United States Department of Agriculture

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 moisture management (INSUFFICIENT WATER)
- Reduce irrigation energy used in farming/ranching practices and field operations (INEFFICIENT ENERGY USE)
- Improve the efficient use of irrigation water (INSUFFICIENT WATER)
- Prevent excessive bank erosion from water conveyance channels (SOIL EROSION)
- Reduce concentrated flow erosion (SOIL EROSION)
- Reduce sheet, rill, & wind erosion (SOIL EROSION)
- Improve plant productivity and health (DEGRADED PLANT CONDITION)
- Maintain or increase organic matter content (SOIL QUALITY DEGRADATION)
- Reduce emissions of particulate matter (AIR QUALITY IMPACTS)

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 the material's availability. The mulch materials may consist of natural or artificial materials of sufficient dimension (depth or thickness) and durability to achieve the intended purpose for the required time period.

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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Prepare the soil surface to achieve its desired purpose prior to mulching.

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., 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 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 plant-based mulch materials with a carbon (C) to nitrogen (N) ratio less than 20:1 to an area of designed surface or subsurface flow to watercourses.

Additional Criteria to Improve the Efficiency of Moisture Management, to Reduce Irrigation Energy Used in Farming/Ranching Practices and Field Operations or to Improve the Efficient Use of Irriga- tion 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) that allow less oxygen penetration than coarser materials should not be thicker than 2 inches.

Additional Criteria to Improvve 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

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.

An evaluation of the system using the current approved soil conditioning index (SCI) procedure results in zero or higher.

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.

When growing fruits or other crops on mulch materials in High Tunnel Systems for improved weed management, consider use of Biodegradable Mulch (BDM) materials in place of typical plastic mulch to reduce non-recyclable waste and enhance sustainability levels for the crop production system. See Washington State University Extension information resource on BDM materials in the “References” section of this standard.

When using plastic mulches for fruit and vegetable production in High Tunnel Systems, consider utilizing application and management techniques from the Iowa State Horticulture resource presentation in the “References” section of this standard.

Mulch materials with low permeability 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

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

Light-reflecting mulches such as white or aluminized plastic film or bright straw can repel some pests.

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 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 minimize these risks.

Consider potential effects of soil physical, chemical, and biological properties. 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 all organic or transitioning to organic operations, follow all National Organic Program rules.

PLANS AND SPECIFICATIONS

Prepare specifications for each site and purpose. Implementation specifications delivered to the producer must include—

- 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.
- Operation and maintenance.

When a job sheet/implementation requirement document for this practice is posted in the NC FOTG Sec IV with this standard, completion is required: (1) as a component of implementation specifications information developed for and delivered to the producer; and (2) to provide sufficient documentation that practice design, checkout, and certification meet all applicable NRCS standards and policies.

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 to be 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.

Prevent or repair any fire damage to the mulch material.

Properly collect and dispose of synthetic mulch material after intended

use. Monitor and control undesirable weeds in mulched areas.

REFERENCES

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