 1.33 to 2.0 pt/A PPI & PRE applications: See table.	Active Ingredient: Metolachlor Similar Products: Dual II Magnum SI Dual IIG Magnum Dual Magnum Cinch Rates may vary due to formulation MOA: 15	EPP. May be applied up to 45 days before planting. PPI. Apply before planting and incorporated 1 to 2 inches. PRE. Apply after planting but before weeds emerge.	See label for soil type restrictions and for split application restrictions. No more than 2.5 pts/A can be applied during any one season. If soil organic matter is 6-20%, 2.5 pts/A may be used. Do not graze or feed treated forage for 30 days after applications.

PPI, & PRE Applications	Dual II Magnum Use Rates (pt/A)		
	Soil Textural Group	Less than 3% OM	3% or more OM
Coarse		1.0 to 1.33	1.33
Medium		1.33 to 1.67	1.33 to 1.67
Fine		1.33 to 1.67	1.67 to 2.0

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Extreme 2.17 lb ai per gallon EPP BURNDOWN & PRE applications: 3 pt/A POST applications: 3 pt/A	Active Ingredient: Imazethapyr Glyphosate Similar Products: None MOA: 2 & 9	EPP BURNDOWN. Apply in no-till or stale seedbed soybeans as a preplant burndown treatment up to 45 days before planting. PRE. Apply after planting but before crop emergence in not-till or stale seedbed soybeans.. POST. Apply POST to actively growing weeds, but only in Roundup Ready Soybean varieties .	Apply POST only in Roundup Ready Soybean varieties. Do not apply products containing chlorimuron ethyl, imazaquin, imazethapyr, or flumetsulam the same year as Extreme because carryover to following crops may occur. Do not harvest soybeans within 85 days following a Extreme application. Do not apply to soybeans after flower initiation. Do not apply more than one Extreme application in a year. Do not graze or feed treated soybean forage, hay, or straw. A nonionic or organo-silicone surfactant and nitrogen-based fertilizer must be used. Avoid drift and contact with desirable plants, because severe injury or plant death may result.
FirstRate 84% DF SOIL applications: See table. POST applications: 0.3 oz/A	Active Ingredient: Cloransulam-methyl Similar Products: Amplify MOA: 2	EPP. Apply up to 4 weeks prior to planting. If rainfall is not anticipated, shallow incorporation within the top 2 inches of soil will improve weed control. PPI. Apply up to 4 weeks prior to planting and incorporate within the top 1-3 inches of soil. For best results apply no more than 2 weeks prior to planting. PRE. Apply after planting but before crop and weed emergence. POST. Apply before 50% flowering stage of soybean and before maximum weed stage on label.	Do not apply more than 0.75 oz/A as soil applications in a growing season. Do not apply more than one soil application per growing season. Do not apply more than 0.6 oz/A as POST applications during the same growing season. Do not apply more than 1.05 oz/A in one growing season. Do not harvest soybeans for forage or hay within 14 days of application. Do not harvest soybeans for 65 days after application. Always use COC, NIS, or MSO with POST applications. When velvetleaf is the target, also use UAN or ammonium sulfate with NIS or COC.

EPP, PPI, & PRE Applications	FirstRate Use Rates (oz/A) ^a		
	Area of Use	Soil Organic Matter Levels	oz/A
	North of Interstate 64	3.0% or less	0.6
	North of Interstate 64	Greater than 3.0%	0.75
	South of Interstate 64	All organic matter levels	0.75
a. Soil applications of 0.75 oz/A FirstRate on soils with greater than 5% organic matter may result in reduced weed control.			

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Flexstar 1.88 lb ai per gallon POST applications: 0.75 to 1.5 pt/A	Active Ingredients: Fomesafen Similar Products: Reflex MOA: 14	POST. Apply POST to actively growing weeds after crop emergence but before soybean bloom.	Do not cultivate prior to application. Cultivation 1 to 3 weeks after application may assist weed control. Do not apply more than 1.6 pt/A (or 0.375 lb ai/A fomesafen) in alternate years. Do not apply after soybean bloom. Do not overlap spray pattern due to potential injury of rotational crops. Do not graze treated areas or harvest forage or hay. Do not graze rotated small grain crops or harvest forage or straw. Some bronzing, crinkling, or spotting of soybeans leaves may occur following POST applications, but soybeans soon outgrow these effects and develop normally. Always include a nonionic surfactant (NIS) or crop oil concentrate (COC).
Frontrow 84% WDG POST applications: One overpack/5A	Active Ingredients: Cloransulam Flumetsulam Similar Products: None MOA: 2 & 2	POST. May be applied any time prior to the 50% flowering stage. Apply to small actively growing weeds and when daytime temps are 70°F or more. May apply a second application 14 days following first application for control of late germinating weeds.	Do not apply using liquid fertilizer as a carrier. Do not graze or feed treated forage, hay, or straw to livestock. Do not apply through any type of irrigation system. Do not harvest crop for 70 days after application.
Fusilade DX 2 lb ai per gallon POST applications: 6 to 24 fl oz/A	Active Ingredients: Fluazifop Similar Products: None MOA: 1	POST. Apply POST to actively growing weeds after crop emergence but before soybean bloom. Refer to label for application rates for specific areas.	Do not apply after soybean bloom. Do not apply more than 32 fl oz/A per year. Do not graze animals in treated areas. Do not cultivate within 7 days before or after application. Cultivation 2 to 3 weeks after application may assist weed control. Always include a nonionic surfactant or crop oil concentrate.
Fusion 2.56 lb ai per gallon POST applications: 6 to 12 fl oz/A	Active Ingredients: Fluazifop Fenoxaprop Similar Products: None MOA: 1	POST. Apply POST to actively growing weeds after crop emergence but before soybean bloom. Refer to label for application rates for specific areas.	Do not apply after soybean bloom. Do not apply more than 24 fl oz/A per year. Do not graze in treated areas. For sequential applications, allow 2 to 3 weeks after the FUSION application before applying a broadleaf herbicide or mixture. If a broadleaf herbicide or mixture is applied first, apply FUSION when the grass weeds begin to develop new leaves (generally around 7 days). Do not cultivate within 7 days before or after application. Cultivation 2 to 3 weeks after application may assist weed control. Always include a nonionic surfactant or crop oil concentrate.
Glyphosate 3 lb ae per gallon EPP BURNDOWN application: 20 to 52 fl oz/A PRE, & POST applications: 20 to 40 fl oz/A	Active Ingredient: Glyphosate Similar Products: Many <u>Rates and required</u> <u>adjutants may vary due</u> <u>to formulation and</u> <u>manufacturer. See</u> <u>appropriate label.</u> MOA: 9	EPP BURNDOWN. Apply before planting the crop. PRE. Apply after planting but before crop emergence. POST. Apply POST only in Roundup Ready Soybean varieties.	Apply POST only in Roundup Ready Soybean varieties. Do not apply more than 6.0 qt/A for preharvest applications. Do not apply more than 1.6 qt/A in any single application. Do not apply more than 4 qt/A in a single EPP or PRE application. Do not apply more than 2.4 qt/A from crop emergence through harvest. Do not apply more than 1.6 qt/A during flowering. Do not harvest soybean within 7 days after application. Do not apply aerially. Do not apply if wind speed is greater than 10 mph. Do not use any other nozzle than low-drift nozzles. Do not graze or harvest treated crop for livestock feed within 25 days of last application.

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Gramoxone Max^r 3 lb ai per gallon EPP BURNDOWN applications: 0.75 to 1.75 pt/A for 1 to 3 inch weeds. 1.75 to 2 pt/A for 3 to 6 inch weeds. 2 to 2.7 pt/A for 6 inch weeds.	Active Ingredients: Paraquat Similar Products: Gramoxone Extra Cyclone Max Rates may vary due to formulation MOA: 22	EPP BURNDOWN. Apply before planting for control of existing vegetation. PRE BURNDOWN. Apply after planting but before soybean emergence for control of existing vegetation.	Do not exceed 4 pt/A/season. Do not apply after crop emergence. Do not use around home gardens, schools, recreational parks, or playgrounds. Always add NIS or COC to the spray mix. Weeds emerging after application will not be controlled.
Harmony GT XP 75% WDG POST applications: 0.083 oz/A	Active Ingredients: Thifensulfuron Similar Products: None MOA: 2	POST. Apply anytime after the first trifoliolate has opened but no later than 60 days before harvest.	Do not graze or harvest for forage or hay. Do not cultivate within 7 days of application. Do not make more than 1 application of Classic in a single season. Do not use on soils with a history of nutrient deficiency, since crop injury may occur. Do not tank mix with organophosphate insecticides or apply Harmony GT within 14 days before or after an organophosphate insecticide application, as severe crop injury may occur. Applications must include 1% COC or 0.25% NIS, and ammonium nitrogen fertilizer.
Intrro^r 4 lb ai per gallon PPI & PRE applications: See table	Active Ingredient: Alachlor Similar Products: None Rates may vary due to formulation MOA: 15	PPI. Apply up to 7 days before planting and incorporate into the top 1 to 2 inches. PRE. Apply after planting, within 5 days of last preplant tillage, and before weed emergence.	Do not flood irrigate after application of alachlor. Do not make more than one application per year or exceed a total of 3 qt/A/year. Do not feed forage, hay, or straw from treated soybeans. Do not ensile soybeans treated with this product.

PPI Applications	Intrro ^r Use Rates (qt/A) ^a		
	Soil Textural Group	Less Than 3% OM	Greater Than 3% OM
Coarse		2.5	2.5
Medium		2.5 to 3	2.5 to 3
Fine		2.5 to 3	3
a. Use higher rate in the recommended range for areas with heavy weed infestations. Use a minimum of 3 qt/A on coarse soils to control yellow nutsedge.			

PRE Applications	Intrro ^r Use Rates (qt/A) ^a		
	Soil Textural Group	Less Than 3% OM	Greater Than 3% OM
Coarse		2 to 2.25	2 to 2.25
Medium		2 to 2.75	2 to 2.75
Fine		2 to 2.75	2.5 to 3
a. Use higher rate in the recommended range for areas with heavy weed infestations. Use a minimum of 2.5 qt/A on coarse soils and 3 qt/A on medium and fine soils to control black and hairy nightshade. When applied through center pivot irrigation or under sprinkler irrigation systems on coarse soils, use a minimum of 3 qt/A.			

^r Restricted Use.

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Outlook 6 lb ai per gallon SOIL applications: See table	Active Ingredient: Dimethenamid Similar Products: Frontier 6.0, Propel MOA: 15	EPP. Apply up to 45 days before planting. PPI. May be applied up to 2 weeks before planting and incorporated 1 to 2 inches. PRE. Apply after planting but before weeds emerge.	Do not apply more than 32 oz/A in a year. Do not apply to coarse soil classified as sand with less than 3% OM and/or where depth to ground water is 30 feet or less, or where annual irrigation + rainfall exceeds 40 inches. Do not graze or feed forage, hay, or straw.

EPP, PPI, & PRE	Outlook Use Rates (fl oz/A) ^a		
		Less than 3% Organic Matter	3% or more Organic Matter
	Coarse	10 to 14	14 to 18
	Medium	14 to 16	16 to 20
	Fine	16 to 18	18 to 21
a. Not recommended on soils with CEC values less than 5 or coarse soils with less than 1.5% organic matter.			

Poast Plus 1 lb ai per gallon POST applications: 1.5 to 2.25 pt/A	Active Ingredient: Sethoxydim Similar Products: Poast <u>Rates may vary due to formulation</u> MOA: 1	POST. Apply POST to actively growing grass weeds within size limits on label.	Do not harvest soybean for at least 75 days after application. Do not apply more than 2.5 pt/A per application. Do not exceed 5 pt/A in a season. Do not cultivate within 5 days before or 7 days after applying Poast. Do not graze or feed forage, hay, or straw.
Prowl 3.3 EC 3.3 lb ai per gallon SOIL applications: See table.	Active Ingredient: Pendimethalin Similar Products: Prowl H2O Pendimax <u>Rates may vary due to formulation</u> MOA: 3	EPP. Apply up to 15 days before planting if used alone or up to 45 days before planting if tank mixed w/ Pursuit or Scepter. PPI. Apply up to 60 days before planting and incorporate within 7 days. PRE. Apply at planting or up to 2 days after planting.	Do not apply POST. Do not use on peat or muck soils. If replanting is necessary, do not work the soil deeper than the treated zone.

EPP & PPI Applications	Prowl Use Rates (pt/A)		
	Soil Texture ^a	Soil Organic Matter Content	
		Less than 3%	More than 3%
	Coarse	1.2 to 1.8	2.4
	Medium	1.8 to 3	3.0 to 3.6
	Fine	2.4 to 3.6	3.6
a. For heavy clay soils, use Prowl 3.3 EC at 3.6 pts/A. The high rates for each soil texture should be used if heavy weed populations are anticipated, extensive crop residues were present prior to seedbed preparation, or in no-till.			

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

PRE Applications	Prowl Use Rates (pt/A)		
	Soil Texture	Soil Organic Matter Content ^a	
		Less than 3%	More than 3%
	Coarse	1.2 to 1.8	1.8
Medium	1.8 to 2.4	1.8 to 2.4	
Fine	1.8 to 2.4	2.4 to 3	
a. The high rates for each soil texture above should be used if heavy weed populations are anticipated, extensive crop residues were present prior to seedbed preparation, or in no-till.			

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Pursuit DG 70% DG SOIL applications: 1.44 oz/A POST applications: 1.44 oz/A	Active Ingredient: Imazethapyr Similar Products: Pursuit MOA: 2	EPP. May be applied up to 45 days before planting. PPI. Apply prior to planting and incorporate into the top 1 to 2 inches of soil. PRE. Apply after planting but before crop and weed emergence. POST. Apply after crop emergence and before or after weed emergence.	Do not make more than one application a year. Do not apply within 85 days of harvest. Do not graze or feed treated forage, hay, or straw. Do not apply during or after bloom stage of soybean. Do not apply in tank mix with Command or Commence. PPI applications are more consistent for control of grass, velvetleaf, jimsonweed, & lambsquarters.
Pursuit Plus EC 2.9 lb ai per gallon SOIL applications: 2.5 pt/A	Active Ingredient: Imazethapyr Pendimethalin Similar Products: None MOA: 2 & 3	EPP. Apply up to 45 days before planting. Incorporate within 7 days of application if rainfall is not received. PPI. Apply up to 45 days before planting. Incorporate prior to planting and within 7 days of application. Incorporate at a depth of 1-2 inches. PRE. Apply up to 2 days after planting but before crop and weeds emerge.	Do not use more than 1 application per season. Do not apply with liquid fertilizer as a carrier. Do not apply within 85 days of soybean harvest. Do not graze or feed treated soybean forage, hay or straw.
Python 80% WDG SOIL applications: See table	Active Ingredient: Flumetsulam Similar Products: None MOA: 2	EPP. Apply alone or tank mixed with other labeled herbicides up to 30 days prior to planting. PPI. Apply alone or tank mixed with other labeled herbicides up to 30 days prior to planting and incorporated into the top 2-3 inches of soil. PRE. Apply after planting but before weeds emerge.	Do not make more than one application a year. Do not apply more than 0.07 lb of flumetsulam in a single year. Do not apply within 85 days of harvest. Do not use on peat or muck soils. Do not use on soils with pH greater than 7.8. Do not apply to soils with >5% OM and <5.9 pH. Do not graze or feed treated forage, hay, or straw. Do not apply if near freezing temperatures are expected.

EPP, PPI & PRE Applications	Python Use Rates (oz/A)	
	Soil Textural Group	Ounces per acre
	Coarse	0.80 to 1.0
Medium or Fine	0.89 to 1.33	

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Raptor 1 lb ai per gallon POST applications: 4 fl oz/A when preceded by a full rate of a soil or grass herbicide or; 5 fl oz/A as a total POST program.	Active Ingredient: Imazamox Similar Products: None MOA: 2	POST. Apply POST to weeds before they exceed 5 inches in height.	Do not make more than one application during a growing season. Do not harvest soybeans within 85 days following application of Raptor. Do not graze or feed treated soybean forage, hay or straw. If arid conditions occur during the year of application, injury to rotational crops may occur. The addition of an adjuvant AND a nitrogen fertilizer solution is required.
Resource 0.86 lb ai per gallon POST applications: 4 to 12 fl oz/A	Active Ingredient: Flumiclorac Similar Products: None MOA: 14	POST. Apply POST after weed and crop emergence when weeds are actively growing and until 60 days before harvest.	Do not apply with aerial applicator. Do not apply RESOURCE within 60 days of harvest. Do not apply more than 12 fl oz/A in a single application or more than a total of 16 fl oz/A during a growing season. Do not graze treated fields or harvest for forage or hay. Do not make more than 2 applications in a season. Apply in a minimum of 15 gallons per acre carrier volume and a spray pressure of 35 to 60 psi. Sequential applications may be made after 14 days have passed from first RESOURCE application. Late POST control of tall velvetleaf may be achieved with RESOURCE plus 1 qt/A of COC or methylated seed oil. Spray grade nitrogen fertilizer (28 to 32% N) or spray grade AMS in addition to COC or methylated seed oil may enhance tall velvetleaf control.
Scepter 70 DG 70% DG PPI or PRE applications: 2.8 oz/A POST applications: 1.4 or 2.8 oz/A	Active Ingredient: Imazaquin Similar Products: None MOA: 2	PPI. Apply alone or tank mixed with other labeled herbicides not more than 30 days before planting and incorporated into the top 1-2 inches of soil. PRE. Apply up to 45 days before, during, or after planting but before the crop and weeds emerge. POST. Apply POST to small, actively growing weeds.	Do not harvest soybeans within 90 days following application of Scepter. Do not graze or feed treated soybean forage, hay or straw.
Select 2 EC 2 lb ai per gallon POST applications: 6 to 16 fl oz/A	Active Ingredient: Clethodim Similar Products: Conclude Xtra G Prism Volunteer <u>Rates may vary due to formulation</u> MOA: 1	POST. Apply to grasses after crop and weed emergence. Annual grasses that emerge after application will not be controlled. Apply to actively growing grasses at recommended weed heights. Will not control sedges or broadleaf weeds. The control of perennial grasses may require more than one application.	Do not cultivate within 7 days before or after application as this may reduce weed control. Do not mow area for two weeks prior to or after the application. Tank mixes with some POST broadleaf herbicides may result in reduced grass control. Applications must include COC or MSO. Do not apply more than 32 fl oz/A (0.5 lb ai/A) per season. Do not apply under conditions of drought stress. Do not graze treated fields or feed treated forage or hay. Do not apply within 60 days of harvest. Do not plant any crop for 30 days after application unless registered for use in that crop.
Sencor DF 75% DF SOIL applications: 2 to 5.33 oz/A	Active Ingredient: Metribuzin Similar Products: None MOA: 5	EPP BURNDOWN. Apply up to 30 days before planting for control of existing vegetation and for residual control. May be tank mixed with other products to increase burndown activity. Apply only by ground equipment when used as a burndown treatment in conservation tillage systems. PRE. Apply after planting and before crop and weed emergence.	Do not apply to soils with a calcareous surface area or to soils that have a pH of 7.5 or higher. Do not apply to sand soils, or to sandy loam or loamy sand soils containing less than 2% OM. Do not apply with soil organophosphate insecticide. Do not apply to soils with less than 0.5% OM. Do not incorporate into soil. Do not apply after crop has emerged. Check soybean varietal restrictions before applying this product. Do not feed or graze treated vines within 40 days after application.

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Sequence 5.25 lb ai per gallon All applications: 2.5 to 4 pt/A	Active Ingredients: Metolachlor & Glyphosate Similar Products: None MOA: 15 & 9	EPP. Apply prior to planting for control of emerged actively growing weeds and soil residual activity. Do not incorporate if applied EPP, or crop injury will result. PRE. Apply after planting but before crop emergence for control of emerged actively growing weeds and soil residual activity. POST only on Roundup Ready Soybean Varieties. Apply after crop and weeds have emerged for control of emerged actively growing weeds and soil residual activity.	Do not graze or feed forage or fodder from Sequence treated crops to livestock for 30 days following application. Do not exceed 4 pt/A Sequence as a EPP or PRE application. On coarse soils apply 2.5 to 3.5 pt/A. On medium textured soils apply 3.5 to 4 pt/A. On fine textured soils apply 3.5 to 4 pt/A. Do not exceed 2.67 lb ai/A S-metolachlor per crop year. PRE applications must be applied before ground cracking of emerging NON-Roundup Ready Soybean plants.
Sonalan HFP 3.0 lb ai per gallon PPI applications: See table	Active Ingredient: Ethalfluralin Similar Products: Sonalan 10G MOA: 3	PPI. Apply and incorporate in the spring before planting or in the fall. Fall application may be made only with dry bulk fertilizer. Refer to label for fertilizer applications. Plant crop no more than 2 inches deep.	Do not graze or forage crop grown in treated soil or cut for hay or silage.

Sonalan HFP Application Rates	
Soil Texture	Pints/Acre
Coarse	1 ½ – 2
Medium	2 – 2 ½
Fine	2 ½ - 3
General weed control, except groundcherry and nightshade from seed.	

Squadron 2.33 lb ai per gallon SOIL applications: 3 pt/A	Active Ingredient: Imazaquin Pendimethalin Similar Products: None MOA: 2 & 3	EPP. Apply up to 45 days before planting. Incorporate within 7 days of application if rainfall is not received. PPI. Apply up to 45 days before planting and incorporate into the upper 2 inches of soil. Incorporate within 7 days of application if rainfall is not received. PRE. Apply after planting but before crop and weeds emerge.	Do not apply postemergence (or at cracking) to soybeans. Do not apply within 90 prior to harvest. Do not graze or feed treated soybean forage, hay, or straw.
Stellar 3.1 lb ai per gallon POST applications: 5 - 7 fl oz /A	Active Ingredient: Flumiclorac Lactofen Similar Products: None MOA: 14 & 14	POST. Apply to actively growing weeds within the growth stages indicated on the label. Most effective when applied under sunny conditions at temperatures above 70°F. A sequential application can be made after a minimum of 14 days have passed following the first application.	Do not apply through any type of irrigation. Do not apply by air. Do not apply within 60 days of harvest. Do not graze animals on treated green forage or stubble. Do not utilize treated hay or straw for animal feed or bedding. Do not apply more than 10 fl oz /A during a single growing season. Do not apply more than two applications during a single growing season.
Storm 4.0 lb ai per gallon POST applications: 1.5 pt/A	Active Ingredient: Bentazon Acifluorfen Similar Products: None MOA: 6 & 14	POST. Apply early when weeds are small. Refer to label for weed size recommendations.	Do not cultivate within 5 days before or 7 days after application. Do not apply more than a total of 3 pt/A per season. Do not apply sequential applications within 15 days following initial application. Do not apply within 50 days of harvest. Do not use treated plants for feed or forage. Do not graze livestock on treated areas.

This section was not revised in 2008.

SOYBEAN WEED SUGGESTIONS (CONT'D)

Read and follow all label directions before product use.

Trade Name, Formulation, and Application Rate	Active Ingredient(s), Similar Products and MOA Group	Application Timing(s), EPP-early preplant, PPI-preplant incorporated PRE-preemergence, or POST-postemergence	Special Instructions and Remarks
Synchrony STS 42% WDG Burndown and POST applications: 0.5 oz/A for STS soybeans Burndown and POST applications: 0.25 oz/A for non-STS soybeans	Active Ingredient: Chlorimuron Thifensulfuron Similar Products: None MOA: 2 & 2	BURNDOWN. Apply up to 30 days before planting but before soybean emergence. POST. Apply any time after the first trifoliolate has opened but no later than 60 days before soybean maturity.	Planting bin run seed saved from SYNCHRONY STS treated soybean the previous year is not recommended . Do not graze treated fields or harvest for forage or hay. Do not cultivate within 7 days of application. Cultivation approximately 14 days after application will help control suppressed weeds. Applications of SYNCHRONY STS on STS soybeans must include 1% v/v crop oil concentrate. On non-STS soybeans add 0.25% NIS. An ammonium nitrogen fertilizer is recommended and required if velvetleaf is present.
Treflan HFP 4 lb ai per gallon PPI applications: See table.	Active Ingredients: Trifluralin Similar Products: Treflan TR-10 Trifluralin HF Trust 10G Trust 4 EC <u>Rates may vary due to formulation</u> MOA: 3	PPI. Apply and incorporate within 24 hours of application. Two incorporation passes, in perpendicular directions, are recommended.	Do not apply to wet soils or soils that are subject to prolonged periods of flooding.

PPI Applications	Treflan HFP Use Rates (pt/A)	
	Soil Textural Group ^a	pt/A
	Coarse	1.0
	Medium	1.5
	Fine	2.0
a. For coarse and medium soils with 2% to 5% organic matter use 1.5 pints. For fine soils with 2% to 5% organic matter use 2.0 pints. For soils with 5% to 10% organic matter use 2.0 to 2.5 pints.		

Ultra Blazer 2.0 lb ai per gallon POST applications: 0.5 to 1.5 pt/A	Active Ingredient: Acifluorfen Similar Products: None MOA: 14	POST. Apply POST to actively growing weeds.	Do not cultivate within 5 days before or 7 days after applying Ultra Blazer . Do not apply more than a total of 2 pints (0.5 pounds of active ingredient) of Ultra Blazer herbicide per acre, per season in soybeans. Do not apply more than 1.5 pints of Ultra Blazer per acre, per application in soybeans. Allow a minimum of 15 days between sequential applications of Ultra Blazer. Do not use treated plants for feed or forage. Leaf speckling may occur, but plants generally outgrow this condition within 10 days. Use a minimum of 10 gallons of water per acre as carrier.
Valor WP 51% WP SOIL applications: 2.5 to 3.0 oz/A	Active Ingredient: Flumioxazin Similar Products: Valor, Encompass <u>Rates may vary due to formulation</u> MOA: 14	PRE. Application must be made within 3 days after planting and prior to crop emergence. Application after the crop has begun to crack, or are emerged, will result in severe crop injury.	Do not graze treated fields or feed treated forage or hay to livestock. Do not incorporate into the soil after application. Do not apply more than 3 oz/A during a single growing season.

MOA Group Tables start on page 46 of the handbook.

SUGGESTIONS FOR DISEASE CONTROL ON SOYBEANS

Quick Guide to Soybean Diseases

Disease (causal agent)	Symptoms	Control
Root (soilborne) diseases		
Seed rot (<i>Pythium</i> spp., <i>Rhizoctonia solani</i> , <i>Phytophthora sojae</i> , <i>Fusarium</i> spp.)	Seeds rot and fail to emerge from the soil resulting in poor stand establishment. Usually a problem resulting from poor quality (low germ or moldy) seed, planting too deep, or from wet and cold soils after planting	Plant high quality seed (>85% germ) when warm soil temperatures favor rapid seed germination and seedling growth. Use a fungicide seed treatment when seed quality or planting conditions are not ideal (See Table 1 below).
Seedling disease – damping off (<i>Pythium</i> spp., <i>Phytophthora sojae</i> , <i>Rhizoctonia solani</i> , <i>Fusarium</i> spp.)	Plants wither and die after emergence or are stunted and grow slowly. Dark and firm or watery and soft decay of the roots and stem at or below the soil line.	Plant high quality seed (>85% germ) when warm soil temperatures favor rapid seed germination and seedling growth. Use a fungicide seed treatment when seed quality or planting conditions are not ideal (See Table 1 below).
Phytophthora root rot (<i>Phytophthora sojae</i>)	Occurs in heavy, poorly drained soils or in low spots in fields. Wet decay of stem and lower branches near the soil line that turns brown. Plants yellow and wilt. Roots are dark brown and rotted. Infection may occur at any stage of growth but is more common on young plants.	Plant resistant varieties and subsoil to break hard pans and promote drainage. Treat seed and/or soil with products containing metalaxyl or mefenoxam (See Tables 1 and 3 below).
Southern blight (<i>Sclerotium rolfsii</i>)	Generally a minor problem on scattered or localized patches of plants in mid to late season. Plants wilt and die. Base of stems covered with white, stringy mold that may extend onto the surrounding soil. Small, mustard seed-like reproductive structures (sclerotia) develop on the white mold.	Crop rotation with non hosts such as corn, sorghum, and cotton will reduce disease levels.
Charcoal rot (<i>Macrophomina phaseolina</i>)	Disease associated with hot dry weather in mid to late season. Plants loose vigor, yellow, wilt, and die with leaves remaining attached. Internal discoloration of tap root and upper stem is silver to gray in color. Numerous black, pepper-like sclerotia form under the bark of lower stem and roots.	Maintain adequate soil fertility and irrigate to reduce moisture stress. Avoid excessive seeding rates.
Soybean cyst nematode (<i>Heterodera glycines</i>) Root-knot nematode (<i>Meloidogyne</i> spp.)	Yield loss is the first symptom of a nematode problem. Above-ground symptoms consisting of stunting, poor growth, yellowing, general decline, and early maturity may or may not appear after several years. Symptoms may mimic N or K deficiency. Root systems may be stunted or deformed. Symptoms are often irregularly distributed, occurring in patches.	Crop rotation with corn, sorghum and grassy forages should be considered. Nematicides provide control (See Table 3 below) but may not be cost effective. The most efficient control incorporates resistant varieties in a crop rotation. (See Soybean cyst nematode and Root-knot nematode below)

SUGGESTIONS FOR DISEASE CONTROL ON SOYBEANS

Quick Guide to Soybean Diseases (Cont'd)

Disease (causal agent)	Symptoms	Control
Foliar (leaf, stem, and pod) diseases		
Bacterial blight (<i>Pseudomonas glycines</i>)	Small, angular, water-soaked spots that later turn yellow and then brown as tissue dies. Brown central area of diseased spot is surrounded by a yellow border. Spots fall out and leaf becomes ragged. Infected seed may be shriveled, slightly discolored or may not show any symptoms at all.	Plant resistant varieties, use high quality seed, practice crop rotation to avoid disease build-up, and use tillage to bury diseased crop residue.
Bacterial pustule (<i>Xanthomonas phaseoli</i>)	Symptoms are similar to bacterial blight (See above) except that tiny pustules (pimples) may form inside spots on the underside of the leaf.	Plant resistant varieties, use high quality seed of resistant varieties, practice crop rotation to avoid disease build-up, and use tillage to bury diseased crop residue.
Anthracnose (<i>Colletotrichum dematium</i> and/or <i>Glomerella glycines</i>)	Stem and pod lesions are indefinite brown areas causing premature death of leaves and pods. Dark streaks develop on petioles and leaves prematurely roll and die. Numerous minute black fruiting structures develop on the infected parts. Seed may be stained brown and appear moldy.	Practice crop rotation, incorporate diseased crop residue into soil, and use fungicide seed treatments to prevent seed transmission. Application of a foliar fungicide may provide an economic return (see Foliar diseases below).
Brown spot (<i>Septoria glycines</i>)	Most commonly leaf disease in Oklahoma. Most severe on early (April) planted soybeans. Cotyledon, unifoliate, and lower trifoliate leaves develop pinpoint brown spots that may enlarge to ¼ inch in diameter and be surrounded by a yellow border. Heavily spotted leaves turn yellow and drop, leading to significant defoliation in the lower and mid-canopy. Easily confused with soybean rust, but the underside of the spots are flat with no raised pustules (pimples).	Practice crop rotation, incorporate diseased crop residue into soil, and use fungicide seed treatments to prevent seed transmission. Application of a foliar fungicide may provide an economic return (see Foliar diseases below).
Downy mildew (<i>Peronospora manshurica</i>)	Symptoms appear on younger (upper) leaves as pale green and then yellow spots. Spots enlarge to up to ½ inch in diameter; the centers die and turn tan colored with a yellow or light green border. In humid weather, tufts of tan colored moldy growth are visible through a hand lens on the undersides of developing spots.	Plant resistant varieties, practice crop rotation, incorporate diseased crop residue into soil, and use fungicide seed treatments to prevent seed transmission.
Frogeye leaf spot (<i>Cercospora sojina</i>)	Sporadic disease that may reduce yield. Reddish brown, circular to angular leaf spots are up to 1/4" diameter. The center of the spots turns gray as spots age, but the borders remain dark.	Plant resistant varieties, practice crop rotation, use fungicide seed treatments to prevent seed transmission, and incorporate diseased crop residue into soil. Application of a foliar fungicide may provide an economic return (see Foliar diseases below).

SUGGESTIONS FOR DISEASE CONTROL ON SOYBEANS

Quick Guide to Soybean Diseases (Cont'd)

Disease (causal agent)	Symptoms	Control
Foliar (leaf, stem, and pod) diseases (cont'd)		
Cercospora blight/Purple Seed Stain (<i>Cercospora kikuchii</i>)	At beginning pod fill, upper leaves exposed to the sun have a light purple, leathery appearance. Affected leaves may drop prematurely. Small sunken, reddish purple spots may develop on pods causing pink to dark purple staining of seeds.	Practice crop rotation, plant high quality seed, use a fungicide seed treatment, harvest promptly, and incorporate disease crop residue into soil. Application of a foliar fungicide may provide an economic return (see Foliar diseases below).
Pod and stem blight, seed decay (<i>Phomopsis longicolla</i>)	Plants are infected early in the growing season, but symptoms on the pods and stems do not appear until the plants are mature. Small black reproductive structures (pycnidia) develop in linear rows on mature stems or scattered on the pods. Affected seed may be covered with white mold or may be dull, cracked, or shriveled.	Practice crop rotation, plant high quality seed, use a fungicide seed treatment, harvest promptly, and incorporate disease crop residue into soil. Application of a foliar fungicide may provide an economic return (see Foliar diseases below).
Soybean rust (<i>Phakospora pachyrhizi</i>)	Faint pale green to yellow flecks appear on leaves in low and mid canopy during reproductive stages. Spots become angular and brown or reddish brown in color. Spots remain small but become numerous. Rust can easily be confused with brown spot and bacterial leaf spots. Key feature are the raised pustules (pimples) on the undersides of spots visible through a hand lens. Tufts of tan colored spores may also be present.	In 2007, rust was found for the first time in OK. Rust has the potential to cause yield loss. Leaf samples suspected to have rust should be submitted for identification to the local county extension office. A fungicide program for rust control may be economical during reproductive stages in fields where the disease has been identified or threatens. (See Foliar diseases below)
Stem canker (<i>Diaporthae phaseolorum var. caulivora</i>)	Reddish brown spots appear at nodes of the main stem during reproductive stages. Spots enlarge into elongated cankers that girdle plants. Leaves develop interveinal yellowing and browning, curl inward, die, and remain attached to stems. Yield losses occur when plants are killed prior to pod fill.	Not a common disease in Oklahoma. Practice crop rotation, incorporate diseased crop residue into soil, and plant resistant varieties.
Soybean mosaic (soybean mosaic virus)	Spread on seed and by aphids. Infected seed may not germinate or produce weak, spindly plants with crinkled unifoliate leaves. Infected older plants are stunted with crinkled or mottled leaves. Seed may be distinctly discolored brown or black as the hilum color bleeds out over the seed.	Yields may be reduced up to 25%. Plant high quality seed or seed from fields free of the virus. Plant resistant varieties.
Bud blight (tobacco ringspot virus or tobacco streak virus)	Spread on seed and by thrips and nematodes. Before flowering, terminal buds and shoots turns brown, curve down, and becomes dry and brittle. Younger leaves often develop a rusty flecking. Plants are dwarfed and produce little seed. After flowering, infection results in poorly filled pods or pods may be shed. Plants may remain green late at the end of growing season.	Plant high quality seed to help avoid seed transmission.

SUGGESTIONS FOR DISEASE CONTROL ON SOYBEANS

Seed Treatment

Fungicide seed treatment can be beneficial under Oklahoma conditions, especially with low seeding rates, use of seed with poor germination (85% or lower), under cool and wet conditions associated with early (April) planting dates, and where *Phytophthora* root rot is a problem. However, yield responses to seed treatments are unlikely to provide an economic return when conditions favor rapid seed germination and seedling growth. In addition, soybean plants are innately able to compensate for a wide range of plant populations, so much so that for some varieties, a field with 50% of a desired plant population may yield as well as a field with a full plant stand. However, early maturing varieties (MG III and IV) tend to branch less than full season varieties (MG V and VI) and yield better where higher plant populations are achieved. Some suggested seed treatment fungicides for prevention of seed rot and seedling diseases are listed below (Table 1). Pre-treated seed can be ordered, or seed treatment fungicides can be purchased for use with slurry or mist-type equipment, auger systems, or planter box applications. Thorough and uniform application to seed is essential for maximum performance. Metalaxyl and mefenoxam provide enhanced (systemic) control of water molds such as *Pythium* and *Phytophthora*. However, they do not have activity against other seedling disease pathogens and should be applied in combination with another seed treatment fungicide such as captan, thiram, carboxin, or fludioxanil to provide broad-spectrum disease control.

Table 1. Seed treatment fungicides for soybeans.

Disease (Causal Agent)	Common name (MOA Group): Formulation and rate /100 lb Seed	Remarks
Seed rot Seedling disease Damping off <i>Phytophthora</i> root rot	azoxystrobin (11) Protégé-FL 0.2 to 0.27 fl oz Dynasty 0.8F 0.15 to 0.46 fl oz	Slurry or mist type treatment. Slurry or mist type treatment.
	<i>Bacillus subtilis</i> : Kodiak HB 0.3D 4 to 8 oz	Biological treatment that can be used in combination with a fungicide treatment. Planter box treatment. Slurry or mist type treatment.
	captan (M): Captan 400 4F 1.5 to 2.5 fl oz Dyna Shield Captan 4F 1.5 to 2.5 fl oz Captan Moly 50D 3.5 oz Hi Moly/Captan-D 50D 3.3 oz	Slurry or mist type treatment. Slurry or mist type treatment. Planter box treatment. Planter box treatment.
	captan (M) + carboxin (7) + metalaxyl(4) Bean Guard/Allegiance 41.25D 3.3 oz	Dry planter box treatment.
	captan (M) + carboxin (7): VitavaxM DC 36.9D 3.3 oz Enhance 40D 5 oz	Dry planter box treatment. Dry planter box treatment.
	carboxin (7) + thiram (M): Vitavax CT Flowable 12 fl oz RTU-Vitavax-Thiram 6.8 fl oz Vitavax M 12 fl oz Vitavax 200 3.34F 4 fl oz VitaFlo 280 4 fl oz Vitavax M DC 36.9D 3.3 oz	Slurry, mist type, or planter box treatment. Slurry, mist type, or planter box treatment. Slurry, mist type, or planter box treatment. Slurry or mist type treatment. Slurry or mist type treatment. Planter box treatment.
	cloroneb (14) + mefenoxam (4): Catapult XL 3.09F 5.5 to 7 fl oz	Slurry, mist type, or planter box treatment.
	fludioxanil (12): Maxim 4FS 0.08 to 0.16 fl oz	<i>Rhizoctonia</i> and <i>Fusarium</i> only. Commercial slurry or mist type treatment.
	metalaxyl or mefenoxam (4): Allegiance FL 2.65F 0.75 to 1.5 fl oz Apron TL 1F 2 to 4 fl oz Replica TL 1F 2 to 4 fl oz Apron XL LS 3F 0.16 to 0.64 fl oz Allegiance Dry 12.5D 1.5 to 2 oz	<i>Pythium</i> and <i>Phytophthora</i> only. Slurry or mist type treatment. Slurry or mist type treatment. Slurry or mist type treatment. Slurry or mist type treatment. Planter box or dry seed treatment.

SUGGESTIONS FOR DISEASE CONTROL ON SOYBEANS

Table 1. Seed treatment fungicides for soybeans. (Cont'd)

Disease (Causal Agent)	Common name (MOA Group): Formulation and rate /100 lb Seed	Remarks
Seed rot Seedling disease Damping off Phytophthora root rot cont'd	metalaxyl (4) + PCNB (14) + carboxin (7): Prevail 33.1D 3.3 to 6.7 oz	Planter box or dry seed treatment.
	metalaxyl (4) + thiram (M): Protector L/Allegiance 6.7 fl oz	Planter box or dry seed treatment.
	mefenoxam (4) + fludioxonil (12): ApronMaxx RFC 0.52F 1.5 fl oz ApronMaxx RTA 5 fl oz Warden RTA 5 fl oz	Slurry or mist type treatment. Slurry or mist type treatment. Slurry or mist type treatment.
	thiabendazole (1): Mertect 340F 0.08 tp 0.16 fl oz	Slurry or mist treatment for Phomopsis seed rot and damping off. Apply with metalaxyl/mefenoxam and/or fludioxonil for broad-spectrum control.
	thiram (M): Flosan 4F 2 fl oz 42S Thiram 4F 2 fl oz Thiram 75DF 2.2 oz Thiram Granuflo 75WDG 2.2 oz Protector-D 35D 3.3 oz	Slurry or mist type treatment. Slurry or mist type treatment. Slurry or mist type treatment. Slurry or mist type treatment. Planter box treatment.
	trifloxystrobin (11): Trilex Flowable 0.32 fl oz	Slurry or mist type treatment.
	trifloxystrobin (11) + metalaxyl (4): Trilex AL 5.7 fl oz Trilex 2000 1.15F 1.0 fl oz	Slurry or mist type treatment. Slurry or mist type treatment.

Soilborne Diseases and Nematodes

Crop rotation with non-host plants should be considered for preventing the build-up of soil-borne diseases and nematodes problems in soybeans, and for reducing pathogen populations in problem fields. Resistant varieties are also available for soilborne problems such as Phytophthora root rot, soybean cyst nematode, and root knot nematode. However, single gene resistance is commonly employed in soybean breeding programs. While single gene resistance initially provides a high level of disease control, repeating cropping of the same resistance gene may lead to a new strain or “race” capable of damaging previously resistant varieties. Nematodes are frequent problems in soybean fields, but often overlooked as a cause of low yield. When nematode problems are suspected, samples should be submitted for analysis to the OSU Plant Disease and Insect Diagnostic Lab through a local OSU County Extension office. Refer to OSU Fact Sheet #7610 "Soil and Plant Sampling for Nematode Analysis" for information on how to sample for nematodes.

Phytophthora root rot: Phytophthora root rot is a problem on finely textured (clay) soils with poor drainage, in fields with hardpans, or in low areas of fields that collect water. The seed rot and damping off phases of Phytophthora root rot may be mistaken for Pythium damping-off. The fungus is highly variable and numerous races have developed in response to the planting of varieties with single-gene (specific) resistance. Once a Phytophthora problem is identified, crop rotation is of little value because the fungus survives indefinitely in soil. Ideally, varieties with single gene (race specific) should be matched to the prevailing race in a problem field. However, race identification is not available in Oklahoma. Variety selection must be based on local variety performance or the selection of varieties with a high probability of success, i.e. the Rps1-c or Rps1-k genes in a high-yielding variety. Tolerant (partially resistant) varieties are also available that are not race specific. However, tolerance is not effective against the disease at the seedling stages and their use should be combined with a seed treatment containing metalaxyl or mefenoxam (See Table 1 above). Mefenoxam can also be applied to soil or in-furrow at planting (See Table 3).

SUGGESTIONS FOR DISEASE CONTROL ON SOYBEANS

Soybean Cyst Nematode: Soybean cyst nematode (SCN) is a significant problem in some old soybean fields. The nematode is probably more widespread than thought, because above ground symptoms are usually not distinct. SCN should be suspected where yields have declined for no other obvious reasons. SCN is best managed by planting resistant varieties in a crop rotation program with non-host crops to limit nematode reproduction. The goal is to reduce nematode numbers below damaging levels. Rotational crops should be summer crops that are grown during periods where nematodes are active. Non-host crops include alfalfa, corn, cotton, forage grasses, and sorghum. Avoid other legumes such as southern peas, beans, and forage legumes. Resistant soybean varieties use mainly two sources of resistance genes, one from “Peking” the other from “PI 88788”. Most SCN-resistant varieties use PI 88788 as source of resistance. A third source of resistance, from PI 437654 contained in the public variety “Hartwig” (some are marketed with a CsyTX, trademark), is available in a few varieties and may be effective in more fields. Cyst nematode populations are highly variable and a particular source of resistance may perform better in one area than another. Seed dealers can recommend varieties that perform best in a particular area. However, repeated cropping of a resistant variety with the same source of resistance can lead to development of new races of the nematode for which the resistance is no longer effective. A certain percentage of cyst nematodes will reproduce on resistant varieties. If sources of resistance are not rotated, these individuals will increase and produce a race shift. The same SCN-resistant variety should not be planted in the same field for two consecutive years. If possible, rotate sources of resistance. Inclusion of susceptible varieties may also be beneficial for countering race shifts. Table 1 lists some rotation sequences recommended for growing soybeans where SCN is a problem. A listing of the sources of the resistance used in SCN-resistant varieties has been maintained yearly at <http://www.ag.uiuc.edu/%7Ewardt/cover.htm> by the University of Illinois.

Table 2. Some suggested crop rotation sequences for soybean cyst nematode using resistant (R) and susceptible (S) soybean varieties.

Year	Rotation A	Rotation B	Rotation C
1	Non-host crop	Non-host crop	Non-host crop
2	Soybean (R)	Soybean (R)	Non-host crop
3	Non-host crop	Non-host crop	Soybean (S)*
4	Soybean (R) – different source from year 2	Soybean (S)*	Non-host crop
5	Non-host crop	Repeat cycle	Non-host crop
6	Soybean (R) – different source from year 4 or (S)*		Soybean (S)*
7	Repeat cycle		Repeat cycle

* A soil test should be done to ensure egg counts are below damaging levels (300 eggs per 100 cc soil for sandy soils; 1,200 eggs/100 cc soil for clay soils) before planting a susceptible variety.

Root-knot nematode: Root-knot nematode (RKN) may not be as widely distributed as SCN, but can cause very severe yield losses where it occurs. It is generally found at damaging levels in sandy soils. Selection of resistant varieties to manage RKN is the simplest method of control. There are several well-adapted varieties available that have high levels of RKN resistance. Growing a RKN-resistant variety for one to three years usually lowers the RKN population significantly. It should be noted that growing the same RKN resistant variety continuously for several years might result in a RKN population capable of damaging the resistant variety. Rotation to non-host crops is a good method of control, but because southern, northern, and peanut root-knot nematodes occur in Oklahoma, it is difficult to select a non-host crop where the species of nematode is not known. Only grass crops such as corn, grain sorghum, and forage grasses are non-hosts for the southern RKN. In fields with northern and peanut RKN, cotton or the grass crops are suggested.

Table 3. Fungicides for control of soilborne diseases of soybeans.

Disease	Common name (MOA group): Formulation and rate/ 1000 ft row	Remarks
Phytophthora root rot Pythium damping off	mefenoxam (4): Ridomil Gold 4E 0.08 to 0.28 fl oz Ridomil Gold 2.5G 1.5 to 6 oz Ridomil Gold SL 4F 0.08 to 0.28 fl oz	At planting treatment. Apply the high rate as a surface application in a 7-inch band and incorporate or water into soil, or apply any of the rates in furrow.

SUGGESTIONS FOR DISEASE CONTROL ON SOYBEANS

Foliar Diseases

Foliar diseases are generally a minor problem except for frogeye leaf spot and soybean rust. Frogeye leaf spot is a sporadic disease that can reduce yields significantly. Soybean rust was identified in Oklahoma for the first time in 2007 and has the potential to reduce yields by up to 50%. Other foliar diseases such as anthracnose, pod and stem blight, and Cercospora blight have adverse effects on seed quality and may reduce yields when rainfall and humidity are high during reproductive stages, and where harvest is delayed by wet weather. Consider a foliar fungicide program when yield potential is high, soybeans are grown under irrigation, soybeans are grown for seed, and when early maturing varieties are grown (Group III and IV). Use the point system for forecasting the need for a fungicide program on soybeans (See OSU Extension Facts no. 7632). The expected price of soybeans should also be considered in making a decision on whether or not to use foliar fungicides. Generally a single application from growth stage R3 to R5 is sufficient for control of diseases that affect seed quality. Rust is potentially damaging and a fungicide program should be beneficial for high yielding soybeans when rust becomes severe. Because rust will not overwinter in Oklahoma, it will likely be a sporadic problem affecting soybeans in years where airborne spores move into the state and weather is favorable for rust development. Currently Oklahoma and surrounding states are part of a national network for monitoring rust development and spread. The current status of rust development in Oklahoma and other soybean growing states can be followed at <http://www.sbrusa.net/>. Consider a fungicide application for soybean rust when soybeans are at growth stages R1 to R5, yield potential is good (>25 bu/A) and when rust threatens or is identified in the field.

Table 4. Fungicides for control of foliar diseases of soybeans

Disease	Common name (MOA group): Formulation and rate/A	Remarks
Anthracnose Brown spot Frogeye leaf spot Pod and stem blight Cercospora blight Seed quality diseases Soybean rust	azoxystrobin (11): Quadris 2.08F 6.0 to 15.4 fl oz	Apply at first sign of frogeye leaf spot during R growth stages or from R3 to R5 for seed quality protection. Use: Point System Guide for Forecasting Fungicide Need (see OSU Extension Facts no. 7632). For soybean rust , apply from growth stages R1 to R5 when rust threatens. A second application may be made from 14 to 21d after the first if needed.
	cyproconazole (3): Alto 100SL 0.83F 4 to 5.5 fl oz	Apply at first sign of frogeye leaf spot during R growth stages or from R3 to R5 for seed quality protection. Use: Point System Guide for Forecasting Fungicide Need (see OSU Extension Facts no. 7632). For soybean rust , apply from growth stages R1 to R5 when rust threatens. A second application may be made from 14 to 21d after the first if needed.
	azoxystrobin (11) + cyproconazole (3): Quadris Xtra 2.34F 4 to 6.8 fl oz	Apply at first sign of frogeye leaf spot during R growth stages or from R3 to R5 for seed quality protection. Use: Point System Guide for Forecasting Fungicide Need (see OSU Extension Facts no. 7632). For soybean rust , apply from growth stages R1 to R5 when rust threatens. A second application may be made from 14 to 21d after the first if needed.
	myclobutanil (3): Laredo EC 2E 4 to 8 fl oz Laredo EW 1.67E 4.8 to 9.6 fl oz	For soybean rust , apply from growth stages R1 to R5 when rust threatens. A second application may be made from 14 to 21d after the first if needed.
	propiconazole (3): Tilt 3.6E 4 to 6 fl oz	Apply at first sign of frogeye leaf spot during R growth stages or from R3 to R5 for seed quality protection. Use: Point System Guide for Forecasting Fungicide Need (see OSU Extension Facts no. 7632). For soybean rust , apply from growth stages R1 to R5 when rust threatens. A second application may be made from 14 to 21d after the first if needed.

SUGGESTIONS FOR DISEASE CONTROL ON SOYBEANS

Table 4. Fungicides for control of foliar diseases of soybeans (cont'd)

Disease	Common name (MOA group): Formulation and rate/A	Remarks
Anthracnose Brown spot Frogeye leaf spot Pod and stem blight Cercospora blight Seed quality diseases Soybean rust (cont'd)	propiconazole (3) + azoxystrobin (11): Quilt 1.66F 14 to 20.5 fl oz	Apply at first sign of frogeye leaf spot during R growth stages or from R3 to R5 for seed quality protection. Use: Point System Guide for Forecasting Fungicide Need (see OSU Extension Facts no. 7632). For soybean rust , apply from growth stages R1 to R5 when rust threatens. A second application may be made from 14 to 21d after the first if needed.
	propiconazole (3) + trifloxystrobin (11): Stratego 2.08E 7 to 10 fl oz	Apply at first sign of frogeye leaf spot during R growth stages or from R3 to R5 for seed quality protection. Use: Point System Guide for Forecasting Fungicide Need (see OSU Extension Facts no. 7632). For soybean rust , apply from growth stages R1 to R5 when rust threatens. A second application may be made from 14 to 21d after the first if needed.
	pyraclostrobin (11): Headline 2.08F 6 to 12 fl oz	Apply at first sign of frogeye leaf spot during R growth stages or from R3 to R5 for seed quality protection. Use: Point System Guide for Forecasting Fungicide Need (see OSU Extension Facts no. 7632). For soybean rust , apply from growth stages R1 to R5 when rust threatens. A second application may be made from 14 to 21d after the first if needed.
	prothioconazole (3): Proline 480SC 2.5 to 3 fl oz	For soybean rust , apply from growth stages R1 to R5 when rust threatens. A second application may be made from 14 to 21d after the first if needed.
	tebuconazole (3): Folicur 3.6F 3 to 4 fl oz	For soybean rust , apply from growth stages R1 to R5 when rust threatens. A second application may be made from 14 to 21d after the first if needed.
	tetraconazole (3): Domark 230 ME 1.9E 4 to 5 fl oz	Apply at first sign of frogeye leaf spot during R growth stages or from R3 to R5 for seed quality protection. Use: Point System Guide for Forecasting Fungicide Need (see OSU Extension Facts no. 7632). For soybean rust , apply from growth stages R1 to R5 when rust threatens. A second application may be made from 14 to 21d after the first if needed.
	thiophanate-methyl (1): Topsin 70W 0.5 to 1.0 lb T-Methyl 70W 0.5 to 1.0 lb Thiophanate Methyl 85WDG 0.4 to 0.8 lb Topsin 4.5F 10 to 20 fl oz T-Methyl 4.5F 10 to 20 fl oz	Apply at first sign of frogeye leaf spot during R growth stages or from growth stage R3 to R5 for seed quality protection. Use: Point System Guide for Forecasting Fungicide Need (See OSU Extension Facts no. 7632).

SUNFLOWER INSECT CONTROL SUGGESTIONS

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)	Rate of Product per Acre	Comments
<p>Cutworms (black, granulate, sandhill) Striped or solid colored, robust caterpillars that “roll” up when disturbed, and prefer to live under ground.</p> <p><u>Damage:</u> Cutworms generally feed at night and live under the soil during the day. Plants will be cut at or slightly above the soil level, causing stand reductions.</p> <p><u>Threshold:</u> Scout fields at seedling emergence. Threshold is one cutworm per square foot combined with a 25% stand reduction. Treat when worms are less than ½ inch long.</p>	<p>Asana XL (3)</p> <p>Baythroid XL (3) (cyfluthrin)</p> <p>Cobalt (1B, 3)</p> <p>Delta Gold (3)</p> <p>Karate w Zeon (3) (lambda cyhalothrin)</p> <p>Lorsban 4E (1B) (chlorpyrifos)</p> <p>Mustang MAX EC (3)</p> <p>Proaxis 0.5 CS (3)</p>	<p>5.8 to 9.6 fl oz</p> <p>0.8 to 1.6 fl oz</p> <p>19 to 38 fl oz</p> <p>1.0 to 1.5 fl oz</p> <p>0.96 to 1.60 (0.015 to 0.025 lb ai/A)</p> <p>2 pts (1 lb ai/A)</p> <p>2.24 to 4 fl oz</p> <p>1.92 to 3.2 fl oz</p>	<p>28 day waiting period for harvest for harvest, do not graze</p> <p>30 day waiting period for harvest for harvest, do not graze</p> <p>45 day waiting period for harvest for harvest, do not graze</p> <p>21 day waiting period for harvest for harvest, do not graze</p> <p>45 day waiting period for harvest for harvest</p> <p>42 day waiting period for harvest for harvest, do not graze</p> <p>30 day waiting period for harvest for harvest, do not graze</p> <p>45 day waiting period for harvest for harvest</p>
<p>Grasshopper 1-2 inches long, outer wings leathery, inner wings clear or colored. Enlarged hind legs designed for jumping.</p> <p><u>Damage:</u> Chew leaves, leaving ragged edges or completely chewing leaf blade. Damage developing seed heads, causing yield loss.</p> <p><u>Threshold:</u> See EPP-7196: Grasshopper Management in Rangeland, Pastures, and Crops</p>	<p>Asana XL (3)</p> <p>Baythroid XL (3) (cyfluthrin)</p> <p>Cobalt (1B, 3)</p> <p>Delta Gold (3)</p> <p>Furadan 4F(1A)</p> <p>Karate w Zeon (3) (lambda cyhalothrin)</p> <p>Lorsban 4E (1B) (chlorpyrifos)</p> <p>Mustang MAX EC (3)</p> <p>Proaxis 0.5 CS (3)</p>	<p>5.8 to 9.6 fl oz</p> <p>2.0 to 2.8 fl oz</p> <p>7 to 13 fl oz</p> <p>1.0 to 1.5 fl oz</p> <p>4 to 16 fl oz</p> <p>1.28 to 1.92 fl oz (0.02 to 0.03 lb ai/A)</p> <p>2 pts (1 lb ai/A)</p> <p>2.24 to 4 fl oz</p> <p>1.92 to 3.2 fl oz</p>	<p>28 day waiting period for harvest for harvest, do not graze</p> <p>30 day waiting period for harvest for harvest, do not graze</p> <p>45 day waiting period for harvest for harvest, do not graze</p> <p>21 day waiting period for harvest for harvest, do not graze</p> <p>28 day waiting period for harvest for harvest</p> <p>45 day waiting period for harvest for harvest</p> <p>42 day waiting period for harvest for harvest, do not graze</p> <p>30 day waiting period for harvest for harvest, do not graze</p> <p>45 day waiting period for harvest for harvest</p>
<p>Foliar-feeding caterpillars (painted lady, woolly bear) Various caterpillars, painted lady and woolly bear caterpillars have hairy bodies.</p> <p><u>Damage:</u> Feed on leaves</p> <p><u>Threshold:</u> Treat when defoliation exceeds 25% and caterpillars are still present.</p>	<p>Cobalt (1B, 3)</p> <p>Karate w Zeon (3) (lambda cyhalothrin)</p> <p>Lorsban 4E (1B) (chlorpyrifos)</p> <p>Proaxis 0.5 CS (3)</p>	<p>19-38 fl oz</p> <p>1.28 to 1.92 fl oz (0.02 to 0.03 lb ai/A)</p> <p>1 to 1.5 pt (1 lb ai/A)</p> <p>1.92 to 3.2 fl oz</p>	<p>45 day waiting period for harvest for harvest, do not graze</p> <p>45 day waiting period for harvest for harvest</p> <p>(woolly bear caterpillars only, 42 day waiting period for harvest, do not graze)</p> <p>45 day waiting period for harvest</p>

SUNFLOWER INSECT CONTROL SUGGESTIONS (CONT'D)

Pest, Damage, and Treatment Threshold	Insecticide Formulation and (MOA Group)	Rate of Product per Acre	Comments
<p>Seed weevils (Red and Gray) Reddish weevil about 1/8 inch long, and grey weevil about 1/4 inch long. Larvae are white, about 1/6 inch long when mature.</p> <p><u>Damage:</u> Larvae feed inside seed, cut exit hole when mature, and burrow into ground.</p> <p><u>Threshold:</u> Scout for red weevil when 85% of plants are past R-4 growth stage. Treat when counts exceed 10 weevils per head. Continue to scout to determine if second spray is needed.</p>	<p>Baythroid XL (3) (cyfluthrin)</p> <p>Cobalt (1B, 3)</p> <p>Delta Gold (3)</p> <p>Karate w Zeon (3) (lambda cyhalothrin)</p> <p>Lorsban 4E (1B) (chlorpyrifos)</p> <p>Methyl parathion 4EC (1B)</p> <p>Mustang MAX EC (3)</p> <p>Proaxis 0.5 CS (3)</p>	<p>2.0 to 2.8 fl oz</p> <p>19 to 38 fl oz</p> <p>1.0 to 1.5 fl oz</p> <p>1.28 to 1.92 fl oz (0.02 to 0.03 lb ai/A)</p> <p>1.0 to 1.5 pt (0.5 to 0.75 lb ai/A)</p> <p>2 pts</p> <p>2.24 to 4 fl oz</p> <p>2.56 to 3.84 fl oz</p>	<p>30 day waiting period for harvest</p> <p>45 day waiting period for harvest</p> <p>21 day waiting period for harvest</p> <p>45 day waiting period for harvest</p> <p>42 day waiting period for harvest</p> <p>30 day waiting period for harvest</p> <p>30 day waiting period for harvest</p> <p>45 day waiting period for harvest</p>
<p>Stem weevil 1/8 inch long, grayish-brown with varying white spots on wing covers. Adults emerge in mid-late June.</p> <p><u>Damage:</u> Adults insert eggs in stalks. Larval feeding causes weakening of stalk, easily lodged heads.</p> <p><u>Threshold:</u> Begin scouting in mid-June. Treat when counts reach 1 weevil per three plants. In areas with history of problem, treat when plants reach 8-10 leaf stage if planted before June 1.</p>	<p style="text-align: center;"><u>Planting Time</u></p> <p>Furadan 4F, LFR (1A)</p> <p style="text-align: center;"><u>Post-Plant</u></p> <p>Baythroid XL (3) (cyfluthrin)</p> <p>Cobalt (1B, 3)</p> <p>Delta Gold (3)</p> <p>Furadan 4F(1A)</p> <p>Karate w Zeon (3) (lambda cyhalothrin)</p> <p>Lorsban 4E (1B) (chlorpyrifos)</p> <p>Mustang MAX EC (3)</p> <p>Proaxis 0.5 CS (3)</p>	<p>2.5 fl oz/1000 ft row</p> <p>1.6 to 2.4 fl oz</p> <p>19 to 38 fl oz</p> <p>1.0 to 1.5 fl oz</p> <p>1 pt (foliar)</p> <p>1.28 to 1.92 fl oz (0.02 to 0.03 lb ai/A)</p> <p>1.0 to 1.5 pt (0.5 to 0.75 lb ai/A)</p> <p>2.24 to 4 fl oz</p> <p>2.56 to 3.84 fl oz</p>	<p>28 day waiting period for harvest</p> <p>30 day waiting period for harvest, do not graze</p> <p>45 day waiting period for harvest, do not graze</p> <p>21 day waiting period for harvest, do not graze</p> <p>28 day waiting period for harvest</p> <p>45 day waiting period for harvest</p> <p>42 day waiting period for harvest, do not graze</p> <p>30 day waiting period for harvest, do not graze</p> <p>45 day waiting period for harvest</p>
<p>Sunflower beetle Similar to Colorado potato beetle, light yellow with dark brown stripes and measures about 3/4 inch long. Larvae are yellow and humpbacked.</p> <p><u>Damage:</u> Feed on foliage, chewing holes in leaves.</p> <p><u>Thresholds:</u> Seedlings: 1 adult per plant. Larger plants: 10 to 15 larvae + 25% defoliation.</p>	<p>Baythroid XL (3) (cyfluthrin)</p> <p>Cobalt (1B, 3)</p> <p>Delta Gold (3)</p> <p>Furadan 4F(1A)</p> <p>Karate w Zeon (3) (lambda cyhalothrin)</p> <p>Lorsban 4E (1B) (chlorpyrifos)</p> <p>Mustang MAX EC (3)</p> <p>Proaxis 0.5 CS (3)</p>	<p>0.8 to 1.6 fl oz</p> <p>19 to 38 fl oz</p> <p>1.0 to 1.5 fl oz</p> <p>4 to 8 fl oz</p> <p>0.96 to 1.60 (0.015 to 0.025 lb ai/A)</p> <p>1.0 to 1.5 pt (0.5 to 0.75 lb ai/A)</p> <p>2.24 to 4 fl oz</p> <p>1.92 to 3.2 fl oz</p>	<p>30 day waiting period for harvest, do not graze</p> <p>45 day waiting period for harvest, do not graze</p> <p>21 day waiting period for harvest, do not graze</p> <p>28 day waiting period for harvest</p> <p>45 day waiting period for harvest</p> <p>42 day waiting period for harvest, do not graze</p> <p>30 day waiting period for harvest, do not graze</p> <p>45 day waiting period for harvest</p>

SUNFLOWER INSECT CONTROL SUGGESTIONS (CONT'D)

Pre-harvest Intervals and grazing restrictions

Asana ^r XL	28 day PHI, do not feed or graze
Baythroid ^r 2, XL	30 day PHI for harvest or grazing
Cobalt ^r	45 day PHI, do not feed or graze
Delta Gold ^r	21 day PHI, do not feed or graze
Furadan ^r 4F	75 day PHI
Karate ^r w Zeon	45 day PHI
Lorsban ^r 4E	42 day PHI, do not feed or graze
Methyl parathion ^r	30 day PHI, do not feed or graze
Mustang ^r MAX EC	30 day PHI, do not feed or graze
Proaxis ^r	30 Day PHI

- Numbers in parentheses (#) that follow the insecticide name are used to designate the mode of action of the insecticide according to the classification system developed by the Insecticide Resistance Action Committee, (IRAC) in 2005. It is intended to help in the selection of insecticides for preventative resistance management. If you make multiple applications for a specific pest during a growing season, simply select a registered insecticide with a different number for each application. To further delay resistance from developing, integrate other control methods into your pest management programs.

This section was not revised in 2008.

VETCH INSECT CONTROL SUGGESTIONS

INSECT AND TIME OF TREATMENT	INSECTICIDE (MOA Group) AND AMOUNT PER ACRE	MINIMUM DAYS FROM APPLICATION TO HARVEST	COMMENTS
Pea aphid In spring	Malathion 57EC (1B) 1.5 - 2.0 pt	7	
Vetch Bruchid Lygus bugs In spring	Malathion 57EC (1B) 1.5 - 2.0 pt	7	For best results in controlling bruchids, spray when they move into the field. Apply chemicals when 10 to 25% of the blooms have fallen if bruchids are present. Generally, the pods will be about 0.25 inch long at that time. Check field 6-8 days later and if bruchids are still present, make another application.

MOA Group Tables start on page 46 of the handbook.

