NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION GUIDE SHEET

MULCHING

(ac.)
CODE 484

GENERAL CRITERIA

Straw mulches consisting of wheat, barley, and/or oats are the most common mulches. Application rates can vary, but average one to two tons per acre. Care must be taken to use certified weed free straw to prevent the introduction of noxious weeds onto the site. Stems need to be as long as possible to increase its life expectancy as a mulch. Straw can be placed on the site by hand or with a blower for large areas. Straw mulch often needs to be anchored to prevent being blown away or washed away by overland water flow. The use of tackifier, plastic, or biodegradable netting is an effective way to retain the straw on the site. Mechanical crimpers have also been used to push the straw into the soil surface on sites where the use of heavy equipment is feasible.

Hydro-mulching with wood fiber or paper in a water slurry is another form of mulching. This requires the use of a machine called a hydro-mulcher or hydro-seeder, and equipment access to the site. Wood fiber mulches are usually more effective than paper mulches because the longer wood fibers adhere to the soil and are more resistant to wind and water erosion. Hydro-mulch is often applied at average rates of 1,500 lbs. to the acre and a tackifier can be used to help it stay on the slope. Incorporation of seed and fertilizer in the mix is not a good idea because much of the seed will not be in contact with the soil and can be lost to desiccation. Fertilizer in the slurry can create a high salt concentration that can reduce water adsorption and kill the seed.

Perennial native or introduced grass should have at least 50 percent of the stems and leaves, by weight, 10 inches long or longer, before being applied to the site. Hay containing mature seed may be used if it is the same species and/or variety as the species used in planting. Native hay mulches often contain high levels of noxious weed seed or other non-desirable plant species. Great care must be exercised when using native hay; if the introduced species are desirable, then native hay can result in increased diversity of the resulting plant community. Therefore, native and introduced hay mulch should be free of noxious weed seed and mold. (Refer to Standard 484 for the appropriate purpose and application rate; 70 percent = 2,000 lbs. and 100 percent = 4,000 lbs.)

Small grain straw shall consist of wheat, oats, barley, or rye straw from which the grain has been removed. At least 50 percent of the stems, by weight, should exceed 6 inches in length before being applied to the site if anchored by resin, netting, tackifiers, etc. When anchored mechanically, 50 percent of the stems, by weight shall exceed 10 inches in length. (Refer to Standard 484 for the appropriate purpose and application rate; 70 percent = 2,000 lbs. and 100 percent = 4,000 lbs.)

Woodchips, sawdust, and bark can also be used as mulch. These can be quite inexpensive if local sources are present. Wood residues are very long lasting compared to other mulches. However, nutrients like nitrogen can get tied up and immobilized in the wood during the decay process. The addition of fertilizer can help offset nitrogen deficiencies during decomposition.

Wood fiber mulch should be cut from green timber. The timber should be cut for maximum fiber length and at slight angle to the wood grain to promote splintering while weathering. As a guide, 50 percent of the fibers, by weight, need to be 6 inches in length.

Spread mulch uniformly by hand or mechanically. When spread by hand, the bales of hay must be torn apart, “fluffed up,” and spread uniformly over the area. For uniform distribution of hand spread mulch, divide the area into 1,000-square foot sections. Mechanically applied mulches should not be applied when wind velocities exceed 15 miles per hour.

The use of pre-made erosion control mats are also effective for revegetation and rehabilitation projects. These mats come in a variety of types, sizes, and strengths and can be expensive. Mats made from straw and/or coconut fiber with biodegradable netting are rolled onto the site and secured with metal staples. Stronger mats,

either pure coconut fiber or synthetic fibers, need to be used on sites with high erosion hazards, high velocity overland flow rates, or steep slopes.

Mulching after seeding can improve the success of the revegetation by keeping the seed in contact with soil, moderating temperatures, and reducing water loss necessary for the seed to germinate. Mulching around planted seedlings can also improve water availability and provide protection from the environment.

If soil crusting has occurred on the surface of the soil prior to seeding, the crust must be broken up and the application of a mulch and tackifier should be utilized. If rainfall has occurred on disturbed areas prior to seeding, crusting has probably occurred. Stockpiling the organic layer and topsoil while building roads or other activities for redistribution later is a very good idea. One of the biggest problems in poor revegetation success is the lack of organic matter and nutrients needed by the plants. Sampling soil pH, bulk densities, and nutrient levels present on and in the seedbed will provide information to help decide if soil amendments, mulches, fertilizers, or other cultural treatments are necessary.

Anchoring

Hay, straw, or wood fiber mulches should be anchored using one of the following **hand methods**:

Using stake and twine anchor immediately after spreading mulch. Drive 8-10 inch wooden stakes to within 2 or 3 inches of the soil surface every 4 feet in all directions. Drive stakes before mulch is applied. Secure mulch to soil surface by stretching twine between pegs in a crisscross-within-a-square pattern. Secure twine around each peg with two or more round turns or a clove hitch.

When using mulch netting staple lightweight paper, jute, cotton, or plastic netting to the soil surface according to the manufacturer's recommendations. The mesh size of the fabric should not exceed one and one-half inches by three inches. The plastic netting should contain a carbon black additive for longer life durability.

When using slit anchoring use a square-pointed spade and cut mulch into the surface soil in contour rows 12 inches apart.

If mulch is **anchored mechanically** use the following methods:

The seedbed must be tilled to a minimum of four to six inches deep immediately before placing and anchoring mulch material. Use a heavy, straight, disk type mulch tiller. The disk should be one-quarter-inch thick and of sufficient diameter to prevent the frame from dragging the mulch. The edges should be dull so as not to cut the mulched hay/straw during the anchoring process. The edges may be serrated or smooth. If serrated, the scallops will not be more than three inches in length and three-quarters-inch in depth.

The rows of furrows made by the mulch tiller should be spaced not more than nine inches apart. Penetration depth should be about two to three inches. The mulch will not be covered with excessive amounts of soil. Limit to no more than two passes by the disk. All mulching operations will be completed as close to the contour as possible.

A farm disk set straight may be used if weight is added to provide adequate penetration depths and if it tucks the material without cutting.

Travel speeds must be reduced to prevent excessive burial of seed and mulch material.

If **resin emulsion mulch tackifier** is used, apply with the following method:

Resin emulsion shall consist of liquid emulsion of water and natural petroleum or acrylic resins prepared specifically for soil stabilization of a type and grade similar to Petroset SB, American Cyanamide, Aerospray 70, or Curosol AH.

The resin is applied with a mechanical mulch blower equipped with an emulsion spray system. Resin should be applied continuously to the mulch as it passes through the nozzle end of the mulch blower and is broadcast upon the ground.

Do not apply resin to the surface of the mulch after it is spread on the ground. Do not apply resin when the air temperature is less than 50 degrees F.

Follow manufacturer's recommendations for proper application rates.

When a **soil retention blanket** is used, use the following method:

A soil retention blanket is made of a uniform web of interlocking wood fiber that has a backing of mulch net fiber on one side only. The fibers should be made from aspen wood and should be 0.021 inch by 0.042 inch plus or minus 25 percent and a minimum of 4 inches in length. The top side is covered with extruded plastic netting. Maximum mesh size shall not exceed two inches by one inch.

For longer life and durability, netting with carbon black additive is recommended. Thickness of the blanket shall not be less than one-quarter inch before installation.

Roll weight shall average 0.8 pounds per square yard plus or minus 10 percent at the time of manufacturing. This information will be stenciled on the roll wrapper or attached tag. Staples used to anchor retention blankets should be U-shaped, 11 gauge or heavier wire, approximately 2 inches wide at the throat, and a minimum of 8 inches in length.

Place blanket with the netting on top and the fibers in contact with the soil over the entire area to be covered. The blanket should be unrolled approximately along the contour of the slope. Begin at the bottom of the slope. Lap each subsequent roll approximately four inches over the adjoining roll.

When used in water overflow areas, the blanket should be unrolled in the direction of flow and lapped four inches over the adjoining downstream roll. When using two or more blankets side by side in a ditch, do not put the seam (lapped edges of the adjoining blankets) in the center of the water flow. Offset seam 6 to 12 inches. In drainages, blanket shall be placed to cover design flow depths.

Blanket must be stapled at joints, corners, and approximately five-foot intervals along the sides and lapped edges. Exterior ends and edges shall be buried to prevent undercutting by water or wind.

Other Mulches

Wood chips or Bark: Wood chips or bark are well suited for mulching of woody plantings. Use bark chips from fir, pine, larch, hemlock, or western red cedar that have a maximum dimension of three inches or shredded particles from the bark. A layer of bark or chips greater than one inch may affect seedling emergence.

Cover the entire area when making mass shrub or tree plantings. For single plant seeding, spread chips or bark around the base and extend outward 18 inches from the main stem or trunk. Applying a depth of three to four inches will assist in controlling weed competition.

Do not use in water flow areas.

Synthetic Mulch (Fabric)

Synthetic fabric may be pin-punched polyethylene, woven polypropylene, or some other rot-resistant material. Roll fabric thickness will be a minimum of 14 mil. The minimum width for continuous rows is six feet with four feet exposed after installation. See Woodland Technical Note No. 38 for additional installation guidance.

Guidelines for Operation and Maintenance

Review the conservation plan annually and make adjustments when needed.

Calibrate application equipment to ensure uniform distribution and accurate application rates.

Clean up residual material from equipment and dispose of properly.

SUMMARY OF MULCHES, EROSION CONTROL BLANKETS, TACKIFIERS, AND GEOMATRIXES.*
(This is a representative list; other suppliers are available.)

PRODUCT NAME	SUPPLIER	DESCRIPTION, ADVANTAGES, AND DISADVANTAGES.
Enkamat	American Excelsior	Heavy-duty nylon monofiliment fibers with 95 percent pore space. Lightweight, flexible, and permeable to water. Expensive, permanent.
Curlex	American Excelsior	Aspen wood shavings in Biodegradable plastic mesh. Lightweight, easy to install, netting decomposes in two to five years. Netting may decompose unevenly.
Hi-V Curlex	American Excelsior	Aspen wood shavings with heavy plastic netting. Effective on steep slopes with high velocity run-off. Heavy plastic has long biodegrade time.
Am-Tak	American Excelsior	Tackifier for wood and straw mulches. Non-toxic, biodegradable, and easy to use. Increased costs and application equipment needed.
Excel mulch	American Excelsior	100 percent aspen fiber mulch. Organic, biodegradable, effective in promoting seedling survival. Increased cost.
Bio-D-mat	American Excelsior	100 percent coconut fiber blankets. Very strong, heavy-duty erosion control blanket. Expensive and long biodegrade time.
Armater Geomatrix	American Excelsior	Non-woven polyester hexagonal matrix. Provides strength, flexibility, and anchors soil surface. Expensive.
S2 Straw Blanket	Bonterra American	Straw blanket with netting on both sides. Inexpensive, biodegradable, lightweight, easy installation and promotes seedling survival. May decompose too fast. Not suited to high velocity run-off.
CS2 Coconut and Straw Blanket	Bonterra American	Coconut and straw blanket with netting on both sides. Strong, lightweight, biodegradable, easy to install, promotes seedling survival. Uneven decomposition.
CS Coconut Blanket	Bonterra American	100 percent coconut blanket with netting on both sides. Strong yet still lightweight, good for high velocity run-off. Slow biodegrade.
SFB synthetic	Bonterra American	Polyethylene fiber blankets. Light weight and strong. Expensive and very long decomposition time.

* Taken in part from the Region 1 Native Plant Handbook, US Forest Service.