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SP291-I-Weed Control in Home Gardens

The University of Tennessee Agricultural Extension Service

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Vegetables

Weed Control in Home Gardens

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What is a weed?

A weed may be broadly defined as any unwanted plant, or as I have heard it said many times, "a weed is a plant out of place." For example, a corn plant is a weed if it is in a strawberry planting. Most weeds are plants that are generally considered undesirable by gardeners. They are neither eaten nor considered attractive. They are frequently invasive and difficult to control.

How do weeds harm gardens?

Weeds compete with crop plants for moisture, nutrients and light. They may also harbor insects that harm flowers or vegetables or transmit diseases to the crop. Weeds can also serve as alternate hosts for diseases. They also promote diseases by increasing humidity, decrease vegetable quality and make harvests difficult. Vegetable plants grown under weedy conditions will have reduced yields, or they may not survive to produce at all. A weedy garden or flowerbed is also unattractive.

Why are weeds hard to control?

Weeds are highly adapted to where they grow. They have large, efficient root systems, grow rapidly and frequently produce tremendous amounts of seed. Most weeds tolerate drought and low fertility. Little of their energy is used producing lush foliage, large seed or fruit. Therefore, they often thrive where vegetables struggle to produce. Many spread rapidly by vegetative structures as well as by seed. The principle methods of weed control fall into three categories: (1) mechanical, (2) cultural and (3) chemical.

Mechanical Weed Control

Mechanical weed control involves removing weeds while they are small and preventing them from producing mature seed. It consists principally of mowing, plowing, rototilling, hoeing and hand pulling. These procedures give immediate results and require little, if any, specialized equipment. Their main disadvantage is that they work only on growing weeds and may need to be repeated frequently.

Remove weeds while they are small because it is quicker, easier and does less damage to desired vegetable plants. Hoe or till shallowly (less than 2 inches deep) to avoid damage to desirable plants and to minimize moisture loss from the soil. The deeper the soil is disturbed, the more weed seed will be brought to the surface where it will grow. Most weed seed that germinate are in the upper 2 inches of soil. Weed seed may survive many, many years in the soil. Each time it is worked, more seed is pulled to the surface.

Gardeners often quit weeding as a crop matures. Weeds do not affect crop yields as much at this stage. However, they will still produce seed. A single weed of some species can produce hundreds of thousands of seed. Weed removal should continue until the vegetable crop is completely harvested. While crops are not growing on the garden spot, the soil may then be kept tilled, mowed or heavily mulched to prevent weeds from propagating. Frequent tillage has the additional advantages of turning organic material under where it will add to soil organic matter and of mechanically destroying any insects that are present.

Cultural Weed Control

Most cultural methods of weed control emphasize prevention. These include mulching, solarization, and multiple or wide-row planting.

Mulches

Any layer of material spread over the soil surface may be considered to be a mulch. There are two classes of mulch: organic and inorganic. Both reduce weed growth, retain soil moisture and influence soil temperature.

Hay, straw, sawdust, ground bark, leaves, compost and even newspapers are among the many substances utilized as organic mulches. All reduce weed emergence and make it easier to pull those weeds that do emerge. Some weeds such as nutsedge will grow through mulch, even through plastic mulch. Extension factsheet **SP 291-H, Mulching Vegetable Gardens**, contains additional information regarding the use of mulches in home gardens.

Inorganic mulches include black and other opaque plastic as well as landscape fabric. Landscape fabric is much more expensive than plastic mulch. However, it has the advantage of allowing water to pass through into the soil. Black plastic (polyethylene) is the most commonly used inorganic mulch. Clear or translucent plastic should not be used as mulch. These plastics allow light to penetrate, which permits germinated weed seed to grow under the plastic mulch. Black plastic eliminates growth of most, but not all, weeds. For example, yellow nutsedge will grow through plastic mulch. Also, weeds will grow in the holes cut in the plastic for the vegetables. More information regarding the proper time and method of application, as well as the advantages and disadvantages of plastic mulches, can be found in **SP 291-H**.

Opaque plastic in colors other than black is sometimes used as mulch and will also control weeds. However, many of these plastics are quite expensive. Some data suggests that tomatoes grown on red plastic or that muskmelon grown on blue plastic will produce higher yields. Yield increases of up to 25 percent have been documented. However, the results are not consistent enough to justify the expense of the colored plastics.

Due to high temperatures and intense solar radiation, the use of black plastic may cause damage to plants transplanted or seeded during the hottest part of the summer. White plastic can be utilized during the summer months to prevent root and stem damage to the plant. White plastic will allow light to penetrate. Therefore, white plastic with a black backing (known as white on black) is preferable. White on black plastic is more expensive and may be difficult for home gardeners to locate in affordable quantities. Another option is to whitewash or paint the black plastic with white latex paint. The paint will eventually wear off, but not until the plants have shaded the plastic around the base of the plant, reducing the chance of damage.

Solarization

Solarization is the use of clear polyethylene plastic sheeting (2 to 6 mils thick) to capture the radiant energy of the sun, thereby raising the soil temperature to levels lethal to many weed seeds. The plastic sheeting is placed over bare, moist soil during a summer fallow period. In Tennessee, best results are obtained by using two layers of plastic sheeting and separating the layers with boards, bricks or small squares (ca. 3” X 3”) of polystyrene insulation called spacers. Spacers are placed every 1.5 to 2 feet on top of the first layer of plastic. The second layer of plastic sheeting is then placed on top. This creates an air gap between the two layers, which provides a reservoir of warm air that minimizes nighttime cooling. The two layers of plastic sheeting are then sealed together by placing soil along the outer edges of the top layer.

The top layer of plastic should be kept clean to maximize solarization efficiency. An occasional dusting with a dust mop or rinsing with a garden hose should be all that is necessary. The plastic is left in place for 4–5 weeks. During this period, soil temperatures are frequently raised to 120–125 degrees F. This practically eliminates viable weed seed in the top 2 to 3 inches of soil. After the plastic is removed, care must be taken not to mix the deeper layers of unsolarized soil with the nearly weed-free solarized soil. Rototilling no deeper than 1–2 inches is recommended. As long as the soil is not rototilled deeper than this, weed control by soil solarization can significantly reduce weed infestations for 12 months or more. Many soil-borne plant pathogens will also be reduced during the solarization process. This improves plant stands and vigor and may double yields.

The best time to solarize soil in Tennessee is from May through early August. Two or three periods, each consisting

of several days in a row of warm weather and bright sunshine, are necessary. Late summer and fall vegetables may be planted the day after removing the plastic.

Multiple or wide row planting

Closely spaced double or triple rows may also assist in weed control. Simply plant two or three rows of a vegetable close enough so that the leaves will cover the area between them rapidly as the plants grow. Very small vegetables such as radishes may be broadcast in a long row a foot or so wide. These techniques allow growing vegetables to shade the soil, which reduces weed growth. They are discussed in more detail in the publication **PB 901, Growing Vegetables in Home Gardens**.

Chemical Weed Control

Chemicals (herbicides) are only occasionally used by home gardeners to control weeds because suitable herbicides are seldom legally available in small, economical amounts.

There are also several other difficulties with the use of herbicides by home gardeners. Many herbicides are nonselective and will kill the vegetables, as well as the weeds. Others are selective and can be used only with certain vegetables or control only certain weeds. Home gardens generally contain many vegetable and weed species, which makes using selective herbicides difficult. Some herbicides may also damage nearby vegetables or remain in the soil and damage future plantings.

Even if available and effective, herbicides may not be legal for use on a specific vegetable or at the time when they are needed. The herbicide application rate may be very low and extreme accuracy in application may be absolutely essential. Overlapping applications may kill vegetable crops and, if areas are skipped, weeds will not be controlled. Required pre-harvest intervals (PHI's) or waiting periods between application and harvest can be lengthy and must be observed. Herbicides may also be effective only for a short period of time or produce results slowly.

Despite all these problems, there are occasions when herbicides may be successfully used in home gardens. The following suggestions will assist home gardeners in effectively using herbicides.

1. Understand the difference between preemergence and postemergence herbicides. Preemergence herbicides are effective only before weeds germinate. Postemergence herbicides work on weeds that are actively growing.

2. Understand the different formulations of herbicides available and how the formulation affects use. Some of the more common formulations are emulsifiable concentrates (EC), flowables (FL), wettable powders (WP) and dry flowables (DF). All are designed to be mixed with water and sprayed on the area to be treated. Wettable powders and dry flowables may settle out unless the sprayer is shaken periodically. Herbicides may also be formulated as granules (G). These are to be spread evenly over the soil surface.

3. Plan the garden in detail. Plan to locate all the crops for which a specific herbicide may be used near each other. This allows treatment of larger areas with less effort.

4. Follow all instructions on the label. This is extremely important. Failure to follow the label instructions precisely may result in harm to the applicator, the environment or the crop. Preemergence herbicides require weed-free soils without lumps or clods. Most are best applied to moist soil and shallowly incorporated by tilling, irrigating or natural rainfall. They must be applied uniformly and at the proper rate to be safe and effective. Postemergence herbicides may be applied over the top of the growing crop and weeds. Again, it is essential that all aspects of the label directions be understood and followed. If you have any questions, consult your county Agricultural Extension agent.

5. Rinse spray equipment. Residual herbicide in sprayers may damage crops. Many gardeners who use herbicides purchase spray equipment for herbicides only and keep it separate from equipment used for insecticides and fungicides.

6. Calibrate application equipment accurately. Inaccurately applied herbicides may be ineffective or dangerous. If there is a question on how to apply a specific herbicide, contact your local county Agricultural Extension office.

The two most suitable herbicides for use on home gardens are Trifluralin (Treflan™) and Sethoxydin (Poast™). Trifluralin is sold in many formulations, each designed for specific uses. Trifluralin prevents the germination of most grasses and some broad-leaved weeds (for several weeks) and must be applied before these weeds germinate. Sethoxydin kills growing grasses. It requires only a short waiting period between application and harvest and may be applied to a wide range of vegetables.

Proper use of herbicides may involve grouping vegetables according to the herbicide that may be applied to them, as well as paying attention to rate, timing, uniformity and method of application. Remember, label directions must always be read and followed.

The Stale Seedbed Technique

The stale seedbed technique is a system that controls weeds prior to the planting of the crop. The theory is that most weed seed that germinate are found in the top 2 to 3 inches of soil. With soil temperatures of 70 degrees F or higher and moist soil, most of the weed seed in the top 2 inches of the soil will germinate in 2 to 4 weeks after a tillage operation. Therefore, a generalized procedure follows.

1. Broadcast fertilizer and incorporate with a final tillage.
2. Allow the weed seed to germinate for 2 to 4 weeks.
3. Once most of the weeds have germinated, kill the emerged weeds. This can be done by using a non-selective herbicide such as glyphosate (Roundup) or by performing a shallow tillage (less than 2 inches).
4. Then seed or transplant the crops with minimal soil disturbance.

Since warm soils are required for this technique to be effective, it generally is not used for spring-planted gardens. It can be very effective when utilized prior to the planting of a fall garden.

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