

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

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

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.

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. *In Kentucky, this will be the criteria utilized when mulch is required to aid in the establishment of vegetation for conservation practices.*

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

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. Mulch would be utilized in addition to, or in place of, other conservation practices to control erosion.

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 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 Improve Soil Quality

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.

CONSIDERATIONS

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 (e.g. rice hulls) which allow less oxygen penetration than coarser materials should be no thicker than 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 allelopathic 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 woody plant stems and crowns to prevent disease and pest problems. Additional weed control may be needed around the plant base area.

Deep mulch for tree plantings provides nesting habitat for ground-burrowing rodents that can chew extensively on trunks and/or 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.

Consider potential effects of soil physical and chemical properties. Refer to soil survey data as a preliminary planning tool for assessment of areas. Consult the Web Soil Survey at: <http://websoilsurvey.nrcs.usda.gov/app/> to obtain Soil Properties and Qualities information.

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.

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 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.

REFERENCES

- Agriculture and Agri-Food Canada. 2000. Plastic mulches for commercial vegetable production. Canada-Saskatchewan Irrigation Diversification Centre. Outlook, Saskatchewan.
- Renard, K.G., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder, Coordinators. 1997. Predicting soil erosion by water: A guide to conservation planning with the Revised Universal Soil Loss Equation (RUSLE). U.S. Department of Agriculture, Agriculture Handbook No. 703.
- Shaffer, M.J., and W.E. Larson (ed.). 1987. NTRM, a soil-crop simulation model for nitrogen, tillage and crop residue management. USDA Conserv. Res. Rep. 34-1. USDA-ARS.
- 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. 2011. National Agronomy Manual. 190-V, 4th Edition. Washington, D.C.

TABLE 1 – GUIDE TO MULCH MATERIAL, RATES & USES

Mulch Materials	Quality Standards	Application Rates		Depth of Application or % Cover	Anchoring Methods ¹	Comments
		per 1000 ft ²	per Acre			
Organic Mulches						
Grass hay or cereal grain straw	Air dried, free of undesirable seeds coarse material, and moldy chunks. Grass hay should be 2/3's grass species	100-120 lbs 2.5-3 bales	2-2.5 Tons 100-125 bales	80-90%	Mulch anchoring tool or disk Wood cellulose fiber Asphalt spray tackifiers Polypropylene plastic netting(See footnote 1)	Good to use where mulch is needed for up to three months. Subject to blowing unless kept moist and anchored. Most common mulching material. Good for erosion control. Good for grassed waterways and concentrated flow areas to establish seedlings.
Sawdust or ground corncobs	Green or composted. Free of objectionable material. Hardwood sawdust is preferred. Corncobs should be free of grain.	200-300 cu ft	5 Tons	Fruit trees: 5-7" Flowers: 2-3" Black & red raspberries 4-7" Strawberries 3" Blueberries 6"	Not required	Most effective as mulch around ornamentals, small fruits, and other nursery stock. Resistant to blowing. Requires 30-35 pounds of nitrogen per ton to prevent N deficiency during decay. One cubic foot weighs approximately 24 lbs.
Compost or manure solids	Well shredded, free of excessive coarse material	400-600 lbs	8-10 Tons		Not required	Use manure high in straw content. Raw manure may create problems due to unwanted weed seed germination. Horse manure bedded with sawdust will need additional nitrogen and pH should be a concern as well. Composted materials are usually free of viable seeds and diseases. Do not use in concentrated flow areas or sensitive areas.

NRCS, KY
December 2013

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [Field Office Technical Guide](#).

TABLE 1 – GUIDE TO MULCH MATERIAL, RATES & USES

Mulch Materials	Quality Standards	Application Rates		Depth of Application or % Cover	Anchoring Methods ¹	Comments
		per 1000 ft ²	per Acre			
Organic Mulches (continued)						
Hydromulch Wood fiber cellulose(partly digested wood fiber)	Made from natural wood fiber, usually with green dye and dispersing agent added.	50-100 lbs	1-2 Tons	80-90%	Not required	Use maximum rate when applied to critical areas. Apply with a hydroseeder.
Hydromulch Wood fiber/paper blend	Blend of natural wood fibers and paper.	50-100 lbs	1-2 Tons	80-90%	Not required	Use maximum rate when applied to critical areas. Apply with a hydroseeder.
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" or longer.	Depends on the properties of the material being used.	Depends on the properties of the material being used.	100%	See footnote ²	Use without additional mulch. Effective for erosion control on steep slopes. Excellent for grassed waterways and concentrated flow areas to establish seedings. Effective around tree and shrub plantings to suppress weed growth.

TABLE 1 – GUIDE TO MULCH MATERIAL, RATES & USES

Mulch Materials	Quality Standards	Application Rates		Depth of Application or % Cover	Anchoring Methods	Comments
		per 1000 ft ²	per Acre			
Fiber Blankets, Mats and Nettings (continued)						
Chopped straw mat	½” layer of chopped straw knitted into polypropylene netting.	Depends on the properties of the material being used.	Depends on the properties of the material being used.	100%	See footnote ²	Use without additional mulch. Effective for erosion control on steep slopes. Excellent for vegetative establishment of grassed waterways.
Semi-permanent or Permanent blanket	Type III: Every component shall be: synthetic, non-biodegradable, and non-photodegradable. 3 dimensional geomatrix of fused nylon fibers (0.7lbs/sq yd minimum)	Depends on the properties of the material being used.	Depends on the properties of the material being used.	100%	See footnote ²	Effective for grassed waterway outlets. Lasts for up to 3 years before it bio-degrades.
Inorganic Mulches						
Plastic	2-4 mil	Depends on roll length and width.	Depends on roll length and width.	Percent coverage depends on purpose.	Soil or stone	Use black for weed control and/or soil warming. Clear plastic is the best choice for soil solarization. Use white or clear for seed establishment without organic mulch. Remove plastic after seeding is established. Effective for moisture conservation and weed control. Large areas should have holes or slits to allow rainwater to percolate.

Footnotes:

¹ This column refers to the different types of mulch anchoring methods found under General Criteria.

² Follow Manufacturer’s recommendation or see Placement and Anchoring of netting and matting located in Anchoring methods found in General Criteria.