



## Natural Resources Conservation Service

### CONSERVATION PRACTICE STANDARD

## MULCHING

### CODE 484

#### (ac)

#### DEFINITION

Applying plant residues or other suitable materials to the land surface.

#### PURPOSE

This practice supports one or more of the following purpose(s):

- Improve the efficiency of moisture management
- Reduce irrigation energy used in farming/ranching practices and field operations
- Improve the efficient use of irrigation water
- Prevent excessive bank erosion from water conveyance channels
- Reduce concentrated flow erosion
- Reduce sheet, rill, & wind erosion
- Improve plant productivity and health
- Maintain or increase organic matter content
- Reduce emissions of particulate matter

#### CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all lands where mulches are needed.

#### CRITERIA

##### General Criteria Applicable to All Purposes

Use of this standard requires compliance with all applicable federal, state, and local laws and regulations.

The selection of mulching materials will depend primarily on the purpose(s) for the mulch application, site conditions and the material's availability. Mulch materials will consist of natural and/or artificial materials that are of sufficient dimension (depth or thickness) and durability to achieve the intended purpose for the required time period.

Prior to mulching, the soil surface will be prepared to achieve the desired purpose.

The mulch material will 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.

In cases where furrow erosion may occur due to concentrated flows from plastic mulches, appropriate measures will be taken to protect the furrows and furrow outlets.

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

NRCS reviews and periodically updates conservation practice standards. To obtain the current version of this standard, contact your Natural Resources Conservation Service State office or visit the Field Office Technical Guide online by going to the NRCS website at <https://www.nrcs.usda.gov/> and type FOTG in the search field.

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In areas within the range of known Threatened & Endangered species that could potentially become snared or entangled in plastic netting, a leno weave (loose woven) netting material will be specified.

Mulch material needs to be of a quality to meet the intended purpose. Mulch material, to the extent practical, will be free of disease, pesticides, chemicals, noxious weed seeds, and other pests and pathogens that prohibit or interfere with the intent of the practice.

Remove synthetic mulches from the field prior to the next crop. Do not incorporate (e.g., disk) synthetic mulches into the soil.

When mulching with wood products such as wood chips, bark, or shavings or other wood materials, apply a minimum 2-inch thickness of particles that will remain in place during heavy rainfall or strong wind events, or both if applicable.

The minimum size of mulching material consisting of gravel or other inorganic mulching is 0.75 inches and applied to a minimum depth of 2 inches.

When mulching with cereal grain straw or grass hay, apply at a rate to achieve a minimum 70-percent ground cover. Determine the mulch rate using the current erosion prediction technology for the intended purpose.

Do not apply mulch with Carbon to Nitrogen ratio (C:N) less than 20:1 to an area of designed flow in watercourses.

<b>Organic Materials and their C:N Ratios</b>	
Fresh wood chips	95:1
Wheat straw	80:1
Hardwood bark	70:1
Fresh wood chips with foliage	65:1
Freshly fallen leaves	55:1
Composted wood chips	40:1
Alfalfa hay	25:1
Composted yard waste	17:1
Composted manure	12:1

**Additional Criteria to Improve the Efficiency of Moisture Management, to Residue Irrigation Energy Used in Farming/Ranching Practices and Field Operations or to Improve the Efficient Use of Irrigation Water**

Mulch materials applied to the soil surface will provide at least **90** percent surface cover to reduce potential evaporation.

Fine-textured mulches (e.g., rice hulls) that allow less oxygen penetration than coarser materials should not be thicker than 2 inches.

**Additional Criteria to Improve Plant Productivity and Health**

When establishing vegetative cover, apply mulch 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 Maintain or Increase Organic Matter Content**

Mulched areas will be periodically inspected, and mulch will 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 will be consistent with the intended purpose and site conditions. Operation of equipment near and on the site will not compromise the intended purpose of the mulch.

Prevent or repair any fire damage to the mulch material.

Properly collect and dispose of artificial/synthetic mulch material after intended use. Monitor and control undesirable weeds in mulched areas.

## **CONSIDERATIONS**

The considerations section contains information that is optional to the planner.

Evaluate the effects of mulching on evaporation, infiltration, and runoff. Mulch material may affect microbial activity in the soil surface, increase infiltration and nutrient contribution, 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.

Avoid excessively thick or tightly packed mulches that can result in soggy, anaerobic conditions at the soil surface during wet weather; or prevent rainfall or overhead irrigation from reaching the soil during times of moisture deficit.

Applying mulch materials with a carbon to nitrogen ratio (C:N) less than 30:1 may immobilize soil nitrogen by soil biota. Mulch materials with a C:N ratio greater than 30:1 may benefit from the addition of nitrogen or be mixed with lower C:N ratio material to get the average ratio less than 30:1.

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

When considering soil health, optimally microbes need a C:N ratio near 24:1, around 16 parts carbon are used for energy and eight parts for maintenance.

Finely-divided plant residues (e.g., sawdust) and those rich in soluble carbohydrates (e.g., fresh green-chopped sorghum-sudangrass, corn, or other grasses) that have a C:N ratio greater than 30 can tie up soil N and necessitate supplemental N applications on crops. Coarser materials such as grain straw and chipped brush usually do not reduce crop-available soil N levels unless and until they are incorporated into the soil by tillage or cultivation.

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

In attempting to provide habitat for ground beetles, spiders, and other predators of weed seeds and crop pests, use mulch of sufficient cover and suitable thickness and texture for the target species. Avoid excessively thick or tightly packed mulches, which can interfere with the movement of ground beetles and other beneficial organisms, and may increase the incidence of crop pests and diseases. Consider mulching crops only if the selected mulching materials, and rates of application do not contribute to pest problems.

During the period when weed seed predation is desired and predators are most active, avoid pesticide applications or pesticide exposures that could adversely affect weed seed consumers.

Low permeability mulches (e.g. Plastic) may increase concentrated flow and erosion on un-mulched areas. Light-reflecting mulches such as white or aluminized plastic film or bright straw can repel some pests.

Select mulching materials and methods that are compatible with the crop and site. Consider potential beneficial or detrimental effects of mulching materials on the biotic community surrounding the crop, including beneficial soil micro- and macro-organisms, as well as plant pathogens and plant pests. These effects are specific to site, mulch, and crop, and may include enhanced soil microbial activity, increased or reduced levels of crop diseases, and toxic (allelopathic) activity against the crop, weeds, or other beneficial or pest organisms.

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.

Consider using only leno weave or other snake-friendly types of erosion control blanket in areas of likely snake habitat, such as wetland restoration areas.

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 to obtain Soil Properties and Qualities information.

For all organic or transitioning to organic operations, follow all National Organic Program (NOP) rules.

## **PLANS AND SPECIFICATIONS**

Specifications will be prepared for each site and purpose and recorded in the approved implementation requirements documentation.

Documentation will 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 will 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 will be consistent with the intended purpose and site conditions. Operation of equipment near and on the site will not compromise the intended purpose of the mulch.

Prevent or repair any fire damage to the mulch material.

Properly collect and dispose of artificial/synthetic mulch material after intended use. Monitor and control undesirable weeds in mulched areas.

## REFERENCES

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