

Weed Management in the Home Garden

Weeds are a constant problem for home gardeners. Weeds compete with garden crops for nutrients, moisture, and sunlight. In large numbers, weeds can reduce the quality and yield of fruits and vegetables.

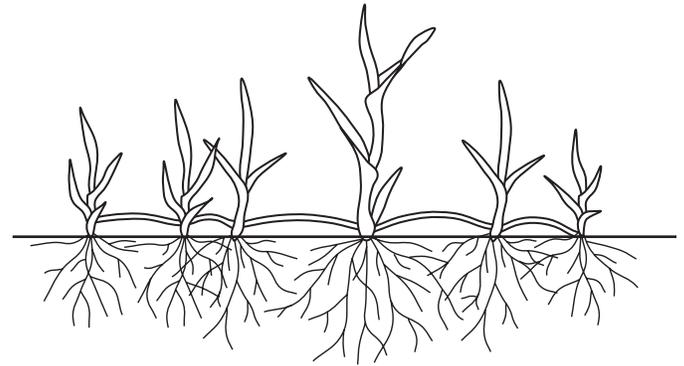
Tall weeds shade plants and interfere with air circulation. The shade may increase humidity and slow evaporation of dew and rain from plant foliage. Periods of prolonged moisture often increase the probability of disease infections.

Weeds also are hosts for disease and insect pests. For example, common ragweed, burdock, and lambsquarter often harbor common stalk borers, an insect that attacks tomato, potato, corn, dahlia, aster, and peony plants. Shepherd's purse harbors flea beetles and cabbage-root flies which infest many types of green vegetables.

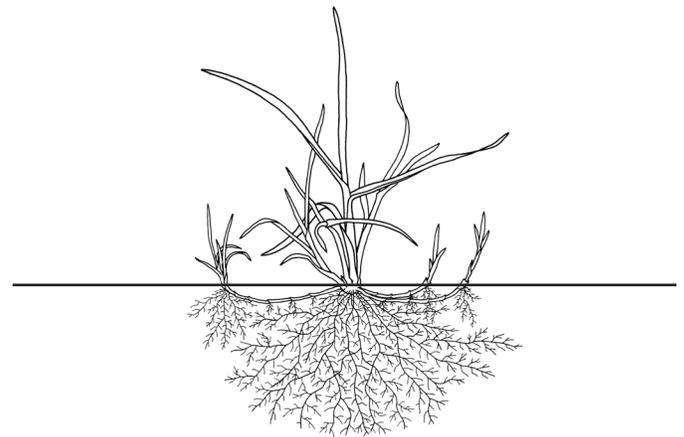
Most weeds are annuals or perennials.

Annuals germinate from seeds, grow, flower, set seeds, and then die within one year. Before they die, most annual weeds produce large quantities of seeds. Examples of annual weeds include common purslane, foxtail, crabgrass, and pigweed. If annual weeds are controlled every year before producing seeds, they will eventually become less of a problem as the seed population gradually decreases.

Perennial weeds live for 3 or more years. Perennial weeds typically die back to ground level in fall but send up new growth in spring. Perennials reproduce by seeds and/or may spread vegetatively by stolons (above ground stems), rhizomes (below ground stems), or by spreading root systems. Creeping perennials can quickly infest a small area like a garden. Therefore, it is important to keep these species controlled. Repeated cultivation slowly depletes the food reserves in the underground storage tissues and eventually controls many perennial weeds.



Stolons are elongated stems or shoots that grow along the surface of the ground.



Quackgrass is a difficult-to-control perennial weed that spreads by rhizomes.

Site selection and preparation are the first steps in successful weed control.

If possible, avoid establishing a garden in an area infested with perennial weeds. Perennial weeds are often difficult to control once flowers and vegetables are planted. When preparing a planting site, rototilling will destroy most annual weeds. However, rototilling provides little or no control of some perennial weeds. Make sure that all perennial weeds in an area are destroyed before planting fruits and vegetables.

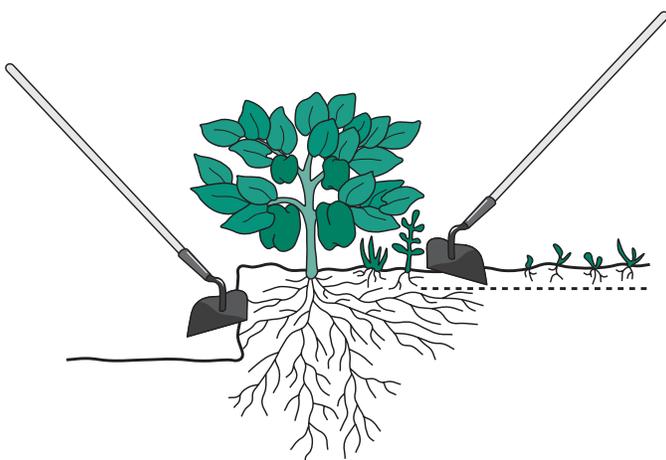
Three general methods of weed control are available to the home gardener.

Destroying weeds by cultivation (hoeing, rototilling) and hand pulling is the most common weed control method used by home gardeners. Weeds also can be controlled by using organic mulches (grass clippings, shredded leaves, straw, sawdust, or paper) or synthetic (plastic) mulches. Herbicides are a third weed control method. However, herbicides are not widely used by home gardeners due to the limited number of crops labeled for use with a particular herbicide and other difficulties.

Each method has advantages and disadvantages. Usually, more than one method will be needed to successfully control weeds. For example, mulches can reduce the number of weeds but some hoeing or hand pulling will be required for complete control.

• Mechanical control through cultivation and hand pulling

Cultivation and hand pulling should be done periodically throughout the growing season. Start early in the season when the weeds are small and repeat the process frequently during the season. It is much easier to destroy small weeds than large weeds. Avoid deep tillage. Roots of many vegetables and flowers grow near the soil surface and spread in all directions. Deep cultivation cuts off some of these roots, thus reducing plant vigor and yield. Deep cultivation also brings more weed seeds to the soil surface where they are more likely to germinate. It also causes the soil to dry out more rapidly.



Shallow cultivation helps prevent damage to plant roots. Instead of deep chopping, scrape the soil surface with the hoe blade nearly parallel to the soil surface.

• Mulches

The seeds of many weed species require light for germination. Adding a layer of mulch reduces the number of weed seeds that germinate by preventing light from reaching the soil surface. Mulching is especially effective in controlling annual weeds because they must germinate from seeds each year. Mulches are less effective in controlling established perennial weeds because their roots and rhizomes contain food reserves, allowing them to push up through the mulch. Therefore, additional steps are required to control perennial weeds.

Mulches also conserve soil moisture, prevent erosion, reduce soil compaction, eliminate root damage caused by deep cultivation or hoeing, keep the fruits of some crops (such as tomatoes, cucumbers, and melons) clean, and add to the general attractiveness of a garden.

Organic mulches are an excellent way to prevent weed growth while conserving soil moisture and improving the soil organic matter content. Organic mulches that might be used include clean weed-free straw, old hay, shredded leaves, grass clippings, crushed corncobs, wood chips, shredded bark, sawdust, and well-rotted animal manures.

Apply organic mulches after the soil has warmed up. Applying them to cool soils in early spring will delay vegetative growth and fruiting of warm season crops, such as tomatoes and muskmelons. After first destroying young weed seedlings by cultivation, apply 2 to 4 inches of mulch around the plants. Another common practice is to lay damp newspapers over the ground and then cover the papers with additional material, such as grass clippings or shredded leaves. Be careful not to cover the garden plants with mulch. If grass clippings are used, let them dry before applying as a mulch. This will help prevent them from becoming an impermeable mat.

Spading the mulch under in the fall helps promote good soil tilth. As the mulch decomposes, it returns organic matter and nutrients to the soil. Some organic materials contain substantial amounts of plant nutrients while others contain very little. The table below shows the fertilizer value of several mulches.

Fertilizer value of several mulches*

Mulch	N	P ₂ O ₄ Percent	K ₂ O
Leaves, oak	1.49	—	—
Alfalfa hay	2.45	0.50	2.10
Alfalfa straw	1.50	0.30	1.50
Grass hay	1.20	0.35	1.75
Pea vines	2.08	0.60	2.00
Bean straw	1.20	0.25	1.25
Wheat straw	0.50	0.15	0.60
Saw and wood shavings	0.20	0.10	0.20

*Based on dry weight

Mulches, such as straw, hay, and cornstalks, contain high amounts of carbohydrates (cellulose) and are low in nitrogen. Tilling these low-nitrogen mulches into the soil in the fall may cause plants to experience a nitrogen deficiency the following year. The deficiency occurs because soil microorganisms cannot get enough nitrogen from these materials to adequately break them down into humus; instead, they absorb additional nitrogen from the soil. In fact, so much soil nitrogen is “tied up” by the bacteria that garden plants may not have access to sufficient amounts of nitrogen for healthy growth. Symptoms of a nitrogen deficiency are yellow foliage and stunted growth. To overcome the problem, either use a mulch high in nitrogen, such as a grass clippings, or add 1 pound of available nitrogen per 1,000 square feet of mulched area. This amount of nitrogen can be supplied by applying 100 pounds of poultry manure, 200 pounds of cow or hog manure, or 10 pounds of an all-purpose garden fertilizer, such as a 10-10-10, per 1,000 square feet. Use additional manure or fertilizer if the mulch contains sawdust or wood shavings. Incorporate the nitrogen source into the soil (along with the mulch) in fall.

Lawn clippings are an excellent mulch for the vegetable garden because they are rich in nutrients and decompose rapidly. However, if the lawn has been sprayed or treated with 2,4-D or a similar broadleaf herbicide, do not use the clippings until the lawn has been mowed at least 2 or 3 times after the herbicide application.



Black plastic mulch is the most effective for conserving soil moisture. Place the edges 1½ to 2 inches under ground to prevent wind from lifting the plastic.



Plastic mulch can be used in a raised strawberry planting.

Synthetic mulches include polyethylene (various colored plastics), polypropylene fabrics, and aluminum foil. Black plastic is the most popular synthetic mulch for home gardeners. Black plastic provides excellent weed control, conserves soil moisture, increases soil temperatures, and keeps fruits and vegetables cleaner. Black plastic increases the yields of warm season crops, such as melons, tomatoes, peppers, and eggplants.

Plastics also are available in red, blue, yellow, green, and brown. Red plastic has reflective and translucent properties that warm the soil and hasten fruit maturation, especially tomatoes. Blue has reflective properties that is claimed to increase the sugar content of sweet corn and muskmelon. Yellow plastic is primarily used as a trap for harmful insects. Wavelength selective films or IRT are green or brown (color dependent on the manufacturer). These materials have translucent properties that increase early spring soil temperatures while they block the wavelengths of light that cause weed seed germination. Clear plastic is seldom used in home gardens because weed seeds readily germinate beneath it.

Other types of film are photo- and bio-degradable mulches. Photo-degradable films are not effective in Iowa and other areas in the northern United States because the degradation process cannot be controlled—thus resulting in large chunks of plastic blowing around in the environment. Biodegradable mulch is rapidly becoming available in the marketplace. A biodegradable mulch degrades in place through soil microorganism activity. Thus, it can be rototilled into the soil rather than removed and discarded in a landfill. The degradation of a biodegradable mulch is controlled, in part, by soil moisture, temperature, and crop canopy. A potential problem can occur if the biodegradable mulch degrades before the crop matures, resulting in a large weed population.

Before laying down a synthetic mulch, make sure the soil is moist and the weather is calm, not windy. Although plastic mulch can be laid immediately after planting, it is much easier to place the plastic over the ground first and then cut holes and plant through it. To install the mulch, make furrows approximately 3 inches deep, place the film edge in the furrow, and then cover the edge with soil. Set plants through the film by cutting holes just large enough to insert the plants. If direct seeding, cut a slit just large enough to place the seeds under the soil surface. Be sure to follow the correct row and spacing guides, setting the plants or direct seed in the center of the film. Most synthetic materials are tough and stay in place satisfactorily through the growing season.

Using synthetic plastic mulches does have some disadvantages. For example, they are costly, they need to be removed by hand after the growing season (except for the biodegradable types), and they do not supply organic matter to the soil. Weed control is still needed for areas not covered by the plastic.

• Herbicides

In limited situations, a gardener can use herbicides to supplement other weed control strategies. However, several factors limit the usefulness of herbicides in the home garden. Most home gardens contain a variety of vegetable or flower crops in a small area. This restricts herbicide use because it is unlikely that the herbicide will be labeled for all crops in the garden. Another potential problem is the tendency to over-apply a herbicide to small areas—thus causing injury to present or subsequent crops.

Herbicides must be used according to label instructions on the package. Never use a herbicide on a crop that is not specifically mentioned on the product label. Failure to follow directions may kill a crop or prevent another crop from being grown in the area. Herbicides are classed as pesticides and are potentially hazardous.

For more information

Additional information about vegetable gardening and other horticultural topics is available from local extension offices and from these Web sites:

ISU Extension Distribution Center

www.extension.iastate.edu/store

ISU Extension Horticulture—

www.yardandgarden.extension.iastate.edu

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