NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
MULCHING
(Ac.)

CODE 484

DEFINITION

Applying plant residues, by-products or other suitable materials produced off site, to the land surface.

PURPOSE

- Conserve soil moisture
- Moderate soil temperature
- Provide erosion control
- Suppress weed growth
- Facilitate the establishment of vegetative cover
- Improve soil condition
- Reduce airborne particulates
- Reduce atmospheric impacts of soil fumigant use

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

The selection of mulching materials will depend primarily on site conditions and the material's availability. Mulch materials shall consist of natural and/or artificial materials such as plant residue, wood bark or chips, by-products, gravel, plastic, fabric, animal manure, rice hulls, and materials from food processing plants or other equivalent materials of sufficient dimension (depth or thickness) and durability to achieve the intended purpose for the required time period.

Mulching is generally performed after grading, soil surface preparation and seeding and plantings are complete. Soil surface shall be prepared in order to achieve the desired purpose.

The mulch material shall be evenly applied and 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.

Manufactured mulches shall be applied according to the manufacturer's specifications.

Mulching operations shall comply with federal, state and/or local laws and regulations during the installation, operation and maintenance of this practice.

Mulch material shall be relatively free of disease, noxious weed seeds, and other pests and pathogens.

The mulch materials that best meet the needs of the site and the desires of the land user shall be selected from the list, which follows:

1. Small Grain Straw and Hay:

   Apply 1 ½ to 2 tons per acre or 70 to 90 pounds per 1000 square feet. The material must be dry and free of coarse stems, mold damage, and noxious weeds. It will be anchored where there is danger of it being blown or washed away.

   Approved methods of anchoring small grain straw and hay include:

   a. Manufactured Tackifiers: These products shall be applied in accordance with the manufacturer's specifications.

   b. Asphalts: Liquid asphalt of the rapid (RC) or medium (MC) curing types will be sprayed on hay or straw mulched areas at the rate of 300

gallons per acre or 6.9 gallons per 1000 square feet. Asphalt emulsions types SS-1, MS-2, RS-1, or RS-2 may be either injected into hay or straw mulch as it is blown on or sprayed on top of the mulch after it is spread. When the asphalt emulsion is blown on with the mulch, the rate of application will be a minimum of 150 gallons per acre (3.4 gallons per 1000 square feet); and when it is sprayed on the mulch, the rate will be 300 gallons per acre (6.9 gallons per 100 square feet). Asphalts shall not be used on areas adjacent to streams or water bodies or on sites where the asphalt may damage the esthetics of current structures or other features.

c. Punching into the Soil: Ends of fibers will be pushed into the soil approximately three inches by passing over them with a special implement built for the purpose of crimping the mulch or a farm disc with the blades set straight, or by use of a shovel on small areas.

d. Mulch Netting: Mulch netting will be installed in accordance to the manufacturer's instructions. The netting will be installed with the length up and down the slope, except in concentrated flow areas the netting shall be installed parallel to the direction of flow.

e. Pegs and Twine: Pegs 8" to 10" long will be set on intervals of approximately 3 ft. by 3 ft. and driven within 3" of the soil surface. Twine will then be used to form a net between the pegs. The twine will be looped around each peg twice and the slack pulled out between pegs. After the net is woven, the pegs will be driven in until their tops are flush with the soil's surface.

f. Rye or millet Seed: Rye or millet seed may be added to appropriate seeding mixtures for the purpose of anchoring straw or hay mulch. Rates will not exceed 20 lbs. of browntop millet or 15 lbs. or rye per acre. This method is limited to slopes $\leq$ 2% and on which the mulch is not subject to blowing or as a supplemental anchorage with other anchoring materials.

2. Pine Straw:

   Apply ½ inch deep on area plantings or from four to six inches deep around individual trees, shrubs, or vines. Needles from long-leaf species of pines are preferred.

3. Sericea Seed-Laden Hay:

   Apply at rates of two to four tons per acre or 90 to 180 pounds per 1000 square feet. The sericea shall be cut when about 75% of the seeds are brown and shall be taken from the fields which could reasonably be expected to produce at least 300 pounds of hulled seed per acre.

4. Wood Cellulose Fiber:

   Wood cellulose shall be applied in accordance with and at the rate specified in the manufacturer's instructions except that the minimum allowable shall be 1250 lbs. per acre on slopes less than 3%; 1500 lbs. per acre on slopes of 3 to 15%; and 2000 lbs. per acre on slopes of more than 15% regardless if the manufacturer's instructions allow less. Wood cellulose fiber mulch should not be used on areas of concentrated flow. An approved commercial tackifier shall be applied in accordance with the manufacturer's specifications to anchor the mulch on slopes $\geq$ 3%.

5. Paper Hydro-mulch:

   Paper hydro-mulch shall be applied in accordance with and at the rate specified in the manufacturer's instructions except that the minimum application shall be 1000 lbs. per acre on slopes of 3% or less; 1200 lbs. per acre on slopes of 3 to 15%; and 1500 lbs. per acre on slopes of more than 15% regardless if the manufacturer's instructions allow less. (The minimums are for a dry weight basis). A fiber tackifier shall be added to

the hydro-mulch mix on slopes more than 3%. Paper hydro-mulch should not be used on areas of concentrated flow.

6. Wood Chips:

   Apply in layers two to six inches deep or 460 to 920 pounds per 1000 square feet. The application of wood chips is limited to slopes ≤ 4 and is prohibited in areas subject to concentrated flows.

7. Burlap, Tobacco Cloth, and other Cloths:

   Materials will be spread loosely but smoothly over the area to be protected and anchored to prevent washing or blowing away.

8. Erosion Control Blankets:

   The appropriate erosion control blanket for the specific site and use shall be based on the manufacturer's guidance. Erosion control blankets typically shall be installed with the length up and down the slope. However, in areas subject to concentrated flow, it shall be installed with the length parallel to the flow. The blanket shall be anchored in accordance with the manufacturer's instructions.

9. Other Materials:

   Mulch materials other than those listed above may be used provided they fulfill the purposes of this standard and are applied according to the manufacturer's specifications or current applicable USDA or Clemson University Cooperative Extension Service publications.

Additional Criteria To Conserve Soil Moisture

Mulch materials applied to the soil surface shall provide at least 60 percent cover to reduce potential evaporation.

Mulch material shall 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.

Additional Criteria To Moderate Soil Temperature

Mulch materials shall be selected and applied to obtain 100 percent coverage over the area treated. The material shall be of a significant thickness to persist for the period required for the temperature modification.

Additional Criteria To Provide Erosion Control

When mulching with cereal grain straw or grass hay, apply in sufficient amounts to provide 70 percent ground cover. Mulch rate shall be determined using current erosion prediction technology to reach the soil erosion objective (See guidance in "General Criteria Applicable to All Purposes".)

When mulching with wood products such as wood chips, bark, or shavings or other wood materials, apply to a 2-inch thickness if the soil is not well-drained, and to a 3- to 4-inch thickness if drainage is good. (See guidance in "General Criteria Applicable to All Purposes".)

More finely textured mulches, which allow less oxygen penetration than coarser materials, should be no thicker than 1 or 2 inches. The mulch material shall provide no greater than 80 percent ground cover in order to ensure adequate air drainage.

Gravel or other inorganic material shall be applied approximately 2 inches thick and shall consist of pieces 0.75 to 2 inches in diameter. The mulch material shall provide no more than 90 percent ground cover in order to ensure adequate air drainage.

Additional Criteria To Suppress Weed Growth

The thickness of mulch will be determined by the size of the plant being mulched. Small plants must not be smothered. Mulches shall be kept clear of the stems of plants where disease is likely to occur. Mulches applied around growing plants or prior to weed seedling development shall have 100 percent ground cover. Thickness of the mulch shall be adequate to prevent emergence of targeted weeds. Plastic mulches may be used.

Additional Criteria To Establish Vegetative Cover

Mulch shall be applied at a rate that achieves 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, emergence, and disease suppression.

Additional Criteria To Improve Soil Condition And Increase Soil Fertility

To increase soil fertility, apply mulch materials with a carbon to nitrogen ratio (C:N) less than 30 to 1 such as animal manure, bio-solids, food processing wastes, or similar materials. Apply other practices such as contouring, filter strips or riparian forest buffers to assure that runoff from the mulched areas will not transport mulching materials to sensitive waterbodies. Do not apply mulch with C:N less than 20:1 to the area of designed flow in watercourses.

Credit nutrients applied with the mulch to the nutrient budget.

Use the Soil Conditioning Index to assess soil quality impacts using the RUSLE2 software.

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. Increased infiltration may increase nutrient and chemical transport below the root zone. The temperature of the surface runoff may also be lowered.

Mulched soil retains moisture, requires less watering and reduces the chance of water stress on plant materials. Mulch also minimizes evaporation from the soil surface and hence reduces losses from bare soil areas.

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

Clear and infra-red transmissible (IRT) plastics have the greatest warming potential. They are transparent to incoming radiation and trap the longer wavelengths radiating from the soil. Black mulches are limited to warming soils by conduction only and are less effective.

Clear mulches allow profuse weed growth and may negate the benefits of soil warming. Black mulches provide effective weed control. Wavelength selective (IRT) blends the soil warming characteristics of clear mulch with the weed control ability of black mulch.

Consider potential toxic allopathic effects that mulch material may have on other organisms. Animal and plant pest species may be incompatible with the site.

Consider the potential for increased pathogenic activity within the applied mulch material.

Keep mulches 3 to 6 inches away from plant stems and crowns to prevent disease and pest problems.

Deep mulch provides nesting habitat for ground-burrowing rodents that can chew extensively on bark on tree trunk 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.

PLANS AND SPECIFICATIONS

Specifications shall be prepared for each site and purpose and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation. Documentation shall include:

- Type of mulch material used
- Purpose of the mulch
- 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 shall be reinstalled or repaired as needed to accomplish the intended purpose.

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

Operation of equipment near and on the site shall not compromise the intended purpose of the mulch.

Prevent or repair any fire damage to the mulch material.

Properly collect and dispose of artificial mulch material after intended use.

Monitor and control undesirable weeds in mulched areas.

REFERENCES

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