



Mulches

Many woody landscape plants evolved in forests where the soil is covered by a moist layer of decaying leaves, twigs, and branches. These natural mulch layers recycle nutrients, reduce competing vegetation and reduce evaporation from the soil surface. Mulching trees and shrubs can recreate some aspects of a forest's soil environment, even in sun-baked landscapes far from any forest. Organic mulches also can improve the soil structure and increase the fertility and permeability of landscape soils, which often are compacted and lacking in organic matter, especially around newly constructed buildings.

There is often confusion about the differences between compost and mulch. Compost is organic material that has been decomposed by soil microbes and is used as a soil amendment. Mulch is material applied to the soil surface in order to moderate soil temperature and conserve soil moisture as well as minimizing weeds and soil erosion.

Common organic mulch materials include bark, sawdust, wood chips, grass clippings, straw, cardboard, newspaper, pine needles, or other leaves. Inorganic mulches are plastics, landscape fabric, gravels, and other materials that are non-living and slow to decompose. Organic mulches are most often used in regularly cultivated areas such as gardens, flower beds, and orchards. Inorganic mulches are often used in permanently landscaped areas, especially in commercial settings.

Organic mulch layers should be at least 2-3 inches thick. Sawdust, wood chips, or straw mulches can cause localized soil nitrogen deficiencies. This occurs because soil microbes colonize organic material and utilize available nitrogen for their growth and reproduction. Deficiencies can be counteracted by adding a small amount of nitrogen fertilizer when nitrogen-consuming crops are present (annuals, vegetables, and fruit trees). Bark-based products are very resistant to decay and will not usually induce a nitrogen deficiency. Green mulch materials, such as alfalfa hay and grass clippings contain nitrogen which becomes available to plants after decomposition.

Straw and hay make good mulch for vegetable and fruit plantings. A 6- to 8-inch layer of hay or straw provides good annual weed control. These materials decompose quickly and must be replenished to keep down weeds. Once moistened and settled, they stay in place and will improve the soil as they decompose. Note: hay containing Bermuda grass is not recommended.

Pine needles make excellent mulch around shrubs, trees, and in other areas where long-lasting mulch is desired. Pine needles are very slow to decompose.

Grass clippings provide good weed control. Build up the layer gradually, using dry grass. A thick layer of green grass will give off excessive heat and foul odors rather than decompose. However, in limited quantity, clippings will decompose rapidly and provide an extra dose of nitrogen to growing plants, as well as adding humus. Avoid bermudagrass and other weedy grasses full of seed heads. Also, do not use clippings from lawns which have been treated that season with herbicide or a fertilizer/herbicide combination.

Dried leaves provide good annual weed control. Leaves are easy to obtain, attractive, and will improve the soil once decomposed. To reduce blowing of dry leaves, allow to decompose partially in a compost pile. Avoid using black walnut leaves as garden mulch. They contain a compound, juglone, which inhibits plant growth.

Bark and wood chips provide good weed control, but are slower to decay than other organic mulches. They are very effective when used as a pathway material and between raised beds. These are often available for free at transfer stations and from arborists and utility companies that maintain line clearances.

Newspaper and cardboard decompose within a season, are readily available, and cheap. Newspaper should be covered with an organic mulch, such as sawdust or hay, to hold in place. Lead in printers' ink has been a concern of some gardeners desiring to use newspaper; however, printers no longer use lead compounds in ink for black and white newsprint. Slick pages of any paper product are not recommended because some inks in these materials may still contain heavy metals.

Black plastic provides excellent weed control, is relatively slow to decompose, but will breakdown after exposure to sunlight and must be replaced every two years or so. Black plastic mulch may increase the soil temperature in the spring. It is not recommended for use under other mulches because it prevents water and oxygen from getting into the soil. Many small-scale growers use it for annual vegetable crops

Clear plastic will provide little weed control; in fact, it makes an excellent environment for growing weeds. This material is most often used to warm the soil temperature early in the spring to prepare an area for planting. It will raise the soil temperature by 10°F or more. It can be used effectively to solarize soil for weed and disease control

Reflective mulches, such as aluminum foil, have been shown to repel aphids and whiteflies. They also keep the soil cooler and have been shown to increase potato yields.

Rock or gravel mulches collect heat, cause temperature increases and therefore increase cooling costs of the home and irrigation costs to the landscape during summer. Weed seeds are easily blown into gravel or stone and soon establish themselves (even if you use landscape fabric underneath). Even so, they are widely used because of their persistence, easy maintenance, and clean appearance.

Flammability is a concern with organic mulch materials. In general, straw, pine needles and newspaper are extremely flammable. In areas where wildfire defensible space is necessary, it is best to avoid thick layers of any organic mulch within 10 to 15 feet of any flammable structure (decks, wooden fences, propane tanks, etc.). Keeping organic mulches away from structures will also reduce the potential for termite activity.

Landscape fabrics, also known as geotextiles or weed barriers, have become widely available for mulch applications. The fabric is usually used as a base and covered with another mulch product such as bark, chips, or gravel. While fabrics seem like a good idea, soil material often blows in and weeds often start growing on top of the fabric after a few years. My recommendation for residential landscapes is to forgo the fabric, prevent/remove weeds, occupy the growing space with desirable plants (consider natives and drought adapted species), don't overwater and keep adding new mulch over time. Do not use black plastic as it repels water and reduces oxygen in the soil.

Plastic mulches do have other beneficial uses. Thin plastic mulches are often used in vegetable crops for a single season. Drip irrigation systems are placed prior to the installation of plastic mulch. Tractors can be fitted with specialized equipment that lays the mulch and covers the edges with soil holding it in place. Holes are punched in the mulch to plant young transplants or sow seed for individual plants. Vegetable crops which have been most successful when planted in these plastic mulches are muskmelons, tomatoes, peppers, cucumbers, squash, eggplant, watermelons, and okra. Cut flowers and strawberries are also commonly grown using plastic mulch. This practice has acquired the name "plasticulture".

Red plastic has been shown to boost tomato yields up to 20 percent in research plots, while conserving water and controlling weeds. Red plastic mulch reflects onto plants higher amounts of certain growth-enhancing wavelengths of light.

Black plastic mulch is the predominant color used in vegetable production. It absorbs most ultraviolet (UV), visible, and infrared wavelengths (IR) of incoming solar radiation and re-radiates absorbed energy. Because thermal conductivity of the soil is high relative to that of air, much of the energy absorbed by black plastic can be transferred to the soil by conduction if the plastic mulch is in close contact with the soil surface. Heat transfer may or may not be desirable depending on the crop grown, time of year, and local climate. Black plastic mulch has been used very effectively in conjunction with vegetable crops on small farms in Yavapai County and could also be used in home gardens.

Silver (also called "reflective"), red, blue, yellow, gray, and orange plastic mulches have been investigated. Each has distinct optical characteristics and reflect different radiation patterns into the canopy of a crop, thereby affecting plant growth and development. This light reflectivity can affect not only crop growth but also insect response to the plants grown with the mulch. Yellow, red, and blue mulches have been shown to increase green peach aphid populations. Yellow mulch has been shown to increase numbers of striped and spotted cucumber beetles and Colorado potato beetles. This is not a surprise, yellow sticky cards have long been used in greenhouses to attract and monitor insect populations. Reflective mulches have been shown to repel certain aphid and whitefly species and reduce or delay the incidence of aphid-borne viruses in summer squash.



Tractor laying plastic mulch prior to planting, M.E. Bartolo, Bugwood.org.



Pepper transplant in plastic mulch, Rebekah D. Wallace, University of Georgia, Bugwood.org.



Artichokes planted in plastic mulch in the Imperial Valley, California, Gerald Holmes, California Polytechnic State University at San Luis Obispo, Bugwood.org.

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Adapted from original Backyard Gardener publications by Jeff Schalau, Agent, Agriculture & Natural Resources, University of Arizona Cooperative Extension, Yavapai County

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