

**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

This practice supports one or more of the following purposes:

- Conserve soil moisture
(Resource concern: Insufficient Water – Inefficient moisture management).
- Reduce energy use associated with irrigation
(Resource concerns: Inefficient energy use – Farming/ranching practices and field operations; and Insufficient Water – Inefficient moisture management).
- Provide erosion control
(Resource concerns: Soil Erosion – Excessive bank erosion from streams shorelines or water conveyance channels, and/or Concentrated flow erosion, and/or Sheet, rill, & wind erosion).
- Facilitate the establishment of vegetative cover
(Resource concern: Degraded plant condition – Undesirable plant productivity and health).
- Improve soil health
(Resource concern: Soil quality degradation – Organic matter depletion).
- Reduce airborne particulates
[Resource concern: Air quality impacts – Emissions of particulate matter (PM) and PM precursors).

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

Mulch materials are natural or artificial materials that have sufficient dimension (depth or thickness) and durability to achieve the intended purpose for the required time period.

Prior to mulching, prepare the soil surface to facilitate the desired purpose.

Evenly apply the mulch material to the soil, and if necessary, use tackifiers, emulsions, pinning, netting, crimping or other acceptable methods of anchoring to hold the mulch in place.

In cases where excessive furrow erosion may occur due to concentrated flows from plastic mulches, take appropriate measures to protect the furrows.

Apply manufactured mulches according to the manufacturer's specifications.

Natural mulches cannot be incorporated until after the intended purpose is met.

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

To reduce evaporation, at least 60 percent of the treated surface area must be covered.

Additional Criteria to Provide Erosion Control and to Reduce Airborne Particulates

When mulching with straw or grass hay, apply at a rate to achieve a minimum 70 percent ground

cover. To estimate the appropriate rate, the current erosion prediction technology can be used.

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

When mulching with gravel or other inorganic material, apply a minimum 2-inch thickness of pieces that are 0.75 to 2 inches in diameter.

Additional Criteria to Establish Vegetative Cover

Apply at a rate that allows adequate light and air penetration to the seedbed to ensure proper germination and emergence. Ground cover should be approximately 50-70%, depending upon the mulch type and the planted species, being sure that the mulch does not inhibit emergence.

Additional Criteria to Improve Soil Health

Use plant-based mulching materials of suitable quantity and quality to add organic matter, provide food and shelter for soil biota, and protect the soil surface from raindrop impact and crusting, while allowing for adequate soil aeration.

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.

An evaluation of the system using the current approved methods yields a soil conditioning index (SCI) of zero or positive.

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.

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

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

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.

Use mulch of sufficient ground cover, and suitable thickness and texture to provide habitat for ground beetles, spiders, and other predators of weed seeds and crop pests. Select crops to be mulched, mulching materials, and rates of application that do not contribute to pest problems. 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.

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.

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

PLANS AND SPECIFICATIONS

Prepare and record specifications for each site and purpose.

Documentation should include:

1. Purpose of the Mulch
2. Type of mulch material used
3. The percent cover and/or thickness of mulch material
4. Timing of application
5. Site preparation
6. Listing of netting, tackifiers, or method of anchoring, and
7. Operation and maintenance.

OPERATION AND MAINTENANCE

Periodically inspect mulched areas and reapply, reinstall or repair as needed to meet 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.

Do not compromise the purpose of the mulch with equipment and management activities.

Prevent or repair any fire damage to the mulch material.

Monitor and control undesirable weeds in mulched areas

Do not remove or incorporate the material until after the identified purpose is met.

Properly collect and dispose of artificial mulch material after intended use and identified purpose is met.

REFERENCES

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- 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.
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