

## 27 Value of Mulching Soils

### Easy Gardening...Mulching

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<http://aggie-horticulture.tamu.edu/extension/easygardening/mulching/mulching1.html>

Mulching your garden shows you really care about your plants. Mulch is any substance spread on the ground to protect plant roots from heat, cold or drought or to keep fruit clean. Mulching is a long established horticultural practice. Farmers know that shallow cultivation of the soil's surface after a rain slows the rate of water loss from the soil. The shallow layer of dry surface soil acts as a mulch. Mulches can be classified as inorganic or organic. Inorganic mulches include plastic, rocks, rock chips and other non-plant materials; whereas, organic mulches include straw, compost, sawdust and similar materials. Plastic is the only inorganic mulch used in vegetable gardens.

#### Value of Mulches

A thin layer of mulch on the soil surface (especially in sloping gardens) reduces the washing away of soil particles by rushing water. Also, mulches prevent raindrops from splashing on the soil surface. See figure 1.



Figure 1

Saving soil moisture is an important use of mulch in Texas. A mulch layer on the soil surface allows the soil to soak up more water. Mulch also reduces the rate of water loss from the soil. A 3-inch layer of mulch on the soil surface dries much faster than the soil below it. Thus it prevents water from moving into the air. See Figure 2.



Figure 2

Mulches modify soil temperature in home gardens. Applied in late fall, winter mulch insulates plant roots, crowns and stems of winter crops from extremely low temperatures. Proper mulching in summer months keeps the soil cooler. Soil covered by black or clear plastic or dark organic mulch in early spring warms faster than bare soil. This allows earlier planting of warm-season crops. See Figure 3.

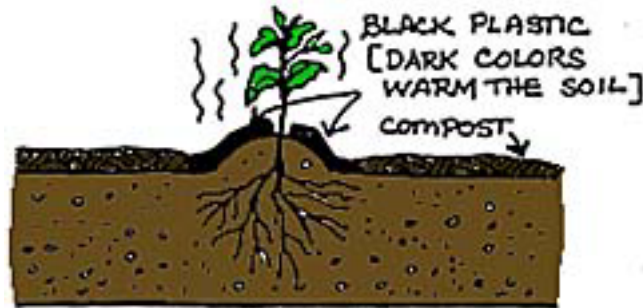


Figure 3

Use light-colored paper such as newspaper in summer to keep the soil cooler. Organic mulches such as compost and sawdust also keep soil below the mulch layer cooler in summer. Dark soil warms much faster than light-colored soil. See Figure 4.



Figure 4

Organic mulches enrich the soil as they decay and provide a better environment for plant growth. Soils high in organic matter are easier to till and better suited to vegetable gardening. Adding organic material makes soils more crumbly, especially clay soils that pack and crust.

Mulches help plants by gradually increasing soil fertility. An organic mulch such as straw or newspaper can be turned under the soil at the end of the season. This helps build the soil's organic matter content. Turn the mulch under as soon as the gardening season is over so it breaks down before the garden is replanted. Most mulches also provide excellent weed control. Mulches do not prevent weed seeds from sprouting. However, weed seedling emergence is blocked by a mulch layer thick enough to exclude light. A 3-inch layer of mulch on the soil surface keeps most annual weed seedlings from coming through. See Figure 5. Weeds that break through are removed more easily from mulched soil. Hard-to-control weeds such as nutgrass and johnsongrass may come through the mulch layer but can be pulled more easily or covered by fluffing the mulch with a fork.

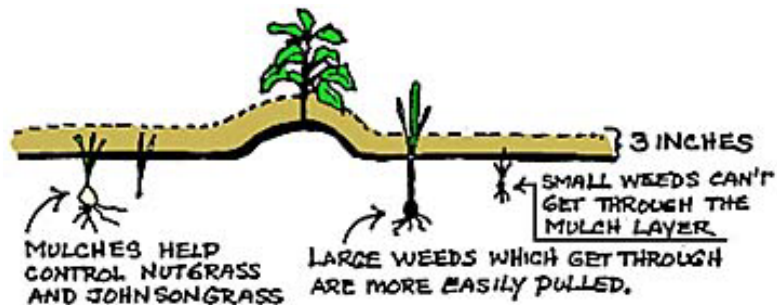


Figure 5

A well-mulched garden can yield 50 percent more than an unmulched garden the same size. Space rows closer as there is little or no need to cultivate the soil. Plant food is more available in cooler soil, and the extra soil moisture increases plant growth and yields. You will harvest more fruit because of less fruit rot. Fruit does not touch the soil, and soil is not splashed up on the fruit. See Figure 6. This is true for tomato fruits that rot easily when resting on the soil surface. Potatoes can be mulched heavily as the vines grow. This causes tubers to form in and under the mulch layer. These potatoes are less susceptible to soil rot, easier to harvest and less likely to be bruised during harvest.



**Figure 6**

Garden mulching reduces maintenance. A good mulch layer eliminates the need for weeding, and mulched vegetables are cleaner at harvest time. Fruits of tomato, melon and squash plants never touch the soil.

### **Mulching Materials**

Many materials are available for mulching a garden. Some examples are: compost, straw, gin trash and sawdust.

Compost is generally the best mulching material for the home garden. It is usually free of weed seeds and is inexpensive. Prepare compost from materials present in your yard. It is not necessary to purchase expensive materials for mulching. Straw is short lived and coarse textured. More straw is needed for the same effect as compost or lawn clippings. Generally, less of the finer-textured material is required to provide a 3-inch layer of mulch after settling. Compost, however, usually requires only about 4 inches to provide a 3-inch mulch layer. Gin trash is commonly available in Texas. It is risky to use, however, without knowing its source and prior treatment. Make sure that the farmer did not use arsenicals on the cotton. Arsenicals are long-lived chemicals that can be present in gin trash for several months or years. Also, gin trash may contain weed seeds and diseases. Composting gin trash before application to your garden will make it safer and easier to use. The heat generated by composting kills most weed seeds and most disease organisms that infect plants. Sawdust is commonly available especially in East Texas. If well managed, it can be a good mulch. It can result in a temporary, but sharp, decrease in soil nitrogen. Add a small amount of garden fertilizer to the soil after applying sawdust directly to a garden. Even better, add nitrogen to sawdust then compost it before spreading it on your garden. Plastic is an effective mulch if used properly. Use black plastic in the spring and early summer to warm the soil. Black plastic keeps light from the soil and prevents weeds from growing. Clear plastic warms the soil, but weeds can grow beneath the plastic. A disadvantage of plastic is that it cannot be turned into the soil at the end of the season. See Figure 7.



Figure 7

### Selection of Mulching Material

When selecting materials, consider these factors:

Cost of the material. Do not spend money on mulching material when suitable materials are available at little or no cost. The crop you plan to mulch. Never use material from the crop that is to be protected. For example, do not use potato vines from the spring crop to mulch fall potatoes for the possibility of disease is increased. When the mulch is to be used, select a light-colored mulch during the summer and early fall to reflect heat. Use a dark-colored mulch in early spring to help warm the soil to permit earlier planting and hasten early growth.

### Using Mulches

Spread mulches on freshly cultivated, weed-free soil before plants are large enough to interfere. Apply organic mulch thick enough to leave a 3-inch layer after settling. Four inches of fine materials like compost should be adequate. Remember that coarser materials, such as straw, settle and may require 6 inches or more initially. If you use newspaper, place three layers on each side of the row. See figure 8. Add more mulch during the season if you are working with organic materials. The mulch settles and gradually rots during the growing season where it meets the moist soil surface. Adding additional layers assures continuous weed control, a clean resting place for the fruits of your labor and creates a pleasing appearance all season long.

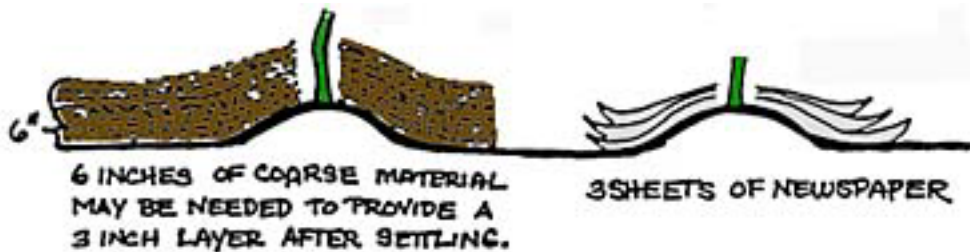


Figure 8

## Mulching Vegetables

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<http://www.ces.uga.edu/Agriculture/horticulture/veg-mulch.html>

Few jobs in the vegetable garden are as rewarding as mulching. Time spent applying mulch to pepper, tomatoes, squash, eggplant and other vegetables will mean extra dividends at harvest time. Mulch prevents loss of moisture from the soil, suppresses weed growth, reduces fertilizer leaching, cools the soil, and keeps vegetables off the ground. Fruit rots sometimes occur when vegetables touch the ground. Mulching serves as a barrier between the plant and the soil and helps prevent fruit rots.

Mulching has several advantages. It reduces labor required in cultivation, since emerging and small weeds perish under their dark barrier. Therefore, it reduces the need for tillage and the use of weed-control chemicals. Water is conserved because mulches reduce the evaporation of soil moisture by lowering the soil temperature. Water absorption by a mulched soil is greater than that of an unmulched soil. Mulch also prevents the formation of soil crusts. Soil loss from heavy rain and wind is decreased. In effect, mulches are excellent conservation agents.

Mulch is an excellent insulator and prevents drastic fluctuations in soil temperature. Mulch keeps the soil cooler in summer and warmer in winter, improving both root growth and nutrient availability. At the end of the growing season, organic mulches can be tilled into the soil to further increase the organic matter content and the water-holding capacity of the soil. Finally, mulches impart a neat, trim look to gardens and reduce the incidences of mud-splashed flowers and vegetables after heavy rains.

### Choosing the Right Mulch

A practical mulch should be easily obtained, inexpensive, and simple to apply. Availability and cost vary from region to region. Mulching materials may be available from materials in your own yard, such as leaves; bought from garden centers; and obtained from tree-service firms. A suggested depth is 3 to 4 inches, bearing in mind that too little will give limited weed control and too much will prevent air from reaching roots. A list of mulching materials follows, with specific emphasis on advantages and disadvantages.

**Bark:** Small pieces of bark are preferred over large chunks. Bark mulches vary, but all are attractive, durable and suitable for foundation shrub plantings. Contact with wood framing is to be avoided, since bark can be a termite vector. The high carbon-to-nitrogen ratio of bark requires prior application of nitrogen fertilizer.

**Cocoa shells:** Available in some areas of Georgia. These are brown, light, easy-to-handle and relatively noncombustible. Cocoa shells have some value as a fertilizer and resist blowing in the wind. Their high potash content harms some plants, so they should not be applied to a depth greater than 2 inches. Cocoa shells may have an offensive odor.

**Coffee grounds:** Coffee grounds cake badly; a depth of 1 inch is recommended. Coffee grounds contain some nitrogen.

**Compost:** An especially good mulch, compost has fertilizer value and soil-like appearance. It is also a good organic amendment for tilling into the soil after the growing season ends.

**Corn cobs:** Ground corn cobs are a good mulch. Some find their light color objectionable. Other uses for ground corn cobs such as in feeds and mash tend to limit the supply for mulching.

**Leaves:** Leaves are free, readily available in many areas, release some nutrients upon decomposition and spread easily. However, they have a tendency to form a soggy, impenetrable mat. This problem can be overcome by mixing leaves with fluffy materials, such as hay or straw, or by shredding the leaves.

**Newspaper:** This is certainly readily available and economical but somewhat difficult to apply. The high carbon-to-nitrogen ratio necessitates the prior application of nitrogen fertilizer. A good use for newspaper is as an undermulch; that is, place two to three sheets under a thin layer of an attractive, more expensive mulch.

Peanut shells: (Not recommended) these are attractive and easy to apply. Peanut shells also contain nitrogen and are long-lasting. However, peanut shells are carriers of *Sclerotium rotfsii*, also known by the common names of Southern blight and white mold, which can be a major problem in the garden. Peanut hulls may also be infested with nematodes and nutsedge seeds and/or tubers. At the present time, peanut hulls are not recommended as a mulch.

Peat moss: This mulch is attractive and easy to handle but somewhat expensive. Dry peat moss requires considerable time and water to become moist, so it should be applied only to a 3-inch or less depth and avoided in areas subject to drought. Its acidic pH makes it especially desirable for acid-loving plants.

Pine needles: these have an esthetics appeal and are not prone to forming a soggy mat as are leaves. They are especially good for acid-loving plants.

Polyethylene film: This is one of the few mulches that is readily available and economical enough to be used on larger-scale commercial applications. Polyethylene allows passage of gases such as nitrogen, oxygen and carbon dioxide. Holes or slits facilitate the planting of seeds or plants and water entry. It can last several years if undamaged by machinery. Usually, it is used as black film. Clear film is sometimes used, but it offers limited weed control (unless herbicide is applied before mulching), since light passes through it. Earlier crops can be produced with the clear and, to a lesser degree, black plastic mulch because of the warming of the soil.

Straw/hay: These materials are lightweight and easy to apply, but their appearance restricts their application mostly to vegetable gardens. They are used more frequently as a winter mulch for protection. They are not long-lasting and frequently contain weed seeds. Coastal Bermuda hay is propagated vegetatively and is an excellent hay mulch.

Sawdust: Ages or partially rotted sawdust makes a satisfactory mulch that lasts a long time. Since it is prone to caking and has a high carbon-to-nitrogen ratio, apply it only 2 inches deep after adding nitrogen fertilizer to the soil.

Wood chips: Since these are moderately priced or free, attractive, readily available and easy to apply, they make an excellent mulch. However, their high carbon-to-nitrogen ratio requires an application of nitrogen fertilizer. Wood chips can last about two years. Like bark mulch, woodchips can be a vector for termites.

## **Mulching for a Healthy Landscape**

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<http://www.ext.vt.edu/pubs/envirohort/426-724/426-724.html>

For as long as trees have grown in forests, leaves and needles have fallen to the ground and formed a natural protective layer over the soil. This same protection can be given to the plants in our landscapes by mulching. Mulching can make a big difference in the success of your landscape. Mulches conserve soil moisture, allowing you to water less often; keep down weeds; reduce erosion; keep plant roots cool; provide winter protection; and make your yard more attractive.

Mulches also simplify lawn mowing around trees and shrubs. A ring of mulch allows you to bring your lawn mower right up to the edge of the mulch, eliminating the need for string weeders. At the same time you are protecting tree trunks and surface roots from damage by mowing and clipping equipment.

### **Selecting the Best Mulch for Your Needs**

Many materials can be used for mulching. How do you decide which mulch is best for you? All mulches have different characteristics, some of which may be advantages in some situations and disadvantages in others. See the list of mulches in this brochure for information on individual mulches. Before choosing a mulch, however, consider how you will use it.

Summer mulches. Summer mulches are in place during the growing season and are used primarily for flowers and vegetables. Their roles are to retain moisture, reduce weed growth, and moderate soil temperatures. Summer mulches are often left in place through the winter to reduce erosion. For perennial plants, they can also be supplemented by winter mulches.

Winter mulches. Mulches used primarily to protect shrubs and flowers from severe winter temperatures and frost heaving are called winter mulches. They are laid down in late fall and serve as insulation during the winter.

Permanent mulches. Permanent mulches are used where mulch is desired year round and does not need to be disturbed—for example, in paths and around trees and shrubs. If organic material is used, "permanent" mulches will still need to be replenished annually.

### How to Mulch

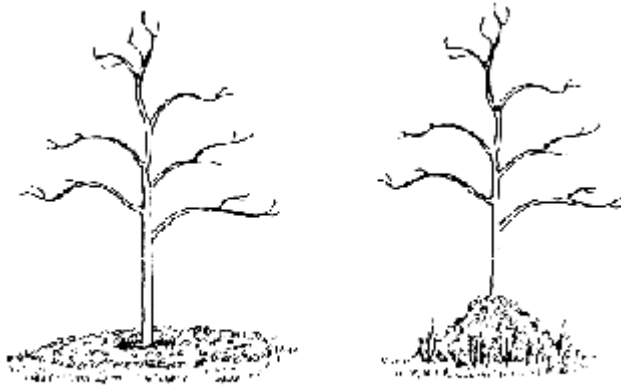
Summer mulches for annual flowers and vegetable gardens are normally applied in midspring, once the soil has warmed enough for active root growth. For best weed suppression in a perennial border, apply mulch in early spring, before the forsythia blooms. For best results, remove any existing weeds before applying mulch. Mulches applied for winter protection should be laid down in early winter, once the soil has cooled but before it has frozen.

For trees and shrubs, spread mulch evenly to a depth of 2 to 3 inches. For trees and shrubs in beds, mulch the entire bed. For those in a lawn, mulch a wide ring (extending from 3 to 6 feet out from the trunk) around each plant. Never pile mulch against tree trunks. Pull mulch back away from the trunk about an inch or so. As organic mulches decompose, they may need to be replenished somewhat every year; but don't let mulch build up to depths greater than about 4 inches.

For flower beds, mulch can be applied up to 3 inches deep (after settling), but should be kept pulled back slightly from plant stems. Mulches should thoroughly cover an area to a uniform depth to be most effective. Low or bare spots are prone to weed problems.

### Organic Mulches

Mulches made from plant material are organic mulches. Over time, organic mulches will decompose and become part of the soil. This is a great advantage, because this decomposition adds organic matter to your soil, helping the soil to better retain water and nutrients—giving you healthier plants. This means, however, that organic mulches will have to be replenished from time to time.



Mulch properly applied

Mulch too deep

Bark. Bark mulches are usually made from the by-products of pine, cypress, or hardwood logs. Most common are shredded bark and bark chunks. Bark mulches resist compaction, will not blow away, are very attractive, and are readily available. Some shredded barks, such as cypress, decompose slowly. Bark chunks (also called nuggets or decorative bark) decompose most slowly but do tend to wash away.

Wood chips. Wood chips are made from many different kinds of trees. Wood chips make an excellent mulch that resists compaction, stays put, and weathers to an attractive silvery-gray color. In addition, they are often available from municipalities or utility companies for little or no cost. However, such "bargain" mulches are likely to contain seeds from trees and other plants that can sprout and create weed problems. Also beware of such mulches that have not been properly aged or composted. Mulch that has not been aged can be toxic to plants due to the formation of organic acids during the decomposition process, and, if placed too close to tender stems, will harm or kill plants. Purchasing mulch from a reputable dealer who has monitored the decomposition process to achieve a high quality, aged product will do a lot to ensure that your valuable plants will not be harmed.

Sawdust. Sawdust is often readily available and may be helpful in acidifying the soil around rhododendrons and other acid-loving plants. Sawdust is a poor choice in most situations, however, as weed seeds easily sprout in the mulch. It also tends to cake, making it harder for water to soak into the ground. Sawdust is low in nitrogen, so it robs nitrogen from the soil as it decomposes. Therefore, more nitrogen fertilizer may be needed. A 3- to 6-inch layer of sawdust does work well, however, for mulching pathways.

Straw. Straw makes a good winter mulch or mulch for the vegetable garden. It is inexpensive, suppresses weeds, conserves moisture, and insulates well. On the other hand, it is not very attractive, may contain crop seeds, and is extremely flammable. It is important to purchase "straw" rather than "hay," as hay contains many weed seeds. Pile mulch 6 to 8 inches deep.

Pine straw. Pine needles are attractive, decompose slowly, resist compaction, and are easy to work with. They are often available commercially or are free if you have pine trees on your property.

Shredded leaves. Leaves that have been shredded with a composting mower are sometimes used as a summer mulch, although they decompose very quickly. Whole leaves can be used instead, but they tend to mat together and block water movement into the soil.

Newspaper. Three layers of newspaper can effectively keep down weeds, especially in the vegetable garden. To keep the paper from blowing away, weight it down using another mulch or other means. Shredded newspaper also works well.

### **Inorganic Mulches**

Inorganic mulches, often of stone or plastics, tend to stay in place, do not rob the soil of nitrogen, and do not harbor weed seeds. However, they have numerous disadvantages when used in the garden. Stone mulches can migrate down into the soil in time, making future digging difficult. Light-colored stones can reflect heat onto plants, scorching sensitive plants. Stones also tend to work free of beds and can be thrown by lawn mowers, potentially causing injury. Perhaps the greatest disadvantage, however, is that these mulches do not contribute organic matter to your soil.

Crushed stone, gravel, volcanic rock. These mulches are available in a wide variety of textures, colors, and materials and are used in rock gardens, driveways, and walkways. Think carefully and make sure you really want this type of mulch before putting it in place, because these mulches are more or less permanent. It is best to underlay these mulches with landscape fabric to reduce movement of stones into the soil. Once gravel becomes mixed with the soil, it is nearly impossible to get it out. Many gravel and stone mulches are made from limestone and cannot be used around rhododendrons, mountain laurels, and other acid-loving plants. When leaves, twigs, and other debris fall into coarse rock mulches, they are difficult to remove and can make the mulch considerably less attractive.

Plastics. Plastic works well for keeping weeds down and retaining soil moisture. Although it prevents water from leaving the soil, it also prevents it from entering the soil-making it unsuitable for landscape plantings that depend on rainfall for their water. Plastic is best reserved for vegetable gardens where irrigation systems can be placed under the plastic and bare spaces left between rows to allow water entry into the soil.

Geotextiles. These are fabric mulches of polypropylene or polyester. They work much as plastic does, but allow water and fertilizer to enter the soil. For the best weed suppression, choose closely woven geotextiles. Generally the fabric is placed on weed-free ground and covered with another mulch, such as

wood chips, to improve its appearance, keep it in place, and reduce damage to the fabric by the sun's rays. With these mulches, it is important to remove weeds as soon as they are noticed. Otherwise, roots can grow right through the fabric and become very difficult to pull.

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## **Soil Moisture Regime Changes in Tephra-Mulched Soils Implications for Soil Taxonomy**

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### **Abstract**

Large areas of the Canarian archipelago are catalogued as aridic according to U.S. soil taxonomy. A traditional system of cultivation, based on the application of a mulch layer of tephra, is widely practiced. The objective of this work is to compare the classification of soils with and without mulch using U. S. soil taxonomy, and illustrate the problems in estimating the soil moisture regime on the basis of meteorological data. In this study the moisture regime of a natural soil and an adjacent soil mulched with a 12-cm layer of basaltic tephra was characterized on the basis of gravimetric moisture measurements, taken over a period of >1 yr, at 10-cm intervals to a depth of 1 m. The moisture regime of the soil was also estimated using meteorological data. Results obtained for the natural, nonmulched soil using measured values and those estimated from atmospheric data are very similar, and both indicate an aridic soil moisture regime. The difference with the soil covered with basaltic tephra is noteworthy. In the latter case, the soil remained moist throughout the year, representing a udic moisture regime. This noteworthy difference is reflected in the classification of the soils: Aridisols in the first case and Inceptisols in the second. A proposal is made to include mulching with tephra as a cultural practice along with irrigation and fallowing in the definition of the classes of soil moisture regimes in U.S. Soil Taxonomy. This would prevent the practice of mulching with tephra from changing the soil order placement in U.S. Soil Taxonomy.