

**NATURAL RESOURCES CONSERVATION SERVICE
NEW JERSEY**

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
- Reduce energy use associated with irrigation
- Moderate soil temperature
- Provide erosion control
- Suppress weed growth
- Facilitate the establishment of vegetative cover
- Improve soil quality
- 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 practices.

CRITERIA

General Criteria Applicable To All Purposes

Mulch materials, rates of application, and anchoring methods can be found in Tables 1 and 2.

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.

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.

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 at least 70 percent ground cover. Mulch rate shall

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be determined using current erosion prediction technology to reach the soil erosion objective.

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. More finely textured mulches, which allow less oxygen penetration than coarser materials, should be no thicker than 1 or 2 inches.

Gravel or other inorganic material shall be applied approximately 2 inches thick and shall consist of pieces 0.75 to 2 inches in diameter.

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 50-75 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. On critical slopes, 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.

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.

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
- 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

Agriculture and Agri-Food Canada. 2000. Plastic Mulches for Commercial Vegetable Production. Canada-Saskatchewan Irrigation Diversification Centre. Outlook, Saskatchewan.

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Toy, Terence J., and George R. Foster, Co-editors. 1998. Guidelines for the Use of the Revised Universal Soil Loss Equation (RUSLE) Version 1.06 on Mined Lands, Construction Sites, and Reclaimed Lands. U.S. Department of the Interior, Office of Surface Mining and Reclamation.

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Wischmeier, W.H. 1974. New Developments in Estimating Water Erosion. In: Proceedings of the 29th Annual Meeting of the Soil Conservation Society of America. Syracuse, New York.

Table 1	Guide to Mulch Materials, Rates and Uses				
Mulch Materials	Quality Standards	Application Rates:		Depth of Application	Remarks
		per 1000 sq. ft.	Per Acre		
Wood chips or shavings	Green or air dried. Free from objectionable coarse materials.	500-900 lbs.	6 tons	2" – 7"	Has about the same use and application as sawdust, but requires less N/ton (10-12 lb) Resistant to wind blowing. Decomposes slowly.
Wood Fiber Cellulose (Partly digested wood fibers)	Dyed green. No growth inhibiting factors. Air-dried 30% fibers 3.7 mm or longer.	30 lbs.	1500 lbs.		When applied for erosion control on critical areas double application rate. Apply with hydroseeder. No tie-down required. Packaged in 100 lb. bags. Use only on short, low-gradient slopes and during optimum seeding dates. Curosol or equiv. may be needed to hold mulch on site.
Leaves	No plastic bags, or household debris.	375-700 lbs. (dry weights)	8-15 tons	3" - 6"	Must be spread within 7 days of delivery. Must be incorporated prior to next growing season. Spreading can be done with a manure spreader. Incorporation can be accomplished with chisel plow and disk. Distribution should be even. Obtain any necessary state and/or local permits.
Cornstalks, shredded or chopped	Air-dried, shredded into 8" to 12" lengths	150-300 lbs.	4-6 tons		Effective for erosion control, relatively slow to decompose. Excellent for mulch on crop fields. Resistant to wind blowing.
Grass clippings	Unbagged, free of debris, minimal odor	700-1400 lbs.	15-30 tons	1" - 2"	Obtain necessary permits. Must be spread within 24 hours of delivery. Observe DEP buffer requirements. Incorporate with next tillage season for crop establishment.

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		per 1000 Sq. Ft.	per Acre		
Gravel, Crushed Stone or Slag	Washed; Size 2B or 3A - 1-1/2"	9 cu. yds.	-----	3"	Excellent mulch for short slopes and around woody plants and ornamentals. Use 2B when subject to foot traffic. Frequently used over black plastic for better weed control.
Hay or Straw	Air-dried; free of undesirable seeds & coarse materials	90-100 lbs. 2-3 bales	2 T 100-120 bales	Cover about 90% of surface	Use straw where mulch is maintained for more than three months. Subject to wind blowing unless anchored. This is the most commonly used mulching material. Best micro environment for germinating seeds.
Peat Moss	Dried, compressed free of coarse	200-400 cu.ft.	1/2-1 T	2" - 4"	Most effective as a mulch around ornamentals. Subject to wind blowing unless kept wet. 1lb. bales (6 cu.ft.). Excellent moisture holding capacity.
Jute Twisted Yarn	Undyed, unbleached plain weave Warp 78 ends/yd 60-90 lbs/roll	48" x 50 yds or 48"x 75 yds	-----	-----	Use without additional mulch. Tie down as in manufacturing specification.

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Excelsior Wood Fiber Mats	Interlocking web of excelsior fibers with Photodegradable plastic netting	48" x 100" 2 sided plastic 48" x 180" 1 sided plastic			Use without additional mulch. Excellent for seed establishment. Tie down as per manufacturer specifications. Approx. 72 lbs/roll for excelsior with plastic on both sides. Use two sided plastic for centerline of waterways.
Glass Fiber	1 /4" thick, 7/16" diameter holes on 1 " centers; 56 lb. rolls.	72" x 30 yds.			Use without additional mulch. Tie down with T bars as per manufacturers specifications.
Plastic	2-4 mils	Variable			Use black for weed control. Effective moisture conservation and weed control for small fruits ornamentals.
Filter Fabrics	Woven or Spun	Variable			
Straw or coconut fiber or combination	Photodegradable plastic net on one or two sides.	most are 6.5 ft x 83.5 ft.	81 rolls		Designed to tolerate higher velocity water flow in centerlines of waterways. 60 sq. yds. per roll.

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Table 2 Mulch Anchoring Guide Specification Sheet		
Anchoring Method or Material	Kind Of Mulch To Be Anchored	How To Apply
A. Manual		
1. Peg and twine	Hay or straw	After mulching, divide areas into blocks approx. 1 sq.yd. Drive 4-6 pegs per block to within 2" to 3" of soil surface. Secure mulch to surface by stretching twine between pegs in criss-cross pattern on each block. Secure twine around each peg with 2 or more turns. Drive pegs flush with soil where mowing and maintenance is planned.
2. Mulch netting	Hay or straw	Staple the light-weight paper, jute, wood fiber, or plastic nettings to soil surface according to manufacturer's recommendations. Should be biodegradable. Most products are not suitable for foot traffic.
3. Soil & Stones	Plastic	Plow a single furrow along edge of area to be covered with plastic, fold about 6" of plastic into the furrow and plow furrow slice back over plastic. Use stones to hold plastic down in other places as needed.
4. Cut-in	Hay or straw'	Cut mulch into soil surface with square edged spade. Make cuts in contour rows spaced 18" apart. Most successful on contour in sandy soils.
B. Mechanical		
1. Asphalt spray emulsion	Compost, wood chips wood shaving, hay or straw	Apply with suitable spray equipment using the following rates: asphalt emulsion: on slopes use 200 gal/ac, on level, use 150 gal/ac: liquid asphalt: (rapid, medium, or slow setting) 0.10 gallons per sq/yd.; 400 gal/ac.
2. Wood cellulose fiber	Hay or straw	Apply with hydroseeder immediately after mulching. Use 750 lbs. wood fiber per acre. Some products contain an adhesive material.
3. Pick chain	Hay or straw manure compost	Use on slopes steeper than 3:1. Pull across slopes with suitable power equipment.
4. Mulch anchoring tool or disk	Hay or straw, manure/mostly straw	Set in straight position and pull across slope with suitable power equipment. Mulch material should be "tucked" into soil surface about 3."
5. Chemical	Hay or straw	Apply Terra Tack AR 120 lbs/ac in 480 gal. of water or Aerospray70 (60 gal/ac) according to manufacturer's instructions. Avoid application during rain. A 24 hour curing period and a soil temperature higher than 45° F are required.

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