

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

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 such as plant residue, wood bark or chips, by-products, gravel, plastic, fabric, animal manure, rice purpose for the required time period. The depth or thickness of organic mulches is related to the length of its effectiveness of its intended purpose.

Mulching is generally performed after grading, soil surface preparation, and seeding and

plantings are complete. Soil surface shall be prepared in order to achieve the desired purpose.

The mulch material shall be evenly applied and 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.

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 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

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.

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. Small plants must not be smothered. 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.

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.

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

Consider 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. Increased infiltration may increase nutrient and chemical transport below the root zone. The temperature of the surface runoff may also be lowered.

Mulched soil retains moisture, requires less watering and reduces the chance of water stress on plant materials. Mulch also minimizes evaporation from the soil surface and hence reduces losses from bare soil areas.

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

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) blends the soil warming characteristics of clear mulch with the weed control ability of black mulch.

Consider potential toxic allopathic 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 mulches 3 to 6 inches away from plant stems and crowns to prevent disease and pest problems.

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

PLANS AND SPECIFICATIONS

Specifications shall be prepared for each site and purpose 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
- Purpose of the mulch
- 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, incorporation, bio- or photo-degradation of mulch and associated 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.

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.

REFERENCES

These publications are available at County Extension Offices; Extension Distribution Center, Printing Building, Iowa State University, Ames, IA 50011; and several are available on the ISU Publications Home page at <http://www.extension.iastate.edu/Pages/pubs/>.

- ISU Publication SUL-12, "Using Mulches in Managed Landscapes."
- 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.
- ISU Weekly Paper, "Horticultural and Home Pest News."

The following publications are available at the Iowa Conservation Partners Home page at: <http://www.ia.nrcs.usda.gov>.

- Revised Universal Soil Loss Equation (RUSLE), Section I, Erosion Prediction of the Field Office Technical Guide.

Agriculture and Agri-Food Canada. 2000. Plastic Mulches for Commercial Vegetable Production. Canada-Saskatchewan Irrigation Diversification Centre. Outlook, Saskatchewan.

Natural Resources Conservation Service. 2002. National Agronomy Manual 190-V. USDA-NRCS. Washington, D.C.

Renard, K.G., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder. 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. Pp. 175,177-179.

Shaffer, M.J., and W.D. Larson. 1987. NTQM, A Soil-Crop Simulation Model for Nitrogen, Tillage, and Crop Residue Management. U.S. Department of Agriculture, Agricultural

Research Service. Conservation Research Report 34-1. Pp. 83.

Toy, Terence J., and George R. Foster, Co-editors. 1998. Guidelines for the Use of the Revised Universal Soil Loss Equation (RUSLE) Version 1.06 on Mined Lands, Construction Sites, and Reclaimed Lands. U.S. Department of the Interior, Office of Surface Mining and Reclamation.

Wischmeier, W.H., and D.D. Smith. 1978. Predicting Rainfall Erosion Losses-A guide to Conservation Planning. U.S. Department of Agriculture, Agriculture Handbook No 537. Pp. 19, 26, 31, 50.

Wischmeier, W.H. 1974. New Developments in Estimating Water Erosion. In: Proceedings of the 29th Annual Meeting of the Soil Conservation Society of America. Syracuse, New York.

