MULCHING

(Acre)
Code 484

Natural Resources Conservation Service
Conservation Practice Standard

I. Definition

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

II. Purpose

This practice may be applied as part of a conservation management system to support one or more of the following purposes:

- conserve soil moisture,
- moderate soil temperature,
- provide erosion control,
- suppress weed growth,
- facilitate the establishment of vegetative cover,
- improve soil condition, and
- reduce airborne particulates.
- Reduce energy use associated with irrigation.

III. 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.

IV. Federal, Tribal, State, and Local Laws

Users of this standard shall comply with applicable federal, tribal, state and local laws, rules, regulations or permit requirements governing mulching. This standard does not contain the text of federal, tribal, state, or local laws.

V. Criteria

A. General Criteria Applicable to All Purposes

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

If the area to be mulched is to be seeded, see Wisconsin NRCS Field Office Technical Guide (FOTG) Section IV, Standard 342, Critical Area Planting, for seedbed preparation, lime, fertilizer, and seeding requirements.

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), byproducts, 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.

1. Criteria for 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.

   Concentrated flow sources above the site where mulch is applied shall be diverted, or mulch designed to withstand anticipated runoff velocities shall be used.

2. Criteria for Materials

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

   ~~The mulch material shall be evenly applied. Manufactured mulches should be applied according to the manufacturer's specifications. General methods for applying manufactured mulches are described in V.B. Mulch Anchoring Methods.~~

3. Criteria for Application

   Criteria for mulch application ~~may be~~ applies~~d~~ to both seeded and unseeded areas. ~~as needed to address identified resource concerns.~~

Mulch shall be applied immediately after seeding or after final grading for unseeded areas.

The mulch material shall be evenly applied.

Manufactured mulches should be applied according to the manufacturer's specifications.

~~When temporary erosion control is needed, mulch may be applied anytime soil and site conditions are suitable for spreading and anchoring.~~

Crimping (disking), wood cellulose fiber, tackifiers, netting, pinning, or other acceptable methods of anchoring will be used if needed to hold the mulch in place. Criteria are described in V.B. Mulch Anchoring Methods.

4. Mulch Application Rate

Straw and hay mulch shall be applied at the rate of 1½ to 2 tons per acre. This application results in a layer of 6 to 7 stems, 1 to 2 inches thick and shall provide a minimum 70% ground cover. Some soil surface can be seen after the application.

Wood chips or wood bark shall be applied at the rate of 6 to 9 tons per acre to achieve a minimum of 80 percent ground cover.

Wood cellulose fiber mulch, applied with a hydroseeder, shall be applied at the rate of 1,500 to 2,000 pounds per acre. Apply a tackifier when the slope exceeds 3 to 1.

Long-fibered wood cellulose shall be applied at the rate of ¾ to 1¼ tons per acre.

Corncobs shall be applied at the rate of 5 tons per acre.

Gravel shall be applied approximately 2 inches deep and shall consist of pieces ¾ to 2 inches in diameter and shall achieve a minimum of 90 percent ground cover.

5. Fiber Blankets and Mats

Erosion control products manufactured from wood fiber, straw, or paper are intended for use in high water velocity conditions. Design and install according to the manufacturer's instructions.

B. Criteria for Mulch Anchoring Methods

1. Mulch Anchoring Tool or Disk (Serrated Blades)

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

2. Wood Cellulose Fiber

Apply wood cellulose fiber with a hydromulcher immediately after spreading mulch. Reduce straw or hay mulch applications to 3,000 pounds per acre and apply 750 pounds of wood fiber per acre over the surface of the straw or hay in combination with a nontoxic, biodegradable tackifier. Use on areas without concentrated flow.

3. Tackifier or Binder Material

Apply tackifier or binder material with suitable equipment by spraying product directly into the mulch as it is applied. Rate of application shall be according to manufacturer's recommendations. Material shall be nontoxic to plant life. Use only on areas without concentrated flow.

Follow the manufacturer's recommendations on mixing and temperature control. The mulch materials and tackifier shall be blown from a machine and uniformly deposited over the area in one operation.

The machine used for placement of mulch shall blow or eject by constant air stream a controlled amount of straw or hay. It shall also introduce into the air stream a spray of asphalt or similar product.

Mulch materials shall not contain moisture in excess of that which will permit uniform feeding through the machine.

4. Polypropylene Plastic or Jute Netting

Use netting on areas without concentrated flow or where concentrated flow velocity is less than 4 feet per second. Prior to recommending the use of netting, evaluate the potential for reptiles or other wildlife to become entrapped by the net. If a risk is identified, select a 100% degradable net (WI DOT Class I Type A, Class II Type C), or an alternative mulch anchoring method.

Apply netting over the mulch application and staple according to manufacturer's recommendations.

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 and spread evenly without stretching to allow maximum contact with the soil. Adjacent edges should be overlapped a minimum of 3 inches with the adjoining mats or nets. 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-inch crown. Staple length shall be determined based on soil condition.

Soil Condition	Staple Length
Highly compacted soils	6 inches
Friable soils	8 inches
Loose or sandy soils	10 inches

Lay downstream blankets first, working upstream. The netting side of the blanket shall be on the top side after installation. Mat and net edges and middles will be stapled according to manufacturer's recommendations.

5. Peg and Twine

   After mulching, divide the area into blocks approximately one square yard in size. Drive 4 to 6 pegs per block to within 2 to 3 inches of the soil surface. Anchor mulch by stretching twine between pegs in a crisscross pattern on each block. Secure twine around each peg with two or more turns. Drive pegs flush with soil surface to allow mowing. Use on areas without concentrated flow.

6. Pinning

   Cut mulch into soil surface with square edge spade or a dull disk. Make cuts in contour rows. Use on small areas without concentrated flow.

7. Soil

   Small areas of mulch can be lightly covered with soil. The soil shall be free of stones and debris, and distributed over the mulch in a thin uniform layer. Use on small areas without concentrated flow.

8. Trenching or Weights

   Bury edge of plastic in a trench 6 inches deep. Compact the soil over plastic in the trench. Use stones to hold plastic down in other places as needed. Use on small areas without concentrated flow.

C. Additional Criteria to Conserve Soil Moisture and/or Reduce Energy Use Associated with Irrigation

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

D. Additional Criteria Applicable to Moderate/Modify Soil Temperature

Nonporous, clear, infrared transmissible, 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 to 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.

E. 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.

F. Additional Criteria to Suppress Weed Growth

The thickness of mulch will be determined by the size and growth characteristics 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.

G. 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.

H. Additional Criteria to Improve Soil Condition

Apply mulch materials with a carbon to nitrogen ratio (C:N) less than 30:1 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.

VI. Considerations

Additional recommendations relating to design that may enhance the use of, or avoid problems with, this practice but are not required to ensure its basic conservation functions are as follows.

A. Consider mulching 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.

B. Consider application of mulch immediately after a precipitation event or watering to conserve soil moisture. Ensure soil under shallow rooted crops is moist, as these crops require a constant supply of moisture.

C. Consider anchoring straw or hay mulch or keep mulch moist to prevent blowing in wind-prone areas.

~~C~~D. Consider the impact of mulch materials with a high water holding capacity and/or high impermeability to water droplets which may reduce the water availability to plants.

~~D~~E. Consider the potential impact of fine-textured mulches (e.g., rice hulls) which allow less oxygen penetration than coarser materials. Fine-textured mulches should be applied in a layer no thicker than 2 inches.

~~E~~F. Consider the potential of organic materials with C:N ratios of less than 20:1 to release excess nitrate to adjoining surface waters.

~~F~~G. Consider the potential for mulch to provide habitat for beneficial insects and provide pest suppression.

~~G~~H. Consider the mulch color impact on plant growth. 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.

~~H~~I. Consider the potential for runoff from low permeability mulches (e.g., plastic) which may increase concentrated flow and erosion on un-mulched areas.

~~I~~J. Consider potential toxic alleleopathic effects that mulch material may have on other organisms. Animal and plant pest species contained in the mulch may be incompatible with the intended use.

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

~~K~~L. Consider the potential for mulch to cause disease and pest problems. Keep mulch 3 to 6 inches away from plant stems and crowns where an identified risk is present. Additional weed control may be needed around the plant base area.

~~L~~M. Consider the potential for deep mulch to provide nesting habitat for ground-burrowing rodents that can chew extensively on tree trunks and/or tree roots. Use of a light mulch applied after the first cold weather may prevent rodents from nesting.

~~M~~N. Consider the potential impacts of mulch material on aquatic environments due to changes in water chemistry or as waterborne debris.

~~N~~O. Consider the use of biodegradable staples in locations where wire staples are determined to be a risk.

VII. 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 the following:

- purpose of the mulch;
- type of mulch material used;
- percent cover and/or thickness of mulch material;
- rate of mulch application (tons/acre, lbs/square foot);
- timing of application;
- site preparation;
- listing of netting, tackifiers, or method of anchoring; and
- operation and maintenance.

VIII. Operation and Maintenance

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

Evaluate the effectiveness of the mulch (application, amount of cover provided, durability, etc.) and adjust the management or type of mulch to better meet the intended purpose(s).

Removal or incorporation of mulch materials as necessary after use 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.

IX. References

USDA, NRCS Wisconsin Field Office Technical Guide (FOTG), Section I, Erosion Prediction, Revised Universal Soil Loss Equation (RUSLE2).

Toy, T.J., and G.R. Foster. (Ed.) 1998. Guidelines for the use of the Revised Universal Soil Loss Equation (RUSLE) Version 1.06 on mined lands, construction sites, and reclaimed lands. USDI, OSMR.

USDA, NRCS. 2002. National Agronomy Manual. 190-V. Washington, D.C.

ASTM Designation: D 977, Standard Specification for Emulsified Asphalt1

Wisconsin Department of Transportation, Erosion Control Product Acceptability Lists (PAL): Erosion Mats, Class I Type A, Class II Type C; Tackifiers. http://www.dot.wisconsin.gov/business/engrserv/docs/pal.pdf