



## 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 is applied to achieve the following purpose(s):

- Improve the efficiency of rain-fed moisture management.
- Improve irrigation energy efficiency.
- Improve the efficient use of irrigation water.
- Prevent excessive bank erosion from streams, shorelines, or water conveyance channels.
- Reduce ephemeral gully erosion.
- Reduce sheet, rill erosion.
- Reduce wind erosion.
- Improve plant productivity and health.
- Reduce particulate matter emissions.
- Reduce plant pest pressure.

#### CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all lands where mulches are needed.

#### CRITERIA

##### General Criteria Applicable to All Purposes

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

Prepare the soil surface to achieve the desired purpose.

Apply the mulch material evenly. Use tackifiers, emulsions, pinning, netting, crimping, or other methods of anchoring, if needed, to hold the mulch in place for specified periods.

In cases where furrow erosion may occur due to concentrated flows from mulches (e.g., impervious plastic mulches on beds), take appropriate measures to protect the furrows and the furrow outlets.

Apply manufactured mulches according to the manufacturer's specifications.

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

When mulching with wood products (e.g., wood chips, bark, or shavings), apply a minimum 2-inch thickness of particles that 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 plant-based mulch materials with a carbon (C) to nitrogen (N) ratio of less than 20:1 to watercourses.

**Additional Criteria to Improve the Efficiency of Rain-fed Moisture Management, to Improve Irrigation Energy Efficiency, or to Improve the Efficient Use of Irrigation Water**

Apply mulch materials to cover at least 90 percent of the soil surface to reduce potential evaporation.

Fine textured mulches (e.g., rice hulls), which allow less oxygen penetration than coarser materials, should be no 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.

Materials selected and applied to moderate soil temperatures for optimal growth shall provide more than 90 percent coverage over the area treated and shall be of a sufficient thickness to persist for the period required for the temperature modification.

**Additional Criteria to Reduce Plant Pest Pressure**

Apply mulch at a rate that achieves a minimum of 90 percent ground cover to minimize weed seed germination and emergence.

Select mulch materials to disrupt particular pests by color and/or reflective characteristics.

**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 water may also be lowered.

To reduce environmental impact of synthetic mulches, use biodegradable synthetic mulch if appropriate to address resource concern(s). Note that some biodegradable mulches will degrade in place (i.e., can be disked into the soil) while others are better broken down by removal from the field and composted in an appropriate facility. It is important to know the nature and behavior of the biodegradable material to know the best disposal procedure.

Mulch materials with low permeability may adversely affect the water needs of plants.

When treating areas prone to fire provide fire breaks or use other appropriate methods to mitigate fire hazards.

Avoid the use of mulches that are likely to contain invasive pests. Fire scars are particularly vulnerable to the establishment of invasive 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.

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.

Organic materials with C:N ratios of less than 20:1 will release nitrate-nitrogen that can 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 organisms.

To provide habitat for ground beetles, spiders, and other predators of weed seeds and crop pests, use mulch of sufficient ground 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, prevent ground nesting of solitary bees and wasps, 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 runoff and erosion on unmulched areas.

There are 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 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.

Refer to soil survey data as a preliminary planning tool for assessment of areas. Consult a resource soil scientist or the Web Soil Survey at: <http://websoilsurvey.nrcs.usda.gov/app/> to obtain soil properties and qualities information.

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

## **PLANS AND SPECIFICATIONS**

Develop plans and specifications for each field or treatment unit according to the Criteria section requirements above, and operation and maintenance section requirements below. Specifications must

describe the requirements to apply this practice to achieve the intended purpose. Record the following specification components in an approved Mulching (Code 484) implementation requirements document.

- Purpose of the mulch.
- Type of mulch material used.
- Percent cover or thickness of mulch material, as applicable.
- Timing of application.
- Site preparation.
- Listing of netting, tackifiers, or method of anchoring.
- Removal and recycling/disposal procedures, as applicable.

## OPERATION AND MAINTENANCE

Periodically inspect the mulched areas and reinstall mulch or repair 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).

Remove or incorporate mulch materials consistent with the intended purpose and site conditions.

Do not operate equipment near the mulched site that would compromise the intended purpose of the mulch.

Properly collect and dispose of synthetic mulch material after intended use. Note that some biodegradable mulches can be disked into the soil while others should be removed and composted in an appropriate facility.

Monitor and control undesirable weeds in mulched areas.

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