

# Mulches for Vegetable Production in New Mexico

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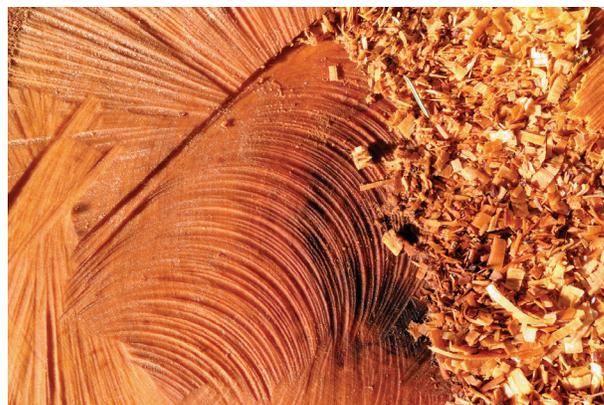
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In New Mexico, growing high-quality vegetables—whether for personal consumption or for sale to the public—requires intensive management skills. Success involves properly managing many factors, such as scarce water supplies, weed and pest control, correct nutrient application, and rapid disease detection and treatment. Using mulches can help farmers and gardeners reduce the impact of some of these factors.



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## MULCHES

Mulching is an agricultural cropping technique that involves placing organic or synthetic materials on the soil around plants to provide a more favorable environment for growth and production. Organic mulches traditionally are used in backyard gardens and smaller truck gardening operations since materials may be limited and application techniques can be labor-intensive. Organic mulches provide many of the benefits of most synthetic mulches, except soil warming and perennial weed control. Unlike synthetic mulches, however, organic mulches like hay, straw, grass clippings, and compost tend to return nutrients to the soil through decomposition. Mulches serve a number of purposes, including

- reducing soil moisture evaporation,
- ensuring a more even soil moisture supply,
- reducing or preventing weed growth,
- insulating soil from extreme temperature changes,
- preventing mud from splashing on crop surfaces,
- reducing fruit rots (in melons, strawberries, and tomatoes),
- reducing soil crusting,
- reducing soil erosion,
- reducing soil compaction,
- protecting perennial plants from freezing, and
- improving neatness of the garden or landscape.

## TYPES OF MULCHES

The selection of a specific mulch will depend on its availability, cost, the crop to be mulched, and the season of the year. Almost any material that insulates well

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and permits gaseous exchange and moisture penetration will make a satisfactory mulch. A good mulch should be non-toxic to plants, easy to apply, free from disease and weed seed, not be so absorbent that it can take moisture away from plants, and easy to remove or be biodegradable once incorporated into the soil after use. It should not pack, blow, wash, ferment, or burn easily.

Many commercially available mulches fulfill most of these criteria. Quite a few are inexpensive. A coarse, heavy mulch may be needed on a windy, hillside site. A soil surface can be covered with either synthetic or natural mulches; however, natural organic mulches will decay over time, mixing in with the topsoil. Such mulches will improve soil structure, improving both water and air penetration into the soil.

### **MULCH MATERIAL OPTIONS**

**Bark** - Large or medium grades can be used on permanent walkways in a garden and/or field. It is available in fine, medium, and large sizes, although medium and coarse grades are best for mulch. Do not incorporate bark into the soil because its high carbon content will cause nitrogen deficiency in plants.

**Coffee grounds** - This material has rich color and is high in nitrogen and some trace elements.

**Compost** - Use finished (well-cured) compost by itself or under other mulches. It can be mixed with soil before planting.

**Corn cobs** - Use medium ground, not fine, cobs. Additional nitrogen may be necessary if corn cobs are mixed with soil.

**Cornstalks** - Cornstalks are very good shredded, or as whole stalks laid over other mulches in vegetable gardens and/or fields. They are good for winter mulch.

**Cover crops** - Any crop that can be grown on spare land and cut before it starts to produce seed can be used for mulch.

**Grass clippings** - Grass will mat and ferment if used fresh in a thick layer and alone, so only use it dry and in a thin layer. It is better mixed with other dry mulches. Do not use clippings if your lawn has been treated with herbicides, and avoid grasses like Bermudagrass that propagate easily.

**Hay and field grass** - Hay and field grass should be mowed before it goes to seed. Legume hays are rich in nitrogen. Loose hay will blow in the wind, and these mulches can carry weed seed.

**Manure** - Use well-rotted or composted manure mixed with straw for best results, and watch out for weed seed. Use manure lightly on vegetable gardens and/or fields.

**Leaves** - This mulch is best placed around vegetables and on bare plots as leaves fall. If possible, shred the leaves to keep them from packing.

**Pine needles** - Pine needles are a very good mulch, especially for plants that thrive in acidic soils (such as strawberries). Pine needles are light, airy, and attractive, but can be a fire hazard.

**Sawdust (preferably decomposed)** - Apply sawdust 1 inch deep, but do not incorporate it into the soil because its high carbon content will cause nitrogen deficiency in plants.

**Straw** - This is a good general mulch used for winter protection and on paths between vegetable rows. It may carry weed seed.

**NOTE:** If plants mulched with high-carbon materials become chlorotic (yellow), additional nitrogen may need to be applied to plants.

**Cloth** - Burlap is sometimes used between rows in vegetable gardens.

**Newspaper** - Use three to six sheets thick and cover it with organic mulches for better appearance and to speed decomposition.

**Paper** - Depending on growing and environmental conditions, paper mulches can be effective in commercial fields and home gardens. They are available from many nurseries in 30-lb, 40-lb, and 50-lb weights, and can also be coated in wax. Paper mulch is biodegradable and can be incorporated into the soil at the end of the season. For best results when



installing paper mulch, the beds must be firm and the paper must have full contact with the soil (Coolong, 2010).

**Plastic film** - These mulches can be used in commercial fields and home gardens. Most commercial plastic mulches are made of either linear, low-density polyethylene or high-density polyethylene. High-density polyethylene is lighter and stronger than the same thickness of low-density polyethylene. Most plastic mulches vary in thickness from 0.75–1.5 mil and may be smooth or embossed (McCraw and Motes, 1991). For best results in situations where irrigation is not underneath the plastic mulch, plastic should be well-perforated to allow aeration and moisture penetration. Soil should be damp before applying plastic. Plastic mulch must be removed after each growing season. Do not disc plastic into the soil.

**Woven weed barrier** - This mulch allows moisture and oxygen to penetrate the soil, encouraging crop roots to penetrate more deeply while deterring weed growth. Cut holes in the barrier for desired plants, or place between planted rows.

### APPLYING MULCH

Most coarse, natural, organic mulches like straw and bark should be applied 2–3 inches deep over the whole area to be mulched. Grass clippings should be allowed to dry out before applying to keep them from matting. Do not apply grass clippings more than 1 inch deep. Woody material should not be incorporated into the soil since it will tend

to tie up nitrogen in the soil, making it unavailable for plant uptake. Do not allow moist organic mulches to come directly into contact with seedlings since they may cause seedling disease problems like “damping-off.” Mulches are generally applied to most crops after they have emerged or around transplants.

Plastic mulches for home gardens should be perforated to allow air and water movement into the soil. Holes cut in unperforated plastic for vegetable transplants should be large enough to accommodate air and water movement around the bases of the plants.

Commercial plastic film and paper mulches can be applied by hand in smaller operations or by machine in larger ones. The basic technique involves bedding up the soil, shaping and pressing the bed, and applying the plastic mulch and drip irrigation line. These operations can be performed separately or in various combinations. First, beds are raised with hilling discs and then compressed to a uniform height and density with a bed shaper. Beds normally have 5- to 6-foot centers and generally are 4–6 inches high and 30–34 inches wide, sloping slightly (1.25 inches) from the center to the edges to shed excess rainfall (Lamont, 1991).

Additionally, for plastic film and paper mulch applications, the drip line can be installed on the soil surface under the mulch or 2–3 inches below the soil surface. The emitters should face up to reduce plugging. For most crops like tomatoes, chile, and vine crops planted one row per bed, the drip line should be located 4–8 inches to the side of the crop and 1–2 inches deep. The crop should be planted in the middle of the bed. Transplants or direct-seeded vegetables can be planted directly through the plastic and paper with a machine or by hand. Starter fertilizer solutions generally are applied to transplants to promote early growth. Fertilize plants midseason by injecting appropriate soluble fertilizers through the drip line.

### MULCH EFFECTS ON TEMPERATURE

The time of year to apply a mulch depends on the type of mulch you wish to apply and your objectives. Clear and black plastic mulches can be applied early in the spring to vegetable gardens to warm the soil. Clear plastic warms soil but permits weed growth, whereas black plastic warms soil and deters weed growth. Paper mulch will not warm soil as quickly as black plastic mulch in the beginning of the season. Waxed paper mulch warms soil the most when compared to other paper mulches (Coolong, 2010). In hot climates, paper mulch would not heat soil as much as black plastic mulch.

Natural organic mulches and white plastic mulch applied in the summer will tend to cool soils. This is important for crops like strawberries, which do not tolerate extreme heat.

Silver reflective mulches and aluminum foil not only cool soils but also reflect light back under leaves, which tends to repel aphids.

Applying natural organic mulches in the garden in the fall before cold weather will help insulate the soil and extend the growing season. Potatoes, carrots, and parsnips can be stored in the ground during the fall and winter using a straw mulch to keep the soil from freezing. Straw placed around blackberry canes in the fall will help reduce winter kill problems.

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