Agronomy Technical Note

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Natural Resources Conservation Service
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TECHNICAL NOTE: – AGRONOMY – OH-1 March 2007

Controlling Kochia and Palmer Amaranth in Warm Season Grass Stands and in Cropland.

Background: There are a few kochia species in the United States. Kochia *(Kochia scoparia)*, and Palmer amaranth (*Amaranthus palmeri*) which are common noxious weeds in states south and west of Ohio have been found in recent warm season grass / forb seedings in Ohio. It is quite possible some of these weed seeds found their way into Ohio with the warm season grass / forb seed.

Both species found in these warm season grass stands appear to be resistant to ALS-inhibiting herbicides (Pursuit, Plateau, etc), and kochia can be resistant to triazine herbicides (atrazine, Sencor). Glyphosate (Roundup) resistant Palmer amaranth biotypes have also been found in Georgia.

Where these weeds are widespread they are considered serious pests. The resistant varieties present a challenge to effective control. They produce large quantities of seed and in the case of kochia spread very quickly by "tumbling" across the ground dropping seed as they roll.

Preventing Future Infestation:
Ohio Department of Agriculture (ODA) has added these two weeds seeds to the prohibited noxious weed and seed lists for Ohio. This means that any seed lot found to contain kochia or Palmer amaranth weed seeds cannot be sold or used in Ohio without first being cleaned in Ohio.

Seed Tag: Seed that is sold for use in Ohio must be labeled properly as required by the Ohio Revised Code. State law requires among other things that seed tags/labels identify the kind and variety of seed listed by percentage contained in the bag, the percent germination of each variety of seed, and the percent and types of noxious weed seeds the lot of seed contains. The Farm Service Agency (FSA) has enacted a State Seed Policy requiring seed planted on CRP acres to be purchased from a vendor registered with ODA and be labeled according to the Ohio Revised Code.

Seed Sampling: ODA can and does sample and test seed to make sure that the seed tag or label is accurate and that the seed does not contain any prohibited weed seed. However, in many cases warm season grass / forb seed is being purchased directly from out of state sources (via phone, Internet) and planted. Because ODA is not aware of these transactions, they do not have the opportunity to sample the seed. Groups, SWCDs and others who are serving as distributors of seed in Ohio are encouraged to verify the seed is labeled properly and have their seed tested by ODA prior to selling/planting.

Kochia *(Kochia scoparia)* Identification:

Kochia Seedling
(very pubescent)

Young Kochia Plant About 2' Tall
Picture by: Steve Dewey
Utah State University

Other Common Names: tumbleweed, summer cypress, Mexican burningbush, mock cypress, Mexican fireweed, fireweed, common kochia, belvedere, fireball, firebush

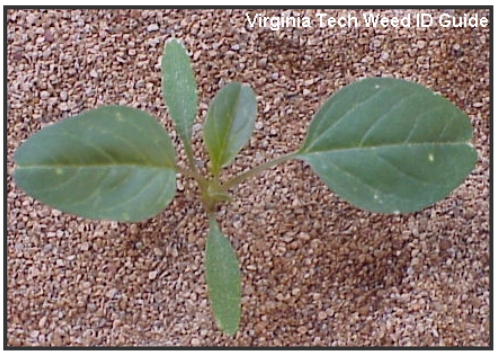
Description of Kochia:
Kochia is a prolific annual forb that reproduces by seed. The plants grow like a small shrub or bush and can grow from 1 to 6 ft tall. They have deep taproots. The stems are striated, erect, light green in color and have many branches. The leaves are alternate and pubescent. They are 1 to 2 in. long, narrow, pointed and attached directly to the stems. Seeds are produced from light green flowers in narrow heads at the leaf axis.

Kochia Seed Head

The plants are dark green when young and turn red as fall approaches and the plants mature. The seeds are small, rough, flat, triangular and grayish-black in color.

In late fall and winter, the plant skeletons which look similar to a Christmas tree skeleton, often break away from the roots and tumble over the ground, scattering their seeds as they roll.

Palmer Amaranth *(Amaranthus palmeri)* Identification:
(pictures from Virginia Tech Weed id Guide)



Alternate leaves with petioles longer than the leaves

Other Common Names: Palmer pigweed, carelessweed

Description of Palmer Amaranth:
Palmer amaranth is an erect summer annual. Is closely resembles many other pigweed species, and is found throughout the southern United States.

One of its distinct characteristics is its dense compact terminal panicle. Plants can grow to a height of 6 feet. It has alternate leaves with petioles that are longer than the leaves. Palmer amaranth is often confused with other similar pigweed species. However, no other pigweed species have such long terminal panicles. The leaves of Palmer amaranth have prominent white veins on the undersurface unlike those of redroot pigweed and they are not pubescent.

The long terminal panicle is characteristic of Palmer amaranth

Controlling Resistant Kochia and Palmer Amaranth in Warm-Season Grasses:
Kochia and Palmer amaranth are summer annuals. Both are most susceptible to herbicides when small, less than 4 inches for kochia and less than 4 to 8 inches for Palmer amaranth. One of the problems with trying to control both weeds with a single herbicide application in warm-season grasses is that their emergence patterns are somewhat different. Kochia emerges early in the season (April into May) and Palmer amaranth emerges later (May into June). So, applying herbicides when kochia is small, which results in most effective control, may still be early in the emergence of Palmer amaranth. As a result, there is the likelihood of Palmer amaranth plants emerging after an early herbicide treatment. Strategies to deal with this issue: 1) make an early herbicide application to obtain maximum control of kochia, and follow with a second herbicide application 3 to 6 weeks later; 2) try to delay the initial herbicide application until kochia plants are somewhat larger, which can improve control of later-emerging Palmer amaranth, but there is the risk of reduced kochia control. Both species can be resistant to ALS-inhibiting herbicides (Pursuit, Plateau, etc), and kochia can be resistant to triazine herbicides (atrazine, Sencor).

Herbicide Treatments for Warm-Season Grasses:
(ranked from least to most risk of injury to forbs)

1. Aim (2 oz/A) - controls kochia and Palmer amaranth that are less than 4 inches tall. Aim is a contact herbicide and should be applied in a spray volume of 20 to 30 GPA. This herbicide may cause temporary injury to grasses, which takes the form of necrosis of leaf tissue. Injury can be more severe when applied to wet foliage. It should be applied with nonionic surfactant (0.25% v/v) or crop oil concentrate (1% v/v). This treatment may cause extensive injury to forbs, but most are likely to survive, especially perennial species.

2. Starane - controls kochia but not Palmer amaranth. Apply 1/3 pint/A for plants up to 4 inches tall, and 2/3 pint/A for plants up to 8 inches tall.

3. Starane + 2,4-D – controls kochia and Palmer amaranth. This mixture is also available in several premix products, such as Starane + Salvo. Use Starane rates shown in #2 above, and add 2,4-D at the rate of 0.5 to 1.0 lb ai/A (1 to 2 pints of 4 lb/gallon product). Use the higher 2,4-D rate for large Palmer amaranth plants. Injury to forbs will increase as the 2,4-D rate increases. This combination should provide the greatest control of both weed species, where the application is delayed into late spring and the kochia is large.

4. 2,4-D (0.5 lb ai/A) + dicamba (0.25 lb ai/A) – controls kochia and Palmer amaranth. Apply when plants are 4 to 8 inches tall.

Controlling Kochia and Palmer Amaranth in Soybeans:

1. Plant no-tillage (to keep the weed seeds on the soil surface) Roundup Ready soybeans since glyphosate is the most effective postemergence herbicide for control of Palmer amaranth and kochia.

2. Control early-emerging kochia plants with a preplant burndown application of glyphosate plus 2,4-D ester (at least 7 days before planting). Include a preemergence herbicide with residual activity on Palmer amaranth and kochia – Gangster, Valor, Sonic, Authority First, or Sencor. Sencor will not control triazine-resistant kochia populations.

3. Apply glyphosate postemergence when weeds are 4 to 8 inches tall and make a second application if Palmer amaranth germinates late in the season.

Controlling Kochia and Palmer Amaranth in Corn:

1. Plant no-tillage (to keep the weed seeds on the soil surface) corn and control early-emerging kochia plants with a preplant burndown application of glyphosate plus 2,4-D ester. Include a preemergence herbicide with residual activity on Palmer amaranth and kochia – Lexar, Lumax, Balance, Radius, and products containing atrazine. Atrazine will not control triazine-resistant kochia populations.

2. Apply postemergence herbicides when weeds are less than 4 inches tall for most effective control. Postemergence corn herbicides that control both Palmer amaranth and kochia include: glyphosate (Roundup Ready corn), Liberty (Liberty Link/Herculex corn), dicamba, Distinct, or Status. Where the kochia is not atrazine –resistant, additional postemergence options include atrazine, combinations of atrazine with Callisto or Impact, and Liberty plus atrazine (Liberty Link/herculex hybrids). Starane controls kochia, but not Palmer amaranth.

Cultural Control of Kochia and Palmer Amaranth:

It is recommended that CRP and cropland fields which have recently been exposed to kochia and/or Palmer amaranth not be tilled for several years until the weed seeds deposited on the soil surface have had a chance to germinate. Tilling will incorporate the seed into the plow layer which could perpetuate the problem.

Allowing the seeds to remain on the surface will increase their chance of germination and the resulting seedling can then be controlled with an appropriate herbicide program or by spot mowing problem areas to prevent the plants from producing seed. For the same reason, the best mid-contract management option for CRP land with a history of kochia or Palmer amaranth might be spraying rather than disking.

Spot mowing problem areas in land enrolled in CRP might prove effective if timed between beginning flower and seed development. If the plants have already set seed, then mowing will broadcast the seed within the field and spread the infestation, however this will significantly reduce the possibility of seed and plants moving to other fields.

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References:

Pictures of Palmer Amaranth – Virginia Tech Weed ID Guide
http://ipm.ppws.vt.edu/scott/weed_id/amapa.htm

NRCS – Plant Database : http://plants.usda.gov/