

# Horticulture Diagnostic Laboratory



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## The Types and Uses of Mulch in the Landscape

### Introduction

As popular as they are in contemporary landscapes, mulches are not a new concept. For as long as trees have grown in forests, leaves and needles have fallen to the ground, matted together, and formed a natural protective layer over the soil.

The English word mulch is probably derived from the German word mulch, meaning soft, beginning to decay. It no doubt referred to early gardeners' use of straw, leaves, and loose earth spread on the ground to protect the roots of newly planted trees and shrubs.

Many different natural and synthetic types of mulch are available today, but all perform at least three basic functions: they reduce soil water losses, suppress weeds, and protect against temperature extremes. In one study comparing various mulch materials with bare soil, soil moisture percentages in mulched plots were approximately twice as high, summer soil temperatures were reduced by 8 to 13 degrees, and the average amount of time required to remove weeds was reduced by two-thirds.

The use of mulches in landscape plantings provides other benefits as well. When water droplets land on bare soil, the impact causes soil particles to fly in all directions, resulting in soil crusting and slow water infiltration. Most types of mulch break the impact of the droplets, reducing soil erosion and crusting and increasing the penetration of water into the soil.

In addition, mulches improve soil structure in several ways. As organic mulches decompose, they provide organic matter that prompts soil particles to aggregate. Large aggregates increase aeration and improve moisture conditions in the soil. These conditions, in turn, encourage additional root development and biological activity, further enhancing soil structure.

Mulched soils are cultivated less frequently than bare soils. It is now known that soil structure is improved by not cultivating, but this relationship was not always understood.

At one time, it was a common practice to cultivate the surface of soil to form a dry "dust mulch." The theory was that the dust layer would obstruct the upward capillary movement of subsoil water and thus reduce soil water losses. Research over the past forty years has shown that dust mulches conserve moisture in soils by inhibiting weed growth; but because they are susceptible to wind erosion, dust mulches actually have a negative effect on soil structure.

### Characteristics of Good Mulch

The ideal mulch is economical, readily available, and easily applied and removed; stays in place well; and supplies organic matter to the soil, yet is free of noxious weeds, insects, and diseases. It also performs the three functions described earlier --suppresses weeds, conserves soil water, and moderates soil temperatures.

Does such a super mulch exist? Black plastic, which warms the soil in spring, also heats the soil in summer, possibly to levels that are lethal to plants. Straw, shredded leaves, pine needles, and wood chips are effective insulating blankets in winter, but they slow soil warming if left on in the spring. Although black plastic effectively prevents the evaporation of water from the soil, it also blocks the entrance of water into the soil. Mineral or synthetic mulches do not contribute beneficial organic matter to the soil, but some types of organic mulches may contribute weed seeds and diseases to a site.

### Selecting the Right Mulch

There is not one perfect mulch. But understanding the attributes of different materials can help you choose the best mulch for a particular location.

The first choice to make is whether a situation calls for a summer or a winter mulch. Winter mulches are used primarily as insulation for woody plants, laid down in late fall to keep the soil evenly cool throughout the winter. Straw, shredded

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leaves and pine needles are all effective winter mulches. Summer or growing mulches are normally applied after the soil begins to warm in the spring. The primary roles of summer mulches are to warm the soil, reduce weed growth, and retain soil moisture.

Another consideration is choosing the right mulch for the location. Black plastic and straw are commonly used in vegetable gardens or small fruit plantings. Wood chips, bark chunks, and pine needles are appropriate mulches for shrub beds or around trees. Fine mulches, such as bark granules, wood shavings, cocoa shells, and buckwheat hulls, are attractive when used in annual or perennial beds. Fine gravel or crushed stone mulches look most natural when used in rock gardens.

Other considerations in selecting mulch are cost and availability. Although cocoa hulls and buckwheat hulls make very attractive mulches, they may only be sold in regions where these commodities are processed. Even when available, these mulches are normally more expensive than wood chips or bark products. On the other hand, some municipalities stockpile wood chips from tree-trimming work and offer the chips free to anyone willing to haul them away.

### **Characteristics of Particular Mulches**

**Bark mulches.** Commercial bark mulches are generally the by-products of milled fir, Douglas fir, pine, redwood, and spruce logs. Three grade standards have been adopted for landscape use based on particle size: bark chunks (decorative bark), bark granules (soil conditioner), and shredded bark. Of the three, bark chunks are the most persistent.

Some bark mulches may be toxic to young plants, particularly if the bark is fresh or if it has been improperly stockpiled. Toxins can be leached from bark by heavy watering or evaporated by thorough aeration. Bark mulches are most likely to cause damage to plants if the mulch particles are small, if the mulch is particularly deep, or if a high proportion of plant roots are in the surface layer of the soil. If you are concerned about the toxicity of fresh chips, spread them thinly under young plants. Bagged bark mulch products have usually been allowed to weather for long periods of time to remove any toxins and are least likely to harm plants.

Among the most desirable characteristics of bark mulches are their excellent resistance to compaction and blowing in the wind, their attractiveness, and their availability.

**Wood chips.** Wood chips are derived from many different hardwood and softwood species. They are often available from municipalities or utility companies involved in pruning or clearing trees.

In general, wood chip mulches have a high carbon: nitrogen ratio. This means that in the process of decomposing they may temporarily reduce the supply of soil nitrogen for plant uptake. You can compensate for this loss by adding nitrogen fertilizer to mulched plants.

Compared with bark mulches, wood chips tend to lose more of their decorative appearance over time, weathering to a gray or silvery gray color. Because of this, people often renew wood chip mulches each year by adding an additional 3 to 4 inches of chips. This over mulching not only wastes mulch but can suffocate the roots of shallow-rooted species and cause cankers to develop around the bases of susceptible trees and shrubs. A better practice is to renew mulches every 2 to 3 years and churn up the existing mulch before adding a light renewal layer.

**Sawdust.** Sawdust is often recommended as mulch for blueberries, rhododendrons, and other acid-loving evergreens. Sawdust mulch has an acidifying effect on the soil as it decomposes, and like wood chips, it can rob the soil of nitrogen.

In addition, sawdust layers are characterized by severe compaction and decomposition over a single growing season. Thus, it is necessary to fluff up and renew sawdust mulch each spring.

**Hulls of cocoa, buckwheat, cottonseed.** In different regions of the country, hulls that are the processing by-products of various crops are available as mulches. Generally, these materials are decorative and impart a delicate, richly textured appearance. As such, they are especially useful around highly visible shrub borders, flower beds, and rose gardens.

Processed hull mulches are more expensive than other mulches. They also are prone to blowing in strong winds and washing out after heavy rains. Cocoa hulls, which have a strong chocolate aroma, also have a high potassium content and may be toxic to some plants.

**Straw.** Straw from wheat, timothy, oats, rye, or barley is widely available and comparatively inexpensive. It is used as winter mulch around tree or shrub roots and as summer mulch in vegetable gardens and strawberry plantings.

Straw has some potential problems that must be recognized before it is used: it is highly flammable; it contains grain seeds that can germinate; it harbors rodents; it lowers the soil nitrogen supply as it decomposes; and it must be renewed annually. Additionally, it is easily blown by wind and lacks the attractiveness of other mulches.

On the other hand, it is cheap and effectively suppresses weeds and reduces soil water losses. As winter mulch, it protects tender roots from cold temperature injury.

**Pine needles.** Pine needles have a pleasing appearance and acidify the soil around acid-loving plants. They normally are not available commercially but can be raked up from around pine plantings.

Pine needles decompose slowly, are resistant to compaction, and are easy to work with. They provide excellent protection around newly set or tender ornamental plants. If left on year-round, pine needles should be renewed annually.

**Shredded leaves.** Leaves that have been shredded with a composting mower are sometimes used as summer mulch. If not shredded finely enough, however, the leaves tend to mat together and form a barrier that blocks free water and oxygen movement into the soil.

For best results, allow leaves to partially rot before using them as mulch. They will finish decomposing in place, contributing humus, nitrogen, and other nutrients to the soil.

**Crushed stone, gravel, volcanic rock.** Mineral mulches offer some advantages over the organic materials described thus far. They are not blown about by wind, they do not harbor weed seeds or diseases, and they do not rob the soil of nitrogen.

Mineral mulches are used in shrub beds, driveways, walkways, and in steps. Depending on the material used, they can be fine textured or coarse. Crushed stone and gravel are appropriate mulches for rock gardens. Some mineral mulch can be colored to blend in with features of the home, patio, or landscape.

Mineral mulch particles can work free of beds and be thrown by rotary lawn mowers, potentially causing injury. Unless under laid with a synthetic fabric or plastic mulch, they migrate down in soils over time. Limestone chips raise the pH of the soil and thus should not be used around acid-loving plants.

**Black plastic.** The best features of black plastic, and the reasons for its continued popularity, are its abilities to suppress weed growth and retain soil moisture. It is commonly used in vegetable and small fruit plantings and is often applied as a layer under wood, bark, or mineral chips.

Unfortunately, although black plastic prevents water from exiting the soil, it also prevents water from entering the soil. This is acceptable in crop plantings where rows covered with black plastic are normally alternated with rows of bare ground, but it is a problem in wide landscape beds.

**Geotextiles.** In the last five years, geotextiles have been the big news in mulches. These woven and non-woven fabrics of polypropylene or polyester are an improvement over traditional black plastic. They not only block weed growth and reduce surface evaporation but also allow water, fertilizer, and oxygen to penetrate easily through to the soil.

Used alone as mulches, geotextiles can be degraded by the ultraviolet rays of the sun. They are used more frequently as mulch under liners, enhancing the weed-suppressing ability of the mulch while separating the mulch and soil.

Non-woven polyester fabrics generally last longer and have greater resistance to chemical and temperature degradation than do polypropylene materials. Polyester mulches, however, are usually more expensive.

Polypropylene fabrics are manufactured by either weaving fibers together or bonding short or continuously spun fibers together. The non-woven fabrics are bonded by needle punching, melting with chemicals or heat, gluing, or molding.

With so many different geotextiles on the market, it may be difficult to choose the right fabric. Some factors to consider are ease of applying the material to the landscape; ease with which water penetrates; effectiveness of the material in suppressing weed growth; and relative cost.

Before a geotextile is applied, the area to be mulched should be cleared of all weeds. Most manufacturers direct the applicator to lay down the fabric and cut slits where plants are to be installed. Landscapers who have worked with geotextiles, however, have found that application is easiest when shrubs are planted in weed-free soil first; then the fabric is laid on top and slits are cut that just allow the fabric to be worked around the base of each plant.

The final step is to apply a 1- to 3-inch layer of mulch on top of the geotextile to improve appearance, reduce wear, and decrease deterioration by the sun's rays.

Although geotextiles are a great advance in mulching technology, they don't prevent all weed growth. Weeds that germinate and grow in a bark or wood chip top mulch can grow right through the fabric. Especially troublesome weeds are grass or grass-like species such as nutsedge and Bermuda grass. To maintain a bed mulched with a geotextile effectively, destroy all weeds as soon as they are noticed.

## **Managing Mulches in the Landscape**

Before covering an area with mulch, bring the site to its desired grade. If annual weeds have been a problem, consider treating the area with a pre-emergent herbicide before mulching.

Mulches applied for winter protection should be laid down in late fall, once the soil has cooled but before it has frozen. Summer mulches are normally applied in mid-spring, once the soil has warmed enough for active root growth. Mulches that are left around trees and shrubs year-round should be pulled away from the trunks in the fall to allow proper hardening of the bark.

Organic or mineral mulch must thoroughly cover an area to a uniform depth to be most effective. Low or bare spots are prone to weed problems. Uneven mulch does not properly insulate the soil.

Although there is no super mulch, knowledge of the characteristics and uses of different mulches allows a gardener or landscaper to use mulches to benefit the entire landscape.

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