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Agricultural Extension Service
The University of Tennessee
SP 291-D

Vegetables

Care of the Vegetable Garden

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A productive garden requires considerable attention and care. Insects, diseases and weeds must be controlled; water and nutrients must be supplied; plants must be supported; and harvests must be made at the proper time for best flavor, yield and nutritional quality. This factsheet discusses these practices.

Weed Control

Lack of proper weed control probably limits production in home gardens more than any other production practice. Weeds compete with vegetable plants for water, nutrients and sunlight and must be controlled if garden vegetables are to grow and produce well. Weeds also serve as a refuge for insects, as well as alternate hosts for diseases. Weeds may be controlled by cultural practices, mechanically, chemically or by a combination of these three practices.

Begin cultural controls by preventing weeds from developing mature seed. Maintain clean cultivation while vegetables are growing. Whenever vegetables are not present in the garden area, mow or turn under weeds before they develop seed.

Weeds are easiest to remove when they are small. Hoe or till frequently, but shallowly so as not to cut vegetable roots or allow valuable moisture to escape. Pull weeds directly in the row by hand. Weeds pull easier with less damage to surrounding plants when the soil is moist.

Use mulches to control weeds and to retain moisture. Both black plastic and various organic mulches may be used.

Black plastic mulch absorbs sunlight and speeds warming of garden soils. Lay strips of black plastic over previously fertilized and worked garden soils a week before planting. Weight the edges of the strips with soil. Cut slits or x's in the strips at the desired locations and seed or transplant through them. A sharpened bulb setter may also be used to cut holes in plastic mulch.

Commonly used organic mulches include leaves, straw, compost, rotted sawdust and grass clippings. Be careful when collecting grass clipping and leaves not to collect weed seed. These light-colored mulches reflect sunlight and are best used around cool-season plants or on warm-season plants when the soil temperature has become sufficiently warm. Apply them 2 or 3 inches thick and turn them under at the end of the growing season. The few weeds that grow through organic mulch can be easily pulled.

Commercial vegetable growers use a wide range of chemicals (herbicides) to kill weeds or to prevent weed seed from germinating. Herbicides are very difficult to use in the home garden. None are effective on all weeds, last all season or are labeled for use on all vegetable crops. They are also difficult to apply uniformly to small plots, often must be purchased in large containers and can be quite expensive. A good understanding of herbicides is essential for proper use. To purchase some products, you must be certified by the Tennessee Department of Agriculture. As a rule, herbicides are not recommended for Tennessee home vegetable gardeners.

Factsheets **SP 291-H and I** of this series contain more detailed information concerning the control of weeds and the use of mulches in home gardens. These are named in the reference list at the end of this publication.

Disease and Insect Control

Garden vegetables are susceptible to a wide variety of insect and disease problems. Unless these problems are controlled, they will reduce yield and quality and may cause crop failure.

Begin control of insects and diseases with sanitation and common sense. Turn insect- or disease-infested plant residues under soon after harvest or remove them from the garden plot. Do not save seed from diseased plants. Support tall-growing, non-supporting vegetables such as tomatoes and cucumbers as needed. Space rows and plants within rows far enough apart so air can circulate freely. Time plantings to avoid the worst pest problems whenever possible. Avoid sprinkler irrigation late in the afternoon, as wet plants are more susceptible to certain diseases. If overhead irrigation is used, apply water just before sunrise. If applied then, the plants are already wet and will dry during the morning hours like normal.

Rotation of plant families between different sections of the garden in successive years will reduce some insect and disease problems. Peas and beans, for example, are in the same plant family and are susceptible to many of the same insects and diseases. Other common vegetable families include cucurbits (squash, pumpkins, muskmelon, watermelon and cucumbers); crucifers (cabbage, cauliflower, broccoli, kale, collards, kohlrabi, turnips, mustard and radish); and solanaceous vegetables (Irish potatoes, peppers, eggplants and tomatoes).

Grow disease-resistant varieties whenever they are available. Many of the varieties recommended in the other factsheets of this series are resistant to one or more disease problems. These varieties are not immune to disease problems, but frequently will bear a respectable crop despite the presence of one or more diseases.

Use non-chemical means of insect control when they are available and adequate. These include sanitation, barriers, repellents, traps and baits. Encourage beneficial insects and birds. When only a few large insects are present, they may sometimes be successfully removed by hand.

Frequent observation (scouting) of the garden is yet another key to the control of insect and disease problems. Walk through the garden at least every two or three days and look for problems. Identify the insect or disease and its recommended treatment before the problem becomes severe. Your county Extension office and the UT references listed at the end of this factsheet can provide the most current recommendations.

Use the least toxic recommended control measure before a problem gets out of control. Consider, for example, insecticidal soaps, summer oils, microbial agents such as *Bacillus thuringiensis* (*Bt*), botanically derived chemicals like rotenone and traditional agricultural chemicals. Whatever you decide to use, **be sure to follow the label instructions exactly**. Chemical labels list a wealth of information such as pests controlled, vegetables on which the chemical may be used, how long after application before the vegetable may be harvested, etc. **It is illegal and can be harmful both to yourself and to the environment to use agricultural chemicals for any purpose or in any manner not permitted by the label**.

Since you will get better coverage of the entire plant with a spray, you will generally be more successful controlling insects and diseases with a spray than with a dust. Use a tank-type sprayer where water and the control agent are mixed together and considerable pressure can be obtained. Be sure to treat the lower side of the leaves and stems, as insect and disease problems frequently originate there.

Fertilization

A soil test should be taken and an analysis performed. Lime should be applied in the fall or first thing in the spring, while a complete fertilizer containing nitrogen, phosphate and potash should be applied prior to final soil preparation. See **SP 291-C** for details concerning the how and why of soil tests and fertilization. Follow the recommendations obtained from the soil test.

In addition, vegetables grown primarily for their leaves and those with an extremely long growing or production season usually benefit from nitrogen sidedressings. Sidedress nitrogen by sprinkling ammonium nitrate or another high-nitrogen fertilizer beside the row or around individual plants. Keep the fertilizer at least 6 inches away from the base of the plants if possible, and brush off any that remains on the leaves. Excessive ammonium nitrate or ammonium nitrate applied too near plants will damage them. Follow the specific recommendations in Extension **PB 901 Growing Vegetables in Home Gardens**.

Side dress cucumbers, cantaloupe, pumpkins, watermelon and winter squash with 1 to 1½ pounds of ammonium nitrate per 100 feet of row or 1 tablespoon per plant when the vines are 1 foot long. Use the same amount on tomatoes, peppers and eggplants when the first fruit is about 1 inch in diameter and once a month thereafter. Sidedressing earlier or at higher rates can cause the flowers and small fruit of these vegetables to abort.

Use 1 to 1½ pounds per 100 feet of row or 1 tablespoon per plant on broccoli, cabbage and cauliflower three or four weeks after planting. Use the same 1 to 1½ pounds per 100 feet of row on corn when it is 8 to 12 inches tall and on okra after the first harvest. Use 2 to 3 pounds on greens six weeks after seeding.

Other fertilizers may be used to sidedress vegetables, but the amount must be adjusted so the actual nitrogen

applied is the same as that contained in the above-suggested amounts of ammonium nitrate. An example of another fertilizer is field-grade calcium nitrate. Calcium nitrate is an excellent nitrogen source for vegetable crops, but must be used at twice the rate of ammonium nitrate.

Irrigation

To maximize production, vegetables require from 1 to 2½ inches of water per week, depending on the stage of development, as well as environmental conditions. Vegetables require less water early in the growing season when they are small and more when they are large and during certain critical growth stages. Most years have dry periods when irrigation will greatly benefit plant growth, yield and ultimately quality.

Gardeners commonly irrigate with a lawn sprinkler. Apply water slowly to reduce erosion and runoff. Place cylindrical containers in the irrigated area to measure the total water applied and its distribution. Apply 1 to 1½ inches of water, then do not irrigate again for several days. Frequent shallow watering promotes shallow root growth. Shallow roots will require more frequent watering than roots that are distributed deeper in the soil. Shallow plant roots are also easily damaged by cultivation.

To reduce the incidence and/or spread of disease, irrigate early in the day so plants dry before evening. Since the plants are already wet with dew, the ideal time to irrigate is just prior to sunrise. The dew and added water should dry by mid-morning, minimizing the time plant tissue is wet.

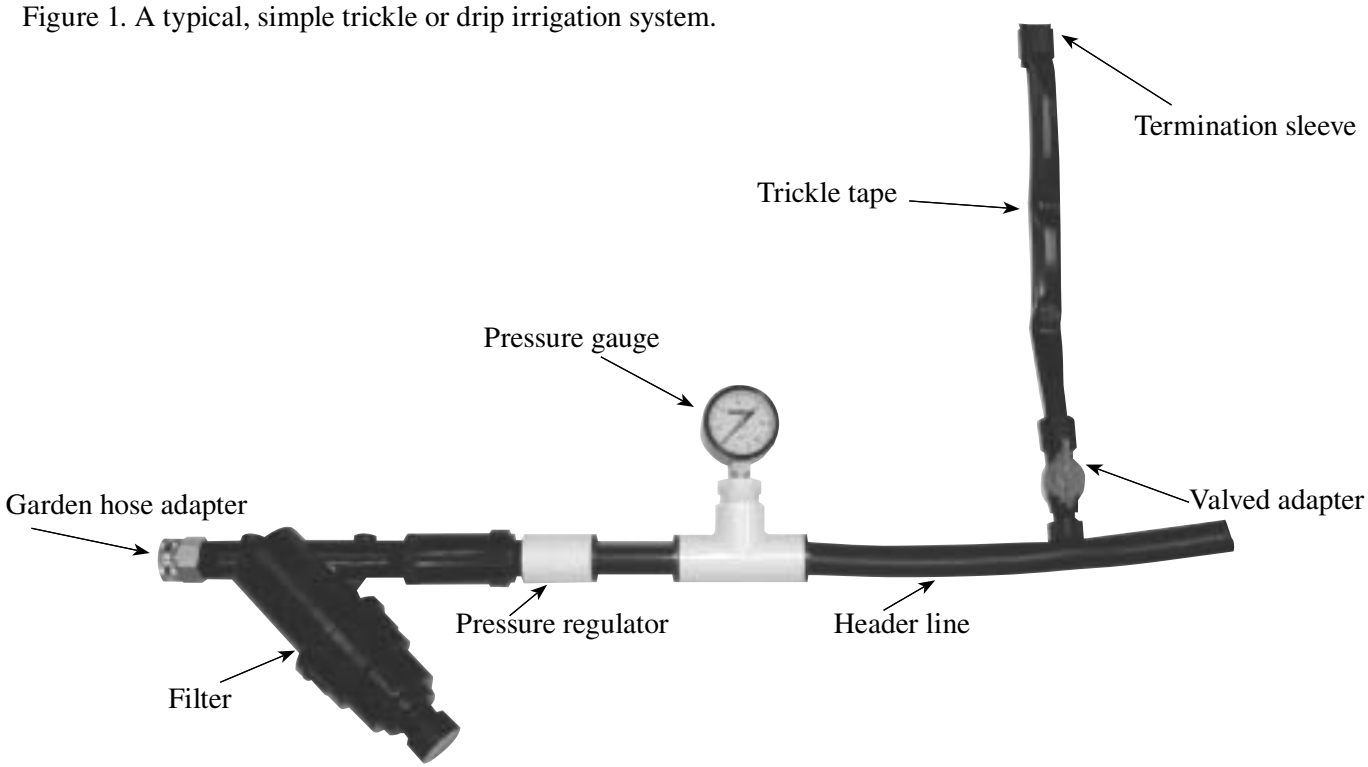
Cultivation prior to overhead irrigation will increase water infiltration and reduce runoff, as well as subsequent erosion. The crust that forms after irrigation will reduce evaporation.

Several forms of trickle irrigation are also available for use in home gardens. Trickle irrigation has the advantages of reducing total water usage by up to 50 percent, not wetting plant foliage and maintaining relatively dry aisles between rows. This enables watering and walking in the garden nearly simultaneously while reducing weed growth, disease problems and soil compaction. However, a trickle irrigation system may be somewhat expensive to purchase.

Trickle or drip systems generally consist of several parts. An example of a simple drip irrigation system is illustrated in Figure 1 below.

Depending on the system, an adapter from garden hose threads to national pipe threads (NPT) may be required. Next, a back- flow preventer should be connected to the water source to prevent reverse water flow into the source. A screen or disk filter should be placed in the line after the back-flow preventer. Even well and municipal water can contain sand or other minute particles that could plug drip tape. Therefore, a filter is essential for all systems. Next, a 10- to 12-psi pressure regulator should be connected. Most trickle tape is designed to operate at 8 to 10 psi. If the pressure is allowed to drop below 6 psi, the water "free-flows,"

Figure 1. A typical, simple trickle or drip irrigation system.



running to low points or flowing out at the beginning of the tape.

A header hose that extends across the end of the garden attaches to the end of the pressure regulator. Soaker hoses or trickle tape (thin-walled polyethylene pipe with emitters spaced about a foot apart) are placed beside each row and connected to the header hose at the end of each row. The last, but not least, component of the drip irrigation system is a pressure gauge. If you do not know the pressure on the system, you do not know if it is operating correctly. If using only one gauge, place it at the highest point in the field. If two or more gauges are used, place one at the end of the longest row, and one at the highest elevation in the field.

A soaker hose is a non-engineered product made of ground tires. It is generally inexpensive, but since it is not "engineered," it is not uniform in water application. Another disadvantage is that wildlife and rodents like to chew on the extruded rubber product. This makes large holes that magnify the lack of water uniformity.

If taken care of properly, the adapter, back-flow preventer, filter, regulator, header line and gauges should last several seasons. If damage from wildlife and/or rodents is prevented, soaker hoses may be used for multiple seasons. Occasionally trickle tape can be reused. However, trickle tape is relatively inexpensive, and it may be easier to discard the old and use new tape next year.

Components of trickle irrigation systems may be purchased at some garden centers. However, garden kits are available for between $100 and $200 from a couple of different sources. There may be other sources, and inclusion in this publication does not imply endorsement by The University of Tennessee Agricultural Extension Service.

Irrigation Mart
3303 McDonald Ave.
Ruston, LA 71270-7412
Phone: 1-800-729-7246
Web: www.irrigation-mart.com

Rain-Flo Irrigation
884 Center Church Rd.
East Earl, PA 17519
Phone: 717-445-6976

Plant Supports

Yields of certain vegetables are higher, quality is increased and losses from fruit rot are reduced when plants are grown on supports.

Support the taller English peas varieties, pole beans and half runner beans vertically on stakes, trellises or wires. Support tomatoes on individual 6-foot stakes or with cages made of 6-foot lengths of concrete reinforcing wire. (See Extension **PB 901** for details.) Tomatoes grown in cages do not need to be pruned, but do need to have their growing ends pushed back into the cage every other day or so. Fasten the cages to stakes or provide support to prevent cages from blowing over.

Vigorous varieties of peppers may also benefit from trellising. Tying the plants to a stake will reduce lodging.

Ten-foot lengths of concrete reinforcing wire made into a circular cage may be used to support cucumbers. Plant the seed around the outer edge of the cage and assist the plants in beginning to climb by pushing them into the cage.

Frequent Harvests

Many vegetables quit setting fruit unless they are harvested frequently. These include cucumbers, summer squash, okra and green beans. Never allow fruit that is over-mature to remain on these plants if you want the plants to continue producing. If you want to save seed, save seed from some of the last fruit set rather than from the first.

Over-mature fruit are also more susceptible to diseases, as well as attractive to insects. See PB 901 for specific information concerning when to harvest each vegetable.

Useful References

Many Tennessee Agricultural Extension Service publications contain information useful to home gardeners. Some of the more popular are listed below:

PB 595	You Can Control Garden Insects
PB 901	Growing Vegetables in Home Gardens
PB 902	Growing Small Fruits in Home Gardens
PB 1215	Disease Control in the Home Vegetable Garden
PB 1228	Gardening for Nutrition
PB 1391	Organic Vegetable Gardening
SP 291-A	Growing Vegetable Transplants for Home Gardens
SP 291-B	Growing Vegetables from Seed
SP 291-C	Soil Preparation for Vegetable Gardens
SP 291-D	Care of the Vegetable Garden
SP 291-E	Growing Sweet Corn in Home Gardens
SP 291-G	Fall Vegetable Gardens
SP 291-I	Weed Control in Home Gardens
SP 291-L	Fresh Vegetable Storage for the Homeowner
SP 291-N	Raised Bed Gardening
SP 291-O	Guide to Spring-Planted Cool-Season Vegetables
SP 291-P	Guide to Warm-Season Vegetables
SP 291-Q	Rhubarb in Home Gardens

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Agricultural Extension Service Charles L. Norman, Dean