**Controlling Weeds by Cultivating & Mulching**

Consider your weed control strategy prior to establishing a vegetable garden in the spring. Weeds compete with vegetables for water, nutrients and light. They also harbor insects and diseases, which may then spread to vegetables. Efforts made early in the growing season will reduce the time required for hand-weeding later in the season. The weed control program may require a combination of methods to manage all weed species.

**Summer Annual Weeds**

Summer annuals are weeds that germinate in spring or early summer and flower in the summer or fall. This is the most common type of weed found in the garden. This group can be further divided into summer annual grasses and summer annual broadleaf weeds.

Common summer annual grasses include large crabgrass, goosegrass and giant foxtail. Annual grasses are easy to control if appropriate measures are taken early in the growing season but can quickly become a severe problem if not controlled when small. Large crabgrass, for example, will root into the soil at the places where the nodes of the stem contact soil, allowing this plant to quickly cover open ground. The fibrous root system of grasses makes them more difficult to pull out of the ground.

Common summer annual broadleaf weeds include smooth pigweed, common lambsquarters, purslane, galinsoga, common ragweed and tall morningglory. When controlling purslane through hoeing, remove all stems from the garden because purslane can reroot if allowed to remain on the soil surface due to the thick, succulent stem that can survive a period of drought. Galinsoga is often called quickweed, perhaps because it develops quickly and flowers while still a small plant. It seems that most gardens contain purslane, galinsoga or both. Small-seeded broadleaf weeds like pigweed are easier to control than large-seeded broadleaf weeds like morningglory. Larger-seeded weeds can germinate from a greater soil depth and can push through a shallow layer of mulch.
Winter Annual Weeds

Winter annuals are weeds that germinate in fall and flower in the spring. These weeds are often present at the time the garden soil is prepared in the spring prior to planting. Tilling the soil will kill existing stands of common chickweed and other winter annuals. Annual bluegrass is a common winter annual grass, while henbit, common chickweed and wild mustard are common winter annual broadleaf weeds. Weeds in this category are generally not as troublesome in the garden as summer annuals.

Perennial Weeds

Herbaceous perennial weeds can be especially difficult to manage in a garden. These plants are killed back to the ground by a hard frost and overwinter through underground plant parts, such as tubers or rhizomes. Tilling the garden may spread these weeds by fragmenting and moving root pieces. Each of the root pieces may develop into a complete plant. The most common perennial weeds are common bermudagrass and yellow nutsedge. Bermudagrass, often called wiregrass, spreads by creeping stolons and rhizomes. Thoroughly remove all plant parts from the garden when hand-weeding because bermudagrass can reroot into the soil. Yellow nutsedge is often called nutgrass, but this plant is a member of the sedge and not the grass family. Yellow nutsedge reproduces by underground tubers.

Mulches

Mulches can be divided into organic, such as grass clippings, and inorganic, such as black plastic. Mulches can be the easiest and most effective way to control annual weeds in the garden. Mulches may also suppress perennial weeds. Mulches control weeds by preventing sunlight from reaching the soil surface. Light is required for the germination of certain weeds, and light is required for the growth of all green plants.

Organic Mulches: Organic mulches include grass clippings, pine bark, straw or similar materials (see table, page 3). Organic mulches cool the soil surface, which is beneficial during hot summer days, but may reduce crop growth in the spring. Do not use grass clippings from a lawn that has been treated with a broadleaf herbicide such as 2,4-D. Tomatoes, peppers and most other vegetables are very sensitive to 2,4-D and could absorb residues of the compound from the treated grass clippings.

Avoid overmulching, which can reduce oxygen levels in the soil. Crop roots require oxygen for growth, so limit the mulch layer to a maximum of about 3 inches. Organic mulches provide good control of annual weeds, but perennial weeds may be able to push through the mulch layer. Also, annual weeds may germinate and grow in the mulch layer.

When using an organic mulch, make sure that the source is not contaminated with weed seed, rhizomes or tubers. Weeds are often spread by contaminated mulch, making weed control harder than if no mulch was used.

Inorganic Mulches: Inorganic mulches are synthetic and can be divided into black plastic and the newer geotextiles. Black plastic, a solid sheet of polyethylene, effectively controls annual weeds. The disadvantage of black plastic is that water and oxygen cannot pass through this material. The soil should be moist prior to laying this synthetic material. Check the soil under black plastic during the growing season to ensure that the soil contains adequate moisture. Black plastic warms the soil, which is an advantage in the spring but can be harmful in the summer.

Clear plastic, which increases soil temperature more than black plastic, will not control weeds since sunlight can reach the soil surface. Perennial weeds may be suppressed by black plastic, but plants like yellow nutsedge will push through the material in places.

The new geotextiles, also called weed barriers, are woven or spun-bonded fabrics containing polypropylene or polyester and may come in black or white. These fabrics are more expensive than black plastic, but they allow water and gases to pass through the fabric. Research generally indicates good control of annual weeds, but annual weeds may be able to germinate above the fabric and send their roots through the fabric. Certain weeds, such as large crabgrass, are able to germinate below these fabrics and push their shoots through holes in the material. Perennial weeds may also push through these fabrics.
Physical Control
Since mature weeds remove large quantities of moisture and nutrients from the soil, removing the weeds when they are young is important. Hand-pulling works for small gardens and raised beds, but a hoe is critical for larger gardens. Cut off weeds just below the soil surface with a sharp hoe. Hoeing must be shallow because most vegetable roots are near the soil surface and can be easily damaged. Manual-powered rotary cultivators do a good job on long rows and pathways, provided that the soil is not too wet or dry and the weeds are small. In large gardens with widely spaced rows, a rotary tiller of appropriate size makes the work easy and fast. Manual and powered rotary cultivators are usually unable to turn under weeds close to vegetable plants without damaging the vegetables. Hand-pulling or hoeing are best for removing weeds near vegetable plants. Deep cultivation with any instrument is likely to damage roots or stems of crop plants.

While cultivating, try to move as little soil as possible to limit the amount of weed seed brought to the soil surface that can then germinate. It is best to cultivate when the soil is moist but not wet. After removing weeds from the garden, apply mulch to control later germinating weeds.

Crop Competition
Once vegetable plants become established, their foliage will begin to shade the ground. This shading effect reduces the amount of light available for weed germination and development. Close spacing of the vegetables will decrease the amount of time required for the crop canopy to significantly shade the soil. If weeds are controlled initially by other means, crop competition will reduce weed growth once the vegetables become well-established.

Chemical Control
For most gardens, annual weeds can be controlled using a combination of mulches and hand-weeding, and herbicides are not needed. If the size of the garden warrants herbicide use, check Weed Control In Home Vegetable Gardens in the Georgia Pest Management Handbook at: http://www.ent.uga.edu/pmh/Hm_Vegetable.pdf for a list of herbicides labeled for use in home vegetable gardens. The difficulty with using herbicides in a vegetable garden is that there are few herbicides that are safe on the wide range of species grown in a garden. Herbicides may temporarily reduce early vigor and growth of some vegetable plants, particularly under cool, wet conditions which often occur in early spring. Timing of the herbicide application and seed planting sequence may vary and can determine whether or not a temporary reduction of plant vigor will occur.

The greatest potential for vigor reduction occurs when cool, wet weather follows an application of either a preemergence or preplant incorporated herbicide. Severe injury can also occur when: label directions for rate and application timing are not followed; herbicides are used on a species of vegetable not shown on the herbicide label; or incorrectly calibrated application equipment is used. Vigor reduction is minimized when a labeled herbicide is used according to label directions. Herbicides are not universally labeled for use on all vegetable crops, because (among other reasons) different crops have differences in tolerance, just as weeds may vary in tolerance.

Hard-to-kill perennial weeds, such as bermudagrass or nutsedge, may be controlled when the garden plot is fallow (not planted in a crop) with glyphosate (Roundup®) in combination with cultivation.

Combination of Methods
A combination of two or more of the methods listed above may be required for weed management in the garden. A combination of mulching and hand-weeding will probably be the best system for most home gardeners. Herbicides could be used for special situations, such as for the control of perennial weeds. Early-season weed control will greatly reduce the time required for hand-weeding later in the growing season. Once vegetable plants are established, they will shade the soil if closely spaced together. This shading of the soil will suppress weed growth.

Some gardeners experiment with various types of no-till gardening to prevent erosion and moisture loss. One method is to plant a fall cover crop and then kill it with a postemergence herbicide, such as glyphosate. Vegetables can then be planted in the killed sod after a waiting period. Another alternative is the use of a mowed, living sod.
The use of cover crops over several seasons can reduce weed problems. However, this method requires leaving that part of the garden uncultivated, which reduces growing space. Use of cover crops and no-till gardening should be tried in small sections of the garden prior to extensive use.

**Mulching Materials for Vegetable Gardens**

**Organic:**
- Straw
- Peanut hulls
- Chopped cornstalks
- Ground corncobs
- Pine needles
- Broomsedge
- Sudangrass
- Grass clippings
- Leaf mold
- Compost
- Newspapers
- Sawdust
- Bark

**Synthetic:**
- Plastic (polyethylene)
- Wax-coated paper
- Aluminum foil
- Kraft paper-polyethylene combination

Excerpted from the *South Carolina Master Gardener Training Manual, EC 678.*


This information is supplied with the understanding that no discrimination is intended and no endorsement of brand names or registered trademarks by the Clemson University Cooperative Extension Service is implied, nor is any discrimination intended by the exclusion of products or manufacturers not named. All recommendations are for South Carolina conditions and may not apply to other areas. Use pesticides only according to the directions on the label. All recommendations for pesticide use are for South Carolina only and were legal at the time of publication, but the status of registration and use patterns are subject to change by action of state and federal regulatory agencies. Follow all directions, precautions and restrictions that are listed.