

**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 may be applied for one or more of the following purposes:

1. To provide erosion control;
2. To conserve soil moisture;
3. To facilitate the establishment of vegetative cover;
4. To reduce energy use associated with irrigation;
5. To improve soil health;
6. To 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 conservation practices.

**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 availability of materials.

Prior to mulching, the soil surface shall be prepared in order to achieve the desired purpose.

The mulching material shall be evenly applied and, if necessary, anchored to the soil. As needed, use tackifiers, emulsions, netting, pinning, crimping, or other acceptable methods of anchoring mulch. As a minimum, manufactured mulches shall be applied according to the manufacturer's specifications.

All newly planted areas that are subject to erosion shall be mulched. If dense ground cover is already present after planting (e.g., there is a previously seeded nurse crop sufficient to control soil erosion), then this mulching requirement shall be considered met.

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

**Mulching Materials.** Mulch shall consist of natural and/or artificial non-toxic materials, such as coconut fibers, wood shavings, straw, hay, bark chips, wood chips, plastic, or fabric of sufficient dimension (depth or thickness), quality, and durability to achieve the intended purpose for the required time period. Anchoring materials shall be sufficiently durable to maintain mulch in place until it is no longer needed.

Bio- or photo-degradation, incorporation, or removal of mulch and associated materials shall be consistent with the intended purpose and site conditions.

**Straw or Hay Mulch** – Cereal grain straw or grass hay shall be applied at the rate of 2 tons per acre (90 pounds per 1,000 square feet). Straw and hay shall be unweathered and free of any known

viable seeds of noxious weeds or invasive plants.

Spread the mulch uniformly by hand or by mechanical methods. Mulch shall not be chopped or finely broken during application. When seeding is used, apply the mulch immediately following seeding.

On sites where mulch is exposed to displacement by wind and water, it shall be anchored immediately after placement. Use one of the following methods, depending on the size of the area, steepness of slope, and costs:

1. **Mulch Netting:** Cover mulch with degradable plastic, jute, or cotton netting. Staple the netting in place using wire staples;
2. **Crimper:** Use a tractor-drawn mulch anchoring coulter (crimper) to cut mulch into the soil surface, so as to anchor part of the mulch and leave part standing upright. Follow the general contours of the site when crimping mulch. Crimping operations are limited to areas accessible by tractor;
3. **Liquid Mulch-Binders:** Use one of the following:
  - a. **Organic and Vegetable-Based Binders:** Mix with water and apply to mulch to form an insoluble polymer gel binder. Use at rates and under weather conditions as recommended by the manufacturer. These mulch binders shall be physiologically harmless and not impede the germination and growth of desired vegetation;
  - b. **Synthetic Binders:** Mix with water and apply to mulch to form an insoluble high polymer synthetic binder. Use at rates and under weather conditions as recommended by the manufacturer.

Wood Fiber or Paper Fiber Mulch - Mulch made from wood, paper, or plant fibers shall be applied at the rate of 2,000 pounds per acre or as recommended by the product manufacturer. Mulch shall not contain any germination or growth inhibiting materials. It may be applied by hydroseeder, but shall not be mixed in the tank with seed. Use shall be limited to flatter slopes and during optimum seeding periods in the spring

and fall. Do not use on steep slopes or in concentrated flow areas.

Pelletized Mulch - Dry pellets of compressed and extruded paper and/or wood fiber products shall be applied by hand or mechanical spreader at the rate of 60 to 75 pounds per 1,000 square feet, in accordance with the manufacturer's recommendations. Pelletized mulch may contain co-polymers, tackifiers, fertilizers, and coloring agents. Apply 1/4 to 1/2-inch of water after spreading pelletized mulch to activate and expand the mulch and to provide sufficient soil coverage. This mulch material is especially applicable for small lawns or renovation areas where weed-free mulch is desirable or straw mulch and tackifiers are not practical.

Bark or Wood Chip Mulch - Wood products such as shredded or chipped hardwood bark, pine bark, bark chips, and wood chips may be used as mulch around plantings, on trails and walkways, and on other heavily used areas. Around plantings of trees, shrubs, groundcovers, and vines, apply mulch to a depth of 2 to 3 inches, keeping 3 inches away from trunks and stems. Pine bark mulch generally decomposes more slowly and is less toxic to plants than hardwood bark mulch.

On steep slopes, use shredded bark mulch, rather than chips, because it is less subject to movement by water.

Erosion Control Blanket - Biodegradable matting shall be used as needed to provide temporary erosion control until seedlings or other plantings become well established. These materials are especially applicable where high water velocities are expected. Biodegradable matting shall be applied on seeded areas and shall be secured to the soil surface according to the manufacturer's instructions.

Matting shall have a uniform thickness and distribution of natural or other biodegradable synthetic fibers, typically with reinforcing polymer netting, that freely allow penetration by water and plant seedlings. The materials shall resist decay for a minimum of 6 months, and shall not contain any harmful chemicals or other materials that may leach into the soil or reduce the germination and establishment of seedlings.

**Synthetic Mulch** – Use permanent geotextiles (non-biodegradable), biodegradable plastic film, polyethylene plastic film, or other approved synthetic mulch to conserve soil moisture, moderate soil temperature, and/or provide erosion control. These materials, typically available in rolls, shall be installed according to the manufacturer's instructions.

**Tree/Shrub Mats** – Use natural or synthetic fabric mats around individual tree and shrub plantings to suppress weeds and conserve soil moisture. Mats shall be at least 3 feet square, or 3 feet in diameter if round, and shall be installed according to the manufacturer's instructions.

#### **Additional Criteria to Provide Erosion Control and to Reduce Airborne Particulates**

When mulching with cereal grain straw or grass hay, apply at a rate to achieve a minimum 85 percent ground cover. The mulch rate shall be determined using current erosion prediction technology to reach the soil conservation objective.

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 or strong wind events.

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

#### **Additional Criteria to Establish Vegetative Cover**

Mulch shall be applied at a rate that achieves a minimum of 85 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 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.

Apply mulch material used to conserve soil moisture prior to moisture loss. Before mulching, ensure soil under shallow rooted crops is moist, as these crops require a constant supply of moisture.

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

#### **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.

Use the current approved NRCS Soil Conditioning Index (SCI) procedure to evaluate the system and determine the amount of biomass required to have a positive trend in the soil organic matter subfactor.

*Note: Specific programs may dictate criteria in addition to, or more restrictive than those specified in this standard.*

#### **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. The temperature of the surface runoff may also be lowered.

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 the 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.

To prevent disease and pest problems, mulch should be kept 3 to 6 inches away from plant stems and crowns. Additional weed control may be needed around the plant base area.

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

Low-permeability mulches (e.g., plastic) may increase concentrated flow and erosion on un-mulched areas.

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. Excessively thick or tightly-packed mulches can also interfere with the movement of ground beetles and other beneficial organisms, and may increase the incidence of crop pests and diseases.

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 they are incorporated into the soil by tillage or cultivation.

Mulching may provide habitat for beneficial insects 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 crop pests and weed seeds.

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

Deep mulch may provide nesting habitat for mice and voles 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 these risks when selecting mulch materials and place mulch in locations that minimizes risks.

## **PLANS AND SPECIFICATIONS**

Plans and specifications for this practice shall be prepared in accordance with the previously listed criteria. Plans and specifications shall contain sufficient detail to ensure successful implementation of this practice, and may be recorded in narrative form, on Implementation Requirements (IR) worksheets, engineering designs and specifications, or other approved forms.

The appropriate fact sheet(s) and completed 484 IR worksheet can serve as the plan and specifications for this practice.

The following items shall be addressed, as appropriate:

1. Purpose(s) of the mulch;
2. Type(s) of mulching material used;
3. The percent cover, and/or depth/thickness of mulching material;
4. Amount of mulch (per unit area);
5. Netting, tackifiers, or method of anchoring (if any);
6. Site preparation;
7. Timing of application.

## OPERATION AND MAINTENANCE

An Operation and Management (O&M) plan shall be prepared and is the responsibility of the client to implement. The appropriate fact sheet(s) and IR worksheet may serve as the management plan, as well as supporting documentation, and shall be reviewed with and provided to the client.

At a minimum, the following components shall be addressed in the O&M plan, as applicable:

1. Inspect mulched areas periodically (at least annually), and reinstall mulch or repair as needed to meet the objectives of the project;
2. 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);
3. Collect and properly dispose of artificial mulch material (e.g., plastic film) after its intended use;
4. Monitor and control undesirable weeds in mulched areas. Control noxious weeds and other invasive plants by spot treatment, using mechanical methods or approved herbicides. Control noxious weeds as required by state law;
5. Protect the mulched area from wildfire and damage from livestock and equipment traffic, to the extent feasible;
6. Describe the acceptable uses (e.g., recreation areas, trails and walkways, etc.) and time of year or frequency of use restrictions, if any. *Pay particular attention to program requirements as they relate to acceptable vs. restricted uses and other management restrictions.*

## SUPPORTING DATA AND DOCUMENTATION

The following is a list of the minimum data and documentation to be recorded in the case file:

1. Extent of practice in acres, field number where the practice is located, and the location of the practice marked on the conservation plan map;
2. Assistance notes. The notes shall include dates of site visits, name or initials of the person who made the visit, specifics as to alternatives discussed, decisions made, and by whom;
3. Completed IR worksheet, and copy of the appropriate fact sheet(s) or other specifications and management plans.

## REFERENCES

1. Chalker-Scott, Linda. 2007. *Wood Chip Mulch: Landscape Boon or Bane?* Puyallup Research and Extension Center, Washington State University, Puyallup, Washington.
2. Renard, K.G., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder (coordinators). 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.
3. Toy, T.J., and G.R. Foster. (ed.) 1998. *Guidelines for the Use of the Revised Universal Soil Loss Equation (RUSLE) Version 1.06 on Mined Lands, Construction Sites, and Reclaimed Lands*. USDI, OSMR.
4. USDA, Natural Resources Conservation Service. *Conservation Practice Standards*. Delaware Field Office Technical Guide, Section IV.
5. USDA, Natural Resources Conservation Service. 2011. *National Agronomy Manual*. 190-V, 4<sup>th</sup> Ed. Washington, D.C.