

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**COVER CROP**

(Ac.)

**CODE 340**

**DEFINITION**

Grasses, legumes, forbs, or other herbaceous plants established for seasonal cover and other conservation purposes.

compatible with the Oklahoma NRCS Nutrient Management (590) and Pest Management (595) standards.

Soil moisture conditions will be adequate to establish the cover crop.

**PURPOSE**

- Reduce erosion from wind and water.
- Sequester carbon in plant biomass and soils to increase soil organic matter content.
- Capture and recycle excess nutrients in the soil profile.
- Promote biological nitrogen fixation.
- Increase biodiversity.
- Weed suppression.
- Provide supplemental forage.
- Soil moisture management.
- Reduce particulate emissions into the atmosphere.

Cover crops will be terminated by harvest, grazing, frost, mowing, tillage, and/or herbicides in preparation for the following crop. When viable seed produced by the cover crop is undesirable, the cover crop will be terminated prior to seed maturity or by selecting varieties that produce sterile seed.

Herbicides used with cover crops will be compatible with the following crop.

Cover crop residue will not be burned.

**Additional Criteria to Reduce Erosion from Wind and Water**

Cover crop establishment, in conjunction with other practices, will be timed so that the soil will be adequately protected during the critical erosion period(s).

Plants selected for cover crops will have the physical characteristics necessary to provide adequate protection such as those listed in **Table 1**. Other crops meeting the above criteria may also be used.

The amount of surface and/or canopy cover needed from the cover crop shall be determined using current erosion prediction technology.

Cover crops used to protect germinating or seedling crops will provide wind erosion protection to the estimated crop tolerance for blowing soil listed in **Table 2**.

**CONDITIONS WHERE PRACTICE APPLIES**

On all lands or practices requiring vegetative cover for natural resource protection.

**CRITERIA**

**General Criteria Applicable to All Purposes**

Plant species, seedbed preparation, seeding rates, seeding dates, seeding depths, and planting methods not listed in **Table 1** will be consistent with Oklahoma State University fact sheets and publications.

Management of the cover crop will be

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.
---

**NRCS, OK  
November 2004**

### **Cover Crops for Establishing Grasses, Forbs, and Legumes**

**Seedbed Preparation:** A seedbed will be prepared by any method that results in a friable, firm seedbed without weed competition.

Hardpans or plowpans will be destroyed prior to planting. The Oklahoma NRCS Deep Tillage (324) standard will be used as guidance.

Refer to **Table 1** for cover crop species selection, planting dates, rates, and additional information. Seed will be drilled providing good soil to seed contact.

**Soil test analysis for nutrient recommendation will not be required for cover crops used for grass establishment based on technical determination.**

**Management of Cover Crop:** Cover crops will be managed to prevent the production of viable seed and volunteering. Cover crops will be terminated by harvest, grazing, frost, mowing, tillage, herbicides, and/or selecting varieties that produce sterile seed. When tillage is used, additional time may be needed for the soil to consolidate and the seedbed to become firm enough for planting.

Periodically, moisture conditions exist that will allow excess growth to be produced by the cover crop. This can occur with forage sorghums or sudangrasses. Excessive top growth can inhibit proper seed to soil contact at planting time and impair grass seeding operations. When excessive top growth occurs, it should be removed by grazing, haying or mowing with a shredder to chop up the residue. Using grain sorghums or delayed planting can help alleviate this condition.

Maintain a minimum stubble height of 12" on the cover crop.

Control weeds as needed in the cover crop during the fallow period. This is best done with herbicides but may be done with tillage as long as an adequate cover of residue remains and the proper firmness of the seedbed can be achieved by grass seeding time.

Volunteer small grains shall be destroyed to break pest cycles such as those that cause wheat streak mosaic.

**Required Cover Crops:** Cover crops used to protect grass/legume seedlings from wind and blowing soil will be required for the following conditions:

- "I" values  $\geq 134$  (statewide)
- "I" values  $\geq 86$  and "C" values  $\geq 35$
- "I" values  $\geq 56$  and "C" values  $\geq 45$
- "I" values  $\geq 38$  and "C" values  $\geq 55$

All residues from the cover crop will be retained on soils having "I" values of 310 or 220 with C factors  $\geq 25$ . Soil loss from wind erosion will not exceed the soil loss tolerance for the field during the establishment period of the seedlings.

### **Additional Criteria to Sequester Carbon in Plant Biomass, in the Soil, and to Increase Soil Organic Matter Content**

Cover crop species will be selected on the basis of producing high volumes of residues to maintain or improve soil organic matter.

The NRCS Soil Conditioning Index (SCI) contained in RUSLE2 will be used to determine the amount of biomass required to maintain or improve soil organic matter (SCI  $\geq 0.0$ ).

The cover crop will be terminated as late as feasible to maximize plant biomass production, considering the time needed to prepare the field for planting the next crop.

### **Additional Criteria to Capture and Recycle Excess Nutrients in the Soil Profile**

Cover crops will be established and be actively growing before expected periods of high precipitation that can cause leaching.

Cover crop species will be selected for their ability to absorb large amounts of nutrients from the rooting profile of the soil. Refer to the ***Agricultural Waste Management Field Handbook, Chapter 6, Table 6-6*** for nutrient removal values of selected crops.

The aboveground biomass will be removed from the field for maximum nutrient removal efficiency, when nutrients will not be recycled through a subsequent crop.

**NRCS, OK**

**November 2004**

### **Additional Criteria to Promote Biological Nitrogen Fixation**

Only legumes or legume grass mixtures will be established as cover crops.

The specific Rhizobium bacteria for the selected legume will either be present in the soil or the seed will be inoculated at the time of planting.

Most legumes are capable of fixing large amounts of atmospheric nitrogen. However, most of the nitrogen fixed by the legume plant is used by the plant (approximately 75%). Only if the plant is left unharvested and returned to the soil will the full nitrogen benefit be realized.

Refer to **Table 3** for a list of legumes and the amount of nitrogen available for the next crop.

### **Additional Criteria to Increase Biodiversity**

Cover crop species shall be selected that, have different maturity dates, attract beneficial insects, serve as a trap crop for damaging insects, and/or provide food and cover for wildlife habitat management.

### **Additional Criteria for Weed Suppression**

Species for the cover crop will be selected for their chemical or physical characteristics to compete with weeds.

Cover crop residues will be left on the soil surface to maximize allelopathic (chemical) and mulching (physical) effects.

### **Additional Criteria to Provide Supplemental Forage**

Species selected will have desired forage traits, be palatable to livestock, and not interfere with the production of the subsequent crop.

Forage provided by the cover crop may be hayed or grazed as long as sufficient biomass is left for resource protection.

### **Additional Criteria for Soil Moisture Management**

Terminate growth of the cover crop sufficiently early to conserve soil moisture for the subsequent crop.

Cover crops established for moisture conservation shall be left on the soil surface until the subsequent crop is planted.

In areas of potential excess soil moisture, allow the cover crop to grow as long as possible to optimize soil moisture removal.

### **Additional Criteria to Reduce Particulate Emissions into the Atmosphere**

Manage cover crops and their residues so that at least 80% ground cover is maintained during planting operations for the following crop.

## **CONSIDERATIONS**

Maintain an actively growing cover crop as late as feasible to maximize plant growth, allowing time to prepare the field for the next crop.

Use deep-rooted species to maximize nutrient recovery.

Consider that grasses utilize more soil nitrogen, and legumes utilize both nitrogen and phosphorus.

Avoiding cover crop species that attract potentially damaging insects.

For most purposes for which cover crops are established, the anticipated benefits are usually accomplished when the plant density is at least 25 stems per square foot, the combined canopy and surface cover is at least 60 percent, and the above ground (dry weight) biomass production is at least 2700 lb/acre.

Consider using plant species that enhance biomass collection opportunities.

## **PLANS AND SPECIFICATIONS**

Plans and specifications will be prepared for the practice site. Plans for the establishment of cover crops shall include:

- Specie(s) of plants to be established.
- Seeding rates.
- Planned dates of establishment.
- Planned method of establishment.
- Planned rates and timing of nutrient application *when applicable*.

- Planned dates for destroying cover crop.
- Other information pertinent to establishing and managing the cover crop.

Plans and specifications for the establishment and management of cover crops may be recorded in narrative form, on job sheets, or on other forms.

#### **OPERATION AND MAINTENANCE**

Control growth of the cover crop to reduce competition from volunteer plants and shading.

Control weeds in cover crops by mowing or by using other pest management techniques.

**TABLE 1**  
**Cover Crops for Establishing Grasses, Forbs, and Legumes**

Cover Crop	Optimum Planting Date	Seeding Rate	Comments
Forage Sorghums	4/15 – 6/15	6 – 12 lbs./ac	Row spacing will be $\leq 20$ ". With adequate moisture, planting may be done until 60 days prior to the average killing frost date for the location.
Sudangrass	4/15 – 6/15	25 – 30 lbs./ac	Row spacing will be $\leq 20$ ". With adequate moisture, planting may be done until 60 days prior to the average killing frost date for the location.
Grain Sorghum	4/15 – 6/15	3 – 8 lbs./ac	Row spacing will be $\leq 30$ ". With adequate moisture, planting may be done until 60 days prior to the average killing frost date for the location. Excluded on soils with an "I" $\geq 134$ in the Panhandle
Wheat	9/1/ - 11/30	40 – 60 lbs./ac	Excluded on soils with an "I" $\geq 134$ Wheat may be used on "I" 134 soils when planting Weeping Lovegrass. All wheat residues will be retained until late spring. Combined residue from harvested wheat will be uniformly distributed on the soil surface. Growing wheat will be destroyed at or just prior to the boot stage but no later than the soft dough stage. Wheat may be used under graze out conditions when planting Old World Bluestems

**TABLE 2**  
**ESTIMATED CROP TOLERANCES TO BLOWING SOIL**

<b>Crop</b>	<b>Tolerance* (Tons/Ac/Yr)</b>
Alfalfa (seedlings)	<0.5
Asparagus	<0.5
Cantaloupe	<0.5
Carrots	<0.5
Celery	<0.5
Eggplant	<0.5
Lettuce	<0.5
Muskmelons	<0.5
Onions (seedlings <30 day old)	<0.5
Peppers	<0.5
Spinach	<0.5
Squash	<0.5
Strawberries	<0.5
Sugar, Table Beets	<0.5
Tomatoes	<0.5
Watermelons	<0.5
Broccoli	1.0
Cabbage	1.0
Cotton	1.0
Cucumbers	1.0
Garlic	1.0
Green, Snap Lima Beans	1.0
Peanuts	1.0
Peas	1.0
Potatoes	1.0
Tobacco	1.0
Alfalfa (mature)	2.0
Field, Sweet Corn	2.0
Onions (>30 days old)	2.0
Soybeans	2.0
Sunflowers	2.0
Barley	5.0 **
Buckwheat	5.0 **
Flax	5.0 **
Millet	5.0 **
Oats	5.0 **
Rye	5.0 **
Sorghum	5.0 **
Wheat	5.0 **

\* The system should be designed to prevent soil loss from exceeding crop tolerance the year the crop is grown.

\*\* Crops will tolerate wind erosion equal to or greater than 5 tons/ac/yr.

**NRCS, OK**

**November 2004**

**TABLE 3****Nitrogen Credits****Average Nitrogen Remaining in Soil After Legume Crop**

<b>Legume</b>	<b>*Nitrogen remaining for next crop (Legume hayed or harvested) (lbs/ac)</b>	<b>**Green manure crop nitrogen remaining (Legume unharvested) (lbs/ac)</b>
Alfalfa	80	200
Ladino Clover	60	180
Sweet Clover	60	120
Red Clover	40	115
White Clover	20	100
Soybeans	20	60
Cowpeas	30	90
Vetch	40	80
Lespedeza (annual)	20	85
Peas	40	70
Peanuts	20	40
Beans	20	40

\* These numbers are derived from crops that are harvested and have the remaining crop residues returned to the soil by tillage. (Reference - Oklahoma Soil Fertility Handbook, 1997 Edition, pg. 21)

\*\* A green manure crop is not harvested or grazed and is returned to the soil just prior to maturity. These numbers reflect the amount of nitrogen available for the next crop when the legume is used as a green manure crop. The numbers are adjusted to account for 30% nitrogen loss due to volatilization, leaching, and microbial action. (Reference – Soil Fertility and Fertilizers, Tidsdale and Nelson, pg. 128 and 566)