NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

MULCHING

(Ac.)

CODE 484

DEFINITION

Applying plant residues or other suitable materials produced off site, to the land surface.

PURPOSE

- Conserve soil moisture
- Reduce energy use associated with irrigation
- Moderate soil temperature
- Provide erosion control
- Suppress weed growth
- Facilitate the establishment of vegetative cover
- Improve soil quality
- Reduce airborne particulates
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CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all lands where mulches are needed. This practice may be used alone or in combination with other practices.

CRITERIA

General Criteria Applicable to All Purposes

The selection of mulching materials will depend primarily on site conditions and the material's availability. Mulch materials shall consist of natural and/or artificial materials that are environmentally safe such as plant residue, wood bark or chips, gravel, plastic, fabric, rice hulls, or other equivalent materials of sufficient dimension (depth or thickness) and durability to achieve the intended purpose for the required time period.

Prior to mulching, the soil surface shall be prepared in order to achieve the desired purpose.

The mulch material shall be evenly applied and, if necessary, anchored to the soil. Tackifiers, emulsions, pinning, netting, crimping or other acceptable methods of anchoring will be used if needed to hold the mulch in place for specified periods.

As a minimum, manufactured mulches shall be applied according to the manufacturer's specifications.

Mulching operations shall comply with federal, state and/or local laws and regulations during the installation, operation and maintenance of this practice.

Mulch material shall be relatively free of disease, pesticides, chemicals, noxious weed seeds, and other pests and pathogens.

Refer to Table 1A and 1B to choose mulching materials, and Table 2 for anchoring method.

Additional Criteria to Conserve Soil Moisture

Mulch materials applied to the soil surface shall provide at least 60 percent surface cover to reduce potential evaporation.

Additional Criteria to Moderate Soil Temperature

Mulch materials shall be selected and applied to obtain 100 percent coverage over the area treated. The material shall be of a significant thickness to persist for the period required for the temperature modification.

Additional Criteria to Provide Erosion Control

When mulching with cereal grain straw or grass

hay, apply at a rate to achieve a minimum 70 percent ground cover. Mulch rate shall be determined using current erosion prediction technology to reach the soil erosion objective.

When mulching with wood products such as wood chips, bark, or shavings or other wood materials, apply a minimum 2-inch thickness.

When mulching with gravel or other inorganic material apply a minimum 2 inch thickness and shall consist of pieces 0.75 to 2 inches in diameter.

Additional Criteria to Suppress Weed Growth

The thickness of mulch will be determined by the size of the plant being mulched. Mulches shall be kept clear of the stems of plants where disease is likely to occur. Mulches applied around growing plants or prior to weed seedling development shall have 100 percent ground cover. Thickness of the mulch shall be adequate to prevent emergence of targeted weeds. Plastic mulches may be used.

Additional Criteria to Establish Vegetative Cover

Mulch shall be applied at a rate that achieves a minimum of 70 percent ground cover to provide protection from erosion and runoff and yet allow adequate light and air penetration to the seedbed to ensure proper germination and emergence.

Mulch bare areas in wild blueberry fields with mulching materials at a minimum thickness of two inches. Rake mulch up to and somewhat into the wild blueberry plants to encourage the growth of the wild blueberry rhizomes. For areas 100 square feet or larger, the thickness of the mulch should be a minimum 3 to 4 inches in the middle of the area. This will encourage the wild blueberry plants to encroach these areas. Mulching materials for this purpose are typically organic materials such as bark mulch, peat moss mixed with sand, wood chips, cedar shingle hair or other suitable materials.

Additional Criteria to Improve Soil Condition

Apply mulch materials with a carbon to nitrogen ratio (C:N) less than 30 to 1 so that soil nitrogen is not immobilized by soil biota. Do not apply mulch with C:N less than 20:1 to an area of designed flow in watercourses.

Use the Soil Conditioning Index to assess soil quality impacts and to determine the type and rate of the mulching material.

Additional Criteria to Reduce Airborne Particulate Matter from Wind Erosion

Mulch rate shall be determined using current wind erosion prediction technology to reach the soil erosion (movement of particulates offsite) objective.

CONSIDERATIONS

The use of mulch on crops may reduce the need for pesticides. However, be aware that incidence of slugs or insects may be increased with mulch use, and mulch materials that contain weed seed may actually increase weed populations.

Where weed control is an issue, small grain straw is a better mulching material than hay or incompletely composted manure, which harbor unwanted seeds. Note that of the small grains, barely straw may contain retained seeds which will result in undesired volunteer grain plants. If raising small grain specifically for straw, harvest prior to grain maturation to avoid this problem.

Mulch can protect against winter injury protection in perennial crops, such as strawberries. Barley straw is not recommended for strawberries. Grain will attract turkeys, which will cause damage to the plants.

Evaluate the effects of mulching on evaporation, infiltration and runoff. Mulch material may affect microbial activity in the soil surface, increase infiltration, and decrease runoff, erosion and evaporation. The temperature of the surface runoff may also be lowered.

Mulch material used to conserve soil moisture should be applied prior to moisture loss. Prior to mulching, ensure soil under shallow rooted crops is moist, as these crops require a constant supply of moisture.

Mulch materials with a high water holding capacity and/or high impermeability to water droplets may adversely affect the water needs of plants.

Fine textured mulches allow less oxygen penetration than coarser materials, and should be no thicker than 1 or 2 inches.

Organic materials with C:N ratios of less than 20:1 will release nitrate-nitrogen which could cause water quality impairments.

Mulching may also provide habitat for beneficial insect and provide pest suppression.

Clear and infra-red transmissible (IRT) plastics have the greatest warming potential. They are transparent to incoming radiation and trap the longer wavelengths radiating from the soil. Black mulches are limited to warming soils by conduction only and are less effective.

Clear mulches allow profuse weed growth and may negate the benefits of soil warming. Black mulches provide effective weed control. Wavelength selective (IRT) plastic provides the soil warming characteristics of clear mulch with the weed control ability of black mulch.

Low permeability mulches (e.g. Plastic) may increase concentrated flow and erosion on un-mulched areas.

Consider potential toxic alleleopathic effects that mulch material may have on other organisms. Animal and plant pest species may be incompatible with the site.

Consider the potential for increased pathogenic activity within the applied mulch material.

Keep mulch 3 to 6 inches away from plant stems and crowns to prevent disease and pest problems. Additional weed control may be needed around the plant base area.

Deep mulch provides nesting habitat for ground-burrowing rodents that can chew extensively on tree trunks and/or tree roots. Light mulch applied after the first cold weather may prevent rodents from nesting.

Some mulch material may adversely affect aquatic environments through changes in water chemistry or as waterborne debris. Consider placing mulch in locations that minimizes these risks.

PLANS AND SPECIFICATIONS

Specifications shall be prepared for each site and purpose and recorded using approved specification sheets, job sheets, technical notes, narrative statements in the conservation plan, or other acceptable documentation.

Documentation shall include:

- Purpose of the Mulch
- Type of mulch material used
- The percent cover and/or thickness of mulch material
- Timing of application
- Site preparation
- Listing of netting, tackifiers, or method of anchoring, and
- Operation and maintenance.

OPERATION AND MAINTENANCE

Mulched areas will be periodically inspected, and mulch shall be reinstalled or repaired as needed to accomplish the intended purpose.

Removal or incorporation of mulch materials shall be consistent with the intended purpose and site conditions.

Operation of equipment near and on the site shall not compromise the intended purpose of the mulch.

Prevent or repair any fire damage to the mulch material.

Properly collect and dispose of artificial mulch material after intended use.

Monitor and control undesirable weeds in mulched areas.

TABLE 1A. GUIDE TO MULCH MATERIALS

Mulch Material	Quality Standards	Application Rates per 1000 Sq. Ft.	Application Rates per Acre
Hay or Straw	Air-dried; free of undesirable seeds and coarse materials	70-90 lbs.	1.5 - 2 Tons
Cornstalks, Shredded or Chopped	Air-dried, shred-dried into 8" to 12" lengths	185-275 lbs.	4-6 tons
Compost or Manure	Well shredded, free of excessive coarse material	370-550 lbs.	8-12 tons
Wood Chips or Shavings	Green or air- dried. Free of objection- able coarse materials.	460-920 lbs.	10-20 tons
Wood Excelsior	Green or air-dried burred wood fibers .024" x .031" x 4"	90 lbs. (1 bale)	2 tons
Sawdust Green or Composted	Free from objectionable coarse material	83-500 cu. ft.	--
Wood Fiber Cellulose (Partly digested wood fibers)	Made from natural wood usually with green dye and dispersing agent added. Max. 15% moisture packed.	50 lbs.	2000 lbs.
Peat Moss	Dried, compressed free of coarse materials	200-400 cu. ft.	--

TABLE 1A. GUIDE TO MULCH MATERIALS (Continued)

Mulch Material	Quality Standards	Application Rates per 1000 Sq. Ft.	Application Rates per Acre
Gravel, crushed stone or slag	Use clean material only.	9 cu yds.	
Twisted Kraft Paper Yarn	Plain weave, warp 7 per in., filling 4 per in. salvage edge with polypropylene filament	45" x 250 yds.	Roll 100 lbs.
Twisted Kraft Paper Yarn	Fungicide treated warp 1.1 pairs per in. filling 2.5 in.	45" x 250 yds.	Roll 80 lbs.
Jute, Twisted Yarn	Undyed, unbleached plain weave. Warp 78 ends/ yd. Weft yds. 41 ends/yd.	48" x 50 yds. or 48" x 75	Roll 60 lbs. 90 lbs.
Excelsior Wood Fiber Mats	Interlocking web of excelsior fibers with mulch net backing on one side only.	36" x 30 yds.	Roll
Glass Fiber	1/4" thick 7/16" dia. holes on 1" centers	72" x 30 yds.	Roll 56 lbs.
Plastic	2-4 mils	Variable up to 50' wide	

TABLE 1B. GUIDE TO MULCH MATERIALS

Mulch Material	Depth of Application or Area Covered Per Unit	Remarks
Hay or Straw	Lightly cover 70 to 90 percent of surface	Use straw where mulch effect is to be maintained for more than 3 months. Subject to wind blowing unless kept moist or tied down. Widely used mulching material. Good for erosion control and establishment of seedings.
Cornstalks, Shredded or Chopped	-----	Effective for erosion control, relatively slow to decompose. Excellent for mulch on crops fields. Same value as a cover crop. Resistant to wind blowing.
Compost or Manure	----	Use straw-filled manure where erosion control is needed. May create problem with weeds. Excellent moisture conserver. Resistant to wind blowing.
Wood Chips or Shavings	2-6"	Has about the same use and application as sawdust, but requires less N/ton (10-12 lbs.). Resistant to wind blowings. Can be used on critical areas if protected from washing. Decompose slowly.

TABLE 1B. GUIDE TO MULCH MATERIALS (Continued)

Mulch Material	Depth of Application or Area Cover Per Unit	Remarks
Wood Excelsior	----	Effective for erosion control. Tie-down usually not required. Decomposes slowly. Subject to some wind blowing. Packaged in 80-90 bales. Extra nitrogen fertilizer may be required.
Sawdust, Green or Composted	1-7"	Effective as a mulch around ornamentals, small fruits, and other nursery stock. Special application rates: fruit trees 5-7"; blueberries 6"; vegetables and flowers 2-3"; blackberries and raspberries 4-7"; strawberries 3". Resistant to wind blowing. Requires 30-35 lbs. N/ton to prevent N deficiency while decaying. One cu. ft. weighs 12-24 lbs.
Wood fiber Cellulose (Partly digested wood fibers)	----	When used for erosion control on critical areas double application rate. Apply by hand or hydro-mulcher. May not require tie-down.

TABLE 1B. GUIDE TO MULCH MATERIALS (Continued)

Mulch Material	Depth of Application or Area Cover Per Unit	Remarks
Peat Moss	2" - 4"	Effective as a mulch around ornamentals. Subject to wind blowing unless kept wet. Excellent moisture holding capacity.
Gravel, Crushed Stone or Slag	2” - 3"	Excellent mulch for short slopes and around woody plants and ornamentals. Use gravel where subject to foot traffic.
Twisted Kraft Paper Yarn	312.5 sq. yds.	Used to hold seed and aid in germination without mulch. Tie down according to manufacturing specifications.
Twisted Kraft Paper Yarn	312.5 sq. yds	Use over bare soil or sod to prevent erosion and hold seed. Good for waterways, critical slopes and ditch bottoms. Tie down with staples as per manufacturing specifications.
Jute, Twisted Yarn	66 sq. yds. 100 sq. yds.	Use without additional mulch. Tie down as per manufacturing specification. Effective for erosion control on critical areas, including diversions and waterways.

TABLE 1B. GUIDE TO MULCH MATERIALS (Continued)

Mulch Material	Depth of Application or Area Covered Per Unit	Remarks
Excelsior Wood Fiber Mats	30 sq. yds.	Use without additional mulch. Tie down as per manufacturing specifications. Good for establishing seedings on critical slopes.
Glass Fiber	60 sq. yds.	Use without additional mulch. Tie down with T bars as per manufacturing specifications.
Plastic	---	Use black for weed control; use clear for seeding establishment without organic mulch. Release plastic after seeding is established. Effective moisture conservation and weed control for small fruits.

TABLE 2. MULCH ANCHORING GUIDE

Anchoring Method or Material	Kind of Mulch to be Anchored	How to apply
A. Manual		
1. Peg and Twine by	Hay or straw, pine straw	After mulching, divide areas into blocks approx. 1 sq. yd in size. Drive 4-6 pegs per block to within 2" to 3" of soil surface. Secure mulch to surface stretching twine between pegs in cross-cross patterns on each lock. Secure around each peg with two or more turns. Drive pegs flush with soil where mowing is planned.
2. Mulch netting	Hay or straw, shredded sugar cane, pine straw, compost, wood shavings, 'tanbark'	Staple with light-weight or plastic nettings to paper, jute, wood fiber, soil surface according to manufacturer's recommendations.
3. Soil and stones	Plastic	Plow a single furrow along edge of area to be covered with plastic, fold about 6" of plastic into furrow and plow furrow slice back over plastic. Use stones to hold plastic down in other places as needed.
4. Silt	Hay or straw	Cut mulch into soil surface with square-edged spade. Make cuts in contour rows spaced 18" apart.

TABLE 2. MULCH ANCHORING GUIDE (Continued)

Anchoring Method or Material	Kind of Mulch to be Anchored	How to apply
B. Mechanical		Apply with suitable spray equipment using the following rates: asphalt emulsion 0.04 gallons per sq. yd.; liquid asphalt (rapid, medium, or slow setting) 0.10 gallons per sq. yd.
1. Asphalt spray (emulsion)	Compost, wood chips, wood shavings, hay or straw.	
2. Wood cellulose fiber	Hay or straw	Apply with hydroseeder immediately after mulching. Use 700 lbs. wood fiber per acre.
3. Pick Chain	Hay or straw manure compost, pine straw	Use on slopes steeper than 3:1. Pull across slopes with suitable power equipment.
4. Mulch anchoring tool or disk (smooth or notched)	Hay or straw, manure compost, pine straw.	Apply mulch and pull a mulch anchoring tool over mulch. When a disk (smooth) is used, set in with straight position and pull across slope with suitable power equipment. Mulch material should be "tucked" into soil surface about 3".
5. Chemical	Hay or straw	Apply Terra Tack II (45lbs.) or Aerospray 70 (60 gal/acre) according to manufacturer's instructions. Avoid application during rain. A 24 hour curing period is required with soil temperature higher than 45 degrees F.