NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

MULCHING

(Acre)
CODE 484

DEFINITION

Applying plant residues, by-products or other suitable materials not produced on the site to the soil surface.

PURPOSE

The practice may be used to:

- conserve moisture,
- prevent surface compaction or crusting,
- reduce runoff and erosion,
- control weeds,
- moderate/modify soil temperature, and
- aid in establishing plant cover.

CONDITIONS WHERE PRACTICE APPLIES

On soils subject to erosion on which low-residue producing crops, such as grapes and small fruits are grown, on critical areas, on soils that have a low infiltration rate, and where needed for control of weeds, such as around newly planted trees and shrubs.

CRITERIA

General Criteria Applicable to all Purposes

The type of mulching material selected should be based on cost, time of year, soils, percent slope, and landscape position.

If the area to be mulched is to be seeded, see Critical Area Planting (342) specifications for seedbed preparation, lime, fertilizer, and seed.

Mulch shall consist of either natural and/or artificial materials such as plant residue (including cereal grain straw, grass hay, wood chips, bark and wood fiber), by-products, gravel, plastic, fabric or other equivalent materials of sufficient dimension (depth or thickness) and durability to achieve the intended effect for the required time period.

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

Site Preparation

Soil surface shall be prepared prior to the application of the mulch material in order to achieve desired purpose and to ensure optimum contact between soil and mulch. All areas to be mulched shall be reasonably smooth and free of rills, gullies, and debris.

Where mulch is to be placed around trees and shrubs, remove all competing vegetation and shape watering saucers as needed so they have an effective depth of 4 inches. Mulch should not be applied closer than 6 inches to the trunk/stem(s).

Materials

Mulch material, quality, rates, depth of application, and anchoring methods will be selected from **Table 1**. Mulch material shall be free of diseased plant residue, weed seeds, and harmful chemical residues. Manufactured mulches should be

applied according to the manufacturer's specifications. General methods for applying manufactured mulches are described the **Plans and Specifications** section.

Application

Mulch may be applied to both seeded and unseeded areas.

Mulch shall be applied immediately after seeding.

When temporary erosion control is needed, mulch may be applied anytime soil and site conditions are suitable for spreading and anchoring. Disturbed areas that will not have additional construction activity for 60 days or completed sites that will not be permanently seeded for periods of 60 days or longer should be mulched.

Anchoring

Mulch will be anchored where as required in **Table 1**. Anchoring methods are described in **Plans and Specifications.**

Additional Criteria Applicable to Conserve Soil Moisture

Mulch material shall be applied after seeding ands hall cover at least 60 percent of the soil surface to reduce potential evaporation.

Additional Criteria Applicable to Moderate/Modify Soil Temperature

Non-porous, opaque and dark-colored material shall be used to raise soil and ambient air temperature below the mulch. Light colored material will be used to cool soil and ambient soil temperature below the mulch. The mulch shall be applied so the desired soil and air temperature below the mulch can be achieved.

The material should be sufficient thickness to persist for the period of time required for the temperature modification.

The percent coverage shall be 100 percent over the area treated.

Additional Criteria Applicable to Provide Erosion Control

Critical Areas: When mulching with straw, use at least 2 tons pounds of cereal grain straw or weed free, grass hay per acre. The straw shall be evenly distributed.

When mulching with wood or bonded fiber material, use at least 2,000 pounds of mulch per acre.

When mulching with other wood products such as wood chips, bark, or shavings or other materials, apply in an amount that will provide at least 80 percent ground cover.

When mulching with gravel or other inorganic material for permanent erosion control, apply in sufficient amounts to provide 90 percent ground cover.

Cropland: Mulch rate shall be determined using current erosion prediction technology to reach the soil erosion objectives. See section I of the NRCS Field Office Technical Guide (FOTG).

Additional Criteria Applicable to Control Weed Growth

Mulches applied around growing plants or prior to seedling development shall provide 100 percent ground cover. Thickness of the mulch shall be adequate to prevent emergence of targeted weeds. Use colored or infrared transmissible (IRT) plastic when plastic mulch is used.

Additional Criteria Applicable to Establish Vegetative Cover

Mulch shall be applied at a rate that achieves 50 percent ground cover. Increase mulch rate where erosion is of concern.

CONSIDERATIONS

Consider impacts that mulch material may have on other organisms.

Installation of this practice with any others proposed, should not negatively impact any federal or state listed Rare, Threatened or Endangered species or their habitat.

Organic mulches are the most effective mulch materials. Hydro fiber mulches are effective when used in combination with grass hay and cereal grain straw. Chemical soil binders are less effective than organic mulches.

Organic fiber mats composed of wood fiber or straw covered with a biodegradable polypropylene netting are effective on critical sites and in areas of concentrated runoff. Other mat type materials manufactured from paper or similar materials are suitable to provide erosion control while vegetation grows through the mat.

Straw or corncobs may attract mice and increase the possibility of plant damage.

Consider the carbon to nitrogen (C:N) ratio when selecting mulch materials in relation to nitrogen immobilization and decomposition.

Materials suitable for use as mulch material includes wood bark, chips, wood shavings, and sawdust, fiber matting with plastic netting, animal manure, and materials from food processing plants. Mulching can provide an environmentally acceptable and economically sound method utilizing these bio-products while also deriving conservation benefits.

Mulch may increase pathogens that live in association with the mulch material.

PLANS AND SPECIFICATIONS

Specifications and the purpose for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, construction specifications or other acceptable documentation. Documentation shall include:

- Type of mulch material used
- Percent cover and/or weight of mulch material
- Timing of application
- Site preparation
- Listing of netting, tackifiers, or method of anchoring
- Operation and maintenance

General Instructions: On slopes, mats and nets may be run either up and down or cross slope. In areas of concentrated flow, mats and nets shall be laid parallel to the direction of flow. Spread evenly without stretching to allow maximum contact with the soil. Adjacent edges should be overlapped a minimum of 3" with the upgrade mat or net on top. Staples of 11 gauge or heavier will be used to hold the mats and nets in place. Staples shall be U shaped with a 1" crown. Staple length shall be determined based on soil condition.

- Highly compacted soils – 6"
- Friable soils – 8"
- Loose or Sandy soils – 10"

Outside edges of mats and nets shall be buried in a trench 6" deep. Mat and net edges and middles will be stapled according to manufacturer's recommendations.

Mulch Anchoring Methods

Mulch Anchoring Tool or Disk (serrated blades) – Apply mulch and pull a mulch anchoring tool over mulch. Use equipment with serrated straight disks spaced 6-10" or other suitable equipment approved by the Natural Resources Conservation Service. Operate as close to the contour as possible. Mulch material should be tucked into the soil surface 2-3". Use on areas where concentrated flow velocity is less than 4 feet per second.

Wood Cellulose Fiber – Apply the material with a hydromulcher immediately after spreading mulch. Reduce mulch applications to 3,000 lbs. per acre and apply 750 lbs. of wood fiber per acre with a non-toxic, biodegradable tackifier. Use on areas without concentrated flow.

Asphalt Spray (emulsion) – Apply with suitable equipment to spray asphalt into the mulch as it is applied. Material shall conform to the requirements of ASTM Specification D977. Application rate is 0.5 gallons per square yard (242 gallons per acre). Material shall be non-toxic to plant life. Use on areas without concentrated flow.

Tackifier or Binder – Method and rate of application shall be according to manufacturer's

recommendation. Use on areas without concentrated flow.

Polypropylene Plastic Netting – Apply plastic netting over mulch and staple with 11 gauge or heavier wire staples. Use on areas without concentrated flow or when concentrated flow velocity is less than 4 feet per second.

Peg and Twine – After mulching, divide area into blocks approximately one square yard in size. Drive 4-6 pegs per block to within 2-3" of the soil surface. Anchor mulch by stretching twine between pegs in a criss-cross pattern on each block. Secure twine around each peg with two or more turns. Drive pegs flush with soil surface to allow mowing.

Slit – Cut mulch into soil surface with square edge spade. Make cuts in contour rows spaced 18" apart.

Soil and Stones – Bury edge of plastic in a trench 6 inches deep. Backfill trench and firm soil over plastic. Use stones to hold plastic down in other places as needed.

OPERATION AND MAINTENANCE

Mulched areas will be periodically inspected, reinstalled or repaired as needed.

Operation of equipment near the site shall not damage the intended purpose of the mulch.

Inadvertent movement of mulching or any mulching operation materials (including degraded or decomposed materials) by wind, surface or subsurface water, or mechanical means must not pose a direct or indirect cumulative environmental or safety hazard.

Prevent any fire damage to the mulch material.

REFERENCES

- "Mulching Trees" http://www.urbanext.uiuc.edu/champaign/homeowners/hc980620.html
- "Mulching" http://www.nrcs.usda.gov/feature/backyard/Mulching.html
- ISU Publication RC-209 "Organic Mulches for Garden and Landscape Plantings".
- ISU Article FM19, "Plastic Mulch in Gardens".
- ISU Article from Yard and Garden Column, "Don't Look Under the Mulch" By Donald Lewis, Extension entomologist.
- Revised Universal Soil Loss Equation (RUSLE) Section I Erosion Prediction of the Field Office Technical Guide.

TABLE 1 – GUIDE TO MULCH MATERIALS, RATES, & USES

Mulch Material	Quality Standards	Application Rates Per 1000 ft^2	 Per Acre	Depth of Application	Anchoring Methods 1/	Remarks
Organic Mulches						
Grass Hay or cereal grain straw	Air-dried, free of undesirable seeds, course material and moldy chunks. Grass hay should be 2/3 grass species.	75-100 lbs. 2-3 bales	1.5-2.5 tons 90-120 bales	Lightly cover 75-90% of the surface	• Mulch Anchoring Tool or Disk, • Wood Cellulose Fiber, • Asphalt Spray • Tackifier, • Polypropylene Plastic Netting, • Peg & Twine • Slit	Good to use where mulch is needed for up to 3 months. Subject to blowing unless kept moist or anchored. Most common mulching material. Good for erosion control
Cornstalks, Shredded or chopped	Air dried, 8-12” lengths	150-300 lbs.	4-6 tons		Not required	Effective for erosion control. Slow to decompose. Excellent for mulch of crop fields. Resistant to blowing.
Sawdust or ground corn cobs	Green or composted. Free of objectionable material. Hardwood sawdust is preferred. Corncobs should be free of grain.	200-300 cu ft	5 tons	2-7”	Not required	Most effective as a mulch around ornamentals, small fruits and other nursery stock. Special application rates: **Fruit trees – 5-7”** **Vegetables and flowers 2-3”** **Black & Raspberries 4-7”** **Strawberries 3”** Resistant to blowing. Requires 30-35 lbs. of N/ton to prevent N deficiency during decay. One cubic foot weighs approximately 24 pounds.

Mulch Material	Quality Standards	Application Rates Per 1000 ft^2	 Per Acre	Depth of Application	Anchoring Methods 1/	Remarks
Compost or Manure	Well shredded, free of excessive course material	400-600 lbs.	8-10 tons		(Optional) • Asphalt Spray • Polypropylene Plastic Netting	Use strawy manure. May create a problem with weeds. Resistant to blowing.
Wood Excelsior	Green or air dried burred wood fibers 4"long	90 lbs. 1 bale	2 ton		• Polypropylene Plastic Netting, • Peg & Twine, • Slit	Effective for erosion control. Anchoring required only on critical areas or sites subject to high winds. Decomposes slowly. Packaged in 80-90 lb bales.
Hydromulch Wood fiber cellulose (partly digested wood fiber)	Made from natural wood fiber, usually with green dye and dispersing agent added.	50 lbs.	.75-1 ton		Not required	Use maximum rate when applied to critical areas. Apply with a hydromulcher.
Hydromulch Wood fiber/paper blend	Blend of natural wood fibers and paper	50 lbs.	.75-1 ton		Not required	Use maximum rate when applied to critical areas. Apply with hydromulcher.
Wood chips or Bark shavings	Green or air-dried. Free of objectionable material. Chips or shavings from hardwood species are preferred.	500-900 lbs.	10-20 tons	2-7"	(Optional) • Asphalt spray, • Polypropylene Plastic Netting, • Peg and Twine, • Slit	Same use and application as sawdust and ground corncobs. Requires 20-25 lbs. N/ton to prevent N deficiency during decay. Resists blowing

Mulch Material	Quality Standards	Application Rates Per 1000 ft^2	Application Rates Per Acre	Depth of Application	Anchoring Methods 1/	Remarks
Peat Moss	Dried, compressed, free of course materials.	200-400 lbs.		2-4”	(Optional) Wood Cellulose fiber	Effective around ornamentals. Keep moist to prevent blowing. Packaged in 100 lbs. bales (6 cu ft) Excellent moisture holding.
Fiber Blankets, Mats and Nettings						
Excelsior wood fiber blanket	Interlocking web of excelsior wood fibers with netting on one or both sides. 80% of the fibers are 6 inches or longer	1.5 roll Rolls 36X36 or 48X48 2 lbs. fiber/1000sq in	61 rolls		See **2/** below Staples	Use without additional mulch. Effective for erosion control on steep slopes. Use around tree and shrub plantings to suppress weed growth.
Chopped straw mat	½” layer of chopped straw knitted into polypropylene netting	1.25 rolls	51 rolls		See **2/** below	Use without additional mulch. Effective for erosion control on steep slopes.
Paper mat	Plastic netting interwoven with paper	0.3 or 0.6 rolls	12 0r 24 rolls		See **2/** below	Use without additional mulch.

1/ This column refers to the different types of mulch anchoring methods found under General Criteria.
2/ Follow Manufactures recommendation or see Placement and Anchoring of netting and matting located in Anchoring methods found in General Criteria.

Mulch Material	Quality Standards	Application Rates Per 1000 ft^2	Per Acre	Depth of Application	Anchoring Methods 1/	Remarks
Inorganic Mulch						
Plastic	2-4 mil	Variable up to 50’ wide			Soil and stone	Use black for weed control. Use white for seed establishment without organic mulch. Release plastic after seeding is established. Effective moisture conservation and weed control. Large areas should have holes or slits cut to let rainfall percolate.
Gravel, crushed stone or slag	Washed	9 cubic yards.		2-4”	Not required	Use on short slopes and around woody plants and ornamentals. Use gravel where subject to foot traffic.

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