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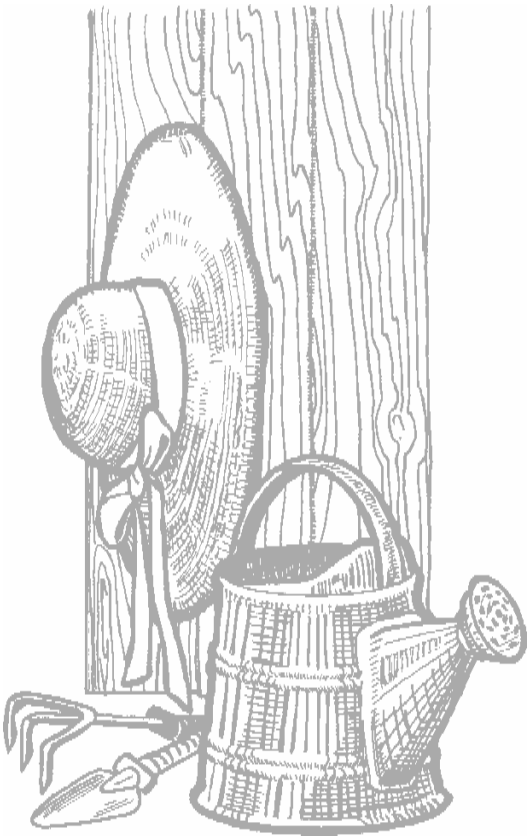
HOME VEGETABLE GARDENING



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COOPERATIVE EXTENSION
Helping People Put Knowledge to Work

College of Agriculture & Life Sciences
Department of Horticultural Science, NC State University

HOME

Contents

VEGETABLE GARDENING

Gardening means different things to different people. Thousands view gardening as a hobby, a relaxing escape from the pressures of an urban environment. For these people, the food produced may be almost secondary. Growing fresh vegetables, herbs, or fruits provides a great sense of joy and accomplishment. A vegetable garden can also reduce the family's food budget, and it can be a source of hard-to-find vegetables such as kohlrabi, Chinese cabbage, horseradish, salsify, and pak choi. One of the main reasons that people garden is that vegetables from the supermarket cannot compare in taste, quality, or freshness with vegetables grown in the home garden.

The vegetable garden has traditionally been located in an area separate from other parts of the landscape because it was considered unsightly. With proper planning, however, the garden can be both functional and attractive. Landscape designers today often incorporate edible plants into many areas of the home landscape and ornamental plants such as flowering annuals into the vegetable garden. This gardening philosophy, coupled with our favorable climate, can offer gardening opportunities nearly all year long.

Selecting a Garden Site

If you are a beginning gardener with an average-sized family, you will not need a lot of space for a vegetable garden. An area 25 feet square should be adequate. Be careful not to start with too large a space; it is easy to "bite off more than you can chew."

Regardless of size, there are five factors to consider in selecting a garden site. The first is **sunlight**. All vegetables need some sunlight. The garden should receive at least 6 hours of direct sunlight each day. Eight to 10 hours each day is ideal. Vegetables should therefore be planted away from the shade of buildings, trees, and shrubs. Some leafy vegetables such as broccoli, collards, spinach, and lettuce tolerate shadier conditions than other vegetables, but if your garden does not receive at least 6 hours of sunlight daily, you will not be successful growing vegetables.

The second consideration is **nearness to the house**. The closer the vegetable garden and the easier it is to reach, the more you will probably use it. You will be more likely to harvest vegetables at their peaks and thus take maximum advantage of garden freshness. It is also more likely that you will keep up with jobs such as weeding, watering, insect and disease control, and succession plantings if the garden is close by.

The third consideration is **soil**. You do not need to have the ideal type of soil to grow a good garden. If possible, the soil should be fertile and easy to till, with just the right texture—a loose, well-drained loam. Avoid any soil that remains soggy after a rain. Heavy clay and sandy soils can be improved by adding organic matter. Of course, gardening will be easier if you start with a naturally rich soil.

The fourth consideration is **water**. Including rain and irrigation, the garden needs at least 1 inch of water per week. Therefore, it is essential to locate the garden near a spigot or some other water source.

The fifth consideration is **good air drainage**. Avoid locating the garden in a low spot such as the base of a hill or at the foot of a slope bordered by a solid fence. These areas are slow to warm in the spring, and frost forms more readily in them because cold air cannot drain away. Vegetable gardens located on high ground are more likely to escape light freezes, permitting an earlier start in the spring and a longer harvest in the fall.

Planning the Garden

The first step in planning your garden is selecting the vegetables you want to grow. With a few exceptions, you can plant what you like. Only a few vegetables may be unsuitable because of space limitations, improper climate, or unusually poor growing conditions.

The second step is to draw a diagram of the garden site. The diagram should show the kind of vegetables to be planted, the distance between rows, and the time of planting. Including dates will help you remember tasks that might otherwise be put off until too late.

The 25-by-42-foot garden shown in Figure 1 should produce most of the vegetables needed for canning, freezing, and fresh use by two people for one year. Most of the rows in the plan are occupied by two crops in succession during the growing season. Because sweet corn requires a large amount of space, the overall yield from the garden would be higher if lima or snap beans were planted in place of corn. A garden of this size will require about 1/2 hour of work a day to obtain maximum production.

Garden Tools

Many tools are available to help you grow a vegetable garden. They range in quality from discount store lines to high-priced luxury models. Tools somewhere between these two extremes are suitable for most gardeners. The tools considered essential for maintaining a small or moderate-sized garden are a spade or four-pronged digging fork, trowel, rake, hoe, measuring stick, string, stakes, and irrigation equipment. To this basic list you may wish to add a wheel cultivator, small sprayer, and wheelbarrow. With these tools at hand, you can readily handle most garden tasks. (See chart on next page.)

In purchasing tools consider the size of the garden, the job to be done, and the amount of money you wish to spend. In the long run, it pays to purchase tools of good quality, as they will give better service and stay sharp longer. If properly cared for, they can last a lifetime.

Soils and Fertilization

A good loamy soil that is fertile, deep, easily crumbled, well drained, and high in organic matter is needed to grow quality vegetables. If properly prepared, however, soils containing light sand or heavy clay can be used.

The fastest way to make a heavy clay or light sandy soil more loamy is by adding organic matter. You can incorporate a 2- to 3-inch layer of well-rotted leaves, compost, old horse manure, and peat moss in the spring before preparing the soil and again in the fall after harvest. Green manure crops such as annual rye, ryegrass, and wheat can be planted on the garden site in the fall and plowed under in the spring when growth is about knee-high. Seeding rates per thousand square feet for annual rye are 1 to 2 pounds; for rye and wheat, 3 to 4 pounds. For best results these crops should be seeded between September 15 and October 20 in the Raleigh area. Most cover crops should be allowed to grow about knee-high before they are tilled under the soil in the spring.

Take a soil sample every three to four years to find out the pH (acidity) of your soil. On a scale from 1 to 14, a pH of 7.0 is neutral. Any value below 7.0 is acid, and any value above that level is alkaline. The ideal pH values for most vegetables are 6.0 to 6.5—slightly acid. For information on taking and submitting a soil sample, see Extension publication AG-372, *Careful Soil Sampling*.

The soil test report will tell you how much lime and fertilizer your garden soil will need per

Garden Tools and the Jobs They Perform

Spade—Select one of these:

1. A *spade with a sharp edge* is used for turning soil and incorporating organic matter.
2. A *four-pronged fork* is good for mixing a compost pile.
3. A *round-pointed shovel* is good for turning soil and can also be used to harvest large-rooted crops such as Irish potatoes and sweetpotatoes.

Rake—Select one of these:

1. A *bow rake* is good for smoothing out soil, removing stones, and breaking up clods.
2. A *straight rake* is designed so that its back can be used to smooth the seedbed and to compact soil over freshly sown seed for improved germination.

Hoe—These come in all shapes, sizes, and models. The hoe is used for preparing the seedbed, and for cultivating the soil to mix in fertilizer and control weeds.

1. A *common* or *square-bladed filed hoe* is good for most garden jobs.
2. A *pointed* or *Warren hoe* is good for opening a furrow by string and for cultivating between plants.
3. A *scuffle hoe*, made in several patterns with a flat bottom that cuts weeds off under the soil surface and breaks up the crust layer on top of the soil as it is pushed back and forth between the rows.

Long-Handled Cultivator—Breaks up large clods and refines the seedbed.

Trowel—For transplanting vegetable plants.

Hand Cultivator—For working around vegetable plants and breaking up soil clods for light replanting.

Irrigation Equipment—A *watering can* for transplanting; *garden* and *soaker hoses* and *sprinklers* for general watering.

Hand Duster—Used to apply pesticides in powder form.

Compressed-Air Sprayer—Most popular piece of equipment for applying pesticides because it gives good coverage, especially to the underside of plant leaves.

String and Stakes—For row alignment.

Measuring Stick—For determining the distance between plants and rows.

Wheelbarrow or Garden Cart—Makes moving soil, stones, tools, and harvested vegetables much easier.

Wheel Cultivator—For removing weeds and preparing the soil.

Spreaders—For lime and fertilizer application:

1. A *drop spreader* covers less area than a broadcast spreader with each pass over the site, but the area covered is easier to detect.
2. A *broadcast spreader* applies materials uniformly, although the margins of the area covered may be difficult to see.

Hand Seeder—Can take some of the backache out of planting. Some can open the furrow, drop the seed, and cover the seed in one operation. The majority of hand seeders are adapted to a wide variety of seed sizes.

Tiller—Makes soil preparation easy for serious gardeners who will use it enough to make the purchase worthwhile. Three types are available; all of them are driven by gasoline or electric motors. On the most common and least expensive type the tines are mounted in front. A second type has the tines mounted in the rear. Although more expensive, the rear-tine type is easier to operate. Many tillers with rear-mounted tines have a reverse gear that makes it possible to work in cramped areas. A third type is the center-mounted or mid-tine tiller, which combines the advantages of the other two types.

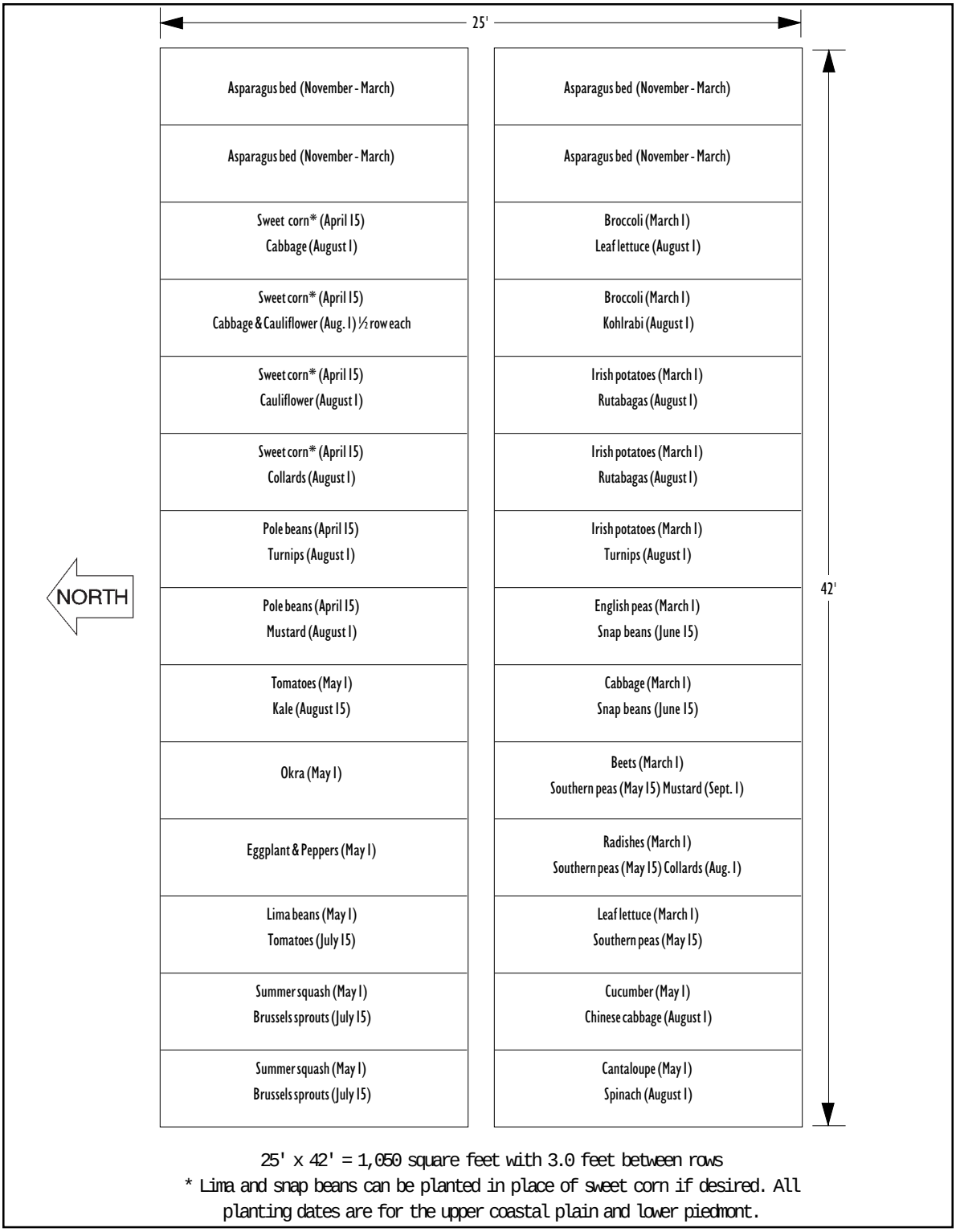

Figure 1. Plan for a garden that can produce most of the vegetables needed by two people for one year.

thousand square feet of growing area. When lime is needed, try to apply it several months before planting. Fall applications of lime have a better chance of correcting soil acidity problems before spring planting.

Fertilizer should generally be applied before or at planting time. The fertilizer can be broadcast or applied in the row. You may want to use a combination of these methods during fertilization. Fertilizer is broadcast by spreading it over the top of the soil with a cyclone or drop fertilizer spreader in an east-west and north-south movement. Till the fertilizer into the soil to a depth of 3 to 4 inches. Generally one-half to two-thirds of the recommended fertilizer is broadcast over the entire garden. The remaining fertilizer is applied in furrows 3 inches to the sides of the row and slightly below the level of the seed (Figure 2). This method is known as *banding*. A complete fertilizer with a formulation such as 8-8-8 (8 parts each of nitrogen, phosphorus, and potassium) or 10-10-10 may be applied at the rate of 20 to 30 pounds per thousand square feet when soil test recommendations are not readily available.

To keep garden vegetables growing rapidly and continuously, extra fertilizer should be applied to the soil in the form of a sidedressing. Sidedressing materials can be applied on both sides of the vegetable row about 4 to 6 inches from the plants (Figure 3). *Only one* of the following materials should be applied per hundred feet of row:

- 1 cup of 33 percent ammonium nitrate;
- 2 cups of 16 percent sodium nitrate;
- 3 to 4 cups of 8-8-8 complete fertilizer.

Individual plants or hills can be sidedressed with 1 level tablespoon of ammonium nitrate per plant. For plants that are widely spaced (such as cucumbers or cantaloupe), the sidedressing fertilizer can be placed in bands 6 inches from the plant's base. Vegetable plants should be side-dressed about midway through their maturity cycle except when grown on sandy soils and during periods of excessive rainfall. These conditions require more frequent sidedressing applications. Also, crops such as tomatoes, eggplant, and okra require two or three sidedressings per season because of their long growth cycles.

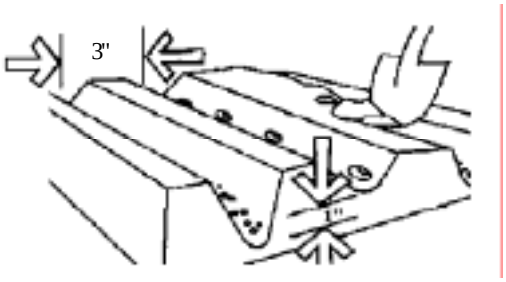

Figure 2. Fertilizer applied by the banding method is placed in furrows 3 inches from the sides of the row and slightly below the depth of the seed.

Some recommended times for side-dressing vegetables are as follows:

Asparagus—Early spring before growth starts.
Beans and Peas—Just before blooming.
Broccoli, Cabbage, Cauliflower—About four weeks after transplanting.
Eggplant, Peppers, Squash, Tomatoes— At blooming and when fruit set starts.
Cucumbers, Cantaloupe, Watermelons— As vines start to run.

Figure 3. Applying fertilizer as a sidedressing.

Growing or Purchasing Transplants

Most plants do better in spring and summer gardens if they are started indoors rather than being planted directly into the garden soil. Seedlings started in containers indoors can be transplanted to the garden when the weather is warm enough and danger of frost is past. See Table 2 on page12 for recommended planting dates.

You may start your own transplants in containers early in the season or you may prefer to buy them from a greenhouse or garden center at transplanting time. If you choose to grow your own, you will need to provide suitable containers, a sterilized growing medium, adequate light, fertilizer, moisture, and proper day and night temperatures. Table 1 shows the temperature and growing times for 15 common garden vegetables.

Table 1. Temperatures and Times Required to Grow Plants for Transplanting into the Garden

Vegetable	Optimum Temperature* Day (°F)	Night (°F)	Growing Time (weeks)
Asparagus	70-80	65-70	8-10
Broccoli	60-70	50-60	5-7
Brussels sprouts	60-70	50-60	5-7
Cabbage	60-70	50-60	5-7
Cauliflower	60-70	50-60	5-7
Sweet corn	70-75	60-65	3-4
Cucumbers	70-75	60-65	3-4
Eggplant	70-80	65-70	6-8
Lettuce	55-65	50-55	5-7
Muskmelons	70-75	60-65	3-4
Onions	60-65	55-60	10-12
Peppers	65-75	60-65	6-8
Summer squash	70-75	60-65	3-4
Tomatoes	65-75	60-65	5-7
Watermelons	70-80	65-70	3-4

Source: *Knott's Handbook for Vegetable Growers.*
*Select the lower temperature on cloudy days.

The growing medium used to grow vegetable transplants should be sterilized to prevent seedlings from being killed by the fungi that cause damping-off disease. A good growing mix can be prepared by using one part loamy garden soil, one part shredded peat moss, and one part sand. Sterilize this soil-peat-sand mixture by baking it in an oven for about 1 hour at 210°F.

Other types of growing media can be bought at local garden centers or from seed and garden supply catalogs. The most widely available seed-starting medium is vermiculite, and it is relatively inexpensive. Seedlings cannot be grown in vermiculite for very long, however, because it contains no nutrients. Seedlings must be given a water-soluble fertilizer regularly or transplanted to sterile soil when the second pair of true leaves form. Vermiculite is sterile when purchased.

Many types of containers are suitable for starting plants. The containers used should be clean, sturdy, and fit into the space available for growing plants in the home. Wooden flats and plastic trays are good for starting a large number of seedlings in a limited work area. They take less space than individual pots. Other popular containers are pots made of compressed peat, disks of pressed peat that swell to potlike cylinders when soaked in water, and peat cubes. Some of the simplest containers can be found right in the kitchen. Aluminum foil frozen-food trays are among the best. After cleaning the trays, poke drainage holes in the bottom with a knife. Cottage cheese dishes, bottom halves of milk cartons, ice cream cartons, egg cartons, and paper cups are other handy starting containers. Remember, all must have drainage holes to allow the excess water to run off.

Once the seeds have germinated, they must receive enough sunlight to ensure that they do not become weak and spindly. Place them in a sun porch or a window with a southern exposure if possible. If bright sunlight is not available, the seedlings can be grown under fluorescent lights. A fixture

containing two 40-watt cool white fluorescent tubes spaced 3 to 4 inches apart is sufficient. Place the seedlings about 6 to 8 inches from the tubes, and leave the light on for 14 to 16 hours each day. Be sure to raise the lights to prevent leaf burn as the plants grow. The growing area must be warm. The temperature should be between 60 and 65°F at night and from 70 to 75°F during the day.

The trays of pots should be checked daily to make sure that the soil is moist. Check whether water is needed by touching the soil to see if it is damp. Do not overwater.

Vegetable seedlings can be fertilized with a water-soluble house plant fertilizer with a formulation such as 20-20-20. If seedlings begin to look yellow and thin, it indicates that a dose of fertilizer is needed. Fertilize the seedlings for the first time a few days after they have emerged, applying the fertilizer at one-half the manufacturer's recommended strength. Later applications should be at full strength. Depending on the fertilizer used, about 1 to 2 teaspoons per gallon of water applied once each two weeks should be adequate. If the seedlings are growing too fast and becoming too large, growth can be slowed by watering less often.

The plants should be “hardened off” before setting them into the garden. This process toughens the plants' tissues so that they can withstand the outdoor environment. It is usually done over a two-week period by setting the plants outside to expose them to lower temperatures during the day and bringing them in at night. Be careful not to let them get caught in a frost.

If you decide to buy vegetable transplants, remember that the best choices are not necessarily the largest and tallest ones available. Tomato plants that have already started to flower are not the best choice because flowering places the plant under stress. Good quality transplants should be stocky with a healthy appearance, be of medium size, have a good green color, be free from insects and diseases, and have good roots.

Planting Transplants

Before transferring plants to the garden, make sure that the soil has been properly tilled, limed, and fertilized, as described in previous sections. To prevent wilting, try to transplant on a cloudy day or in early evening when the plants will suffer less water loss than on a hot, sunny day. An hour or two before transplanting, thoroughly water the soil in which the plants are growing. Bare-rooted plants should be allowed to soak in water for 1 to 2 hours to replenish water loss before planting. Handle the plants carefully to avoid disturbing the roots and bruising the stems.

For container-grown plants, use a trowel to dig a hole large enough to accommodate the container. Peat and other fiber pots can be set directly in the planting hole; they will disintegrate when they are in contact with the ground. For most types of vegetables, place the transplant in the ground slightly deeper than it grew in the container (Figure 4). Tomato plants are an exception; they will develop roots all along the stems and can be planted deep enough to leave only two or three sets of leaves exposed.

Applying a starter fertilizer solution at planting time is recommended to help the plants overcome transplanting shock and to ensure proper fertility during the initial growth period. A starter solution is a water-soluble fertilizer high in phosphorus content, with a formulation such as 10-52-17. (The second number represents the proportion of phosphorus.) Mix the fertilizer with water at the rate of 2 tablespoons per gallon. As you set the plant in the soil, pour 1 cup of the solution around the roots, then finish filling the hole with soil.

A starter solution can also be made by mixing 3 to 4 level tablespoons of a complete fertilizer such as 8-8-8 in a gallon of water. Commercially prepared starter solutions are preferable to home mixes because they have a higher proportion of phosphates to promote better root growth.

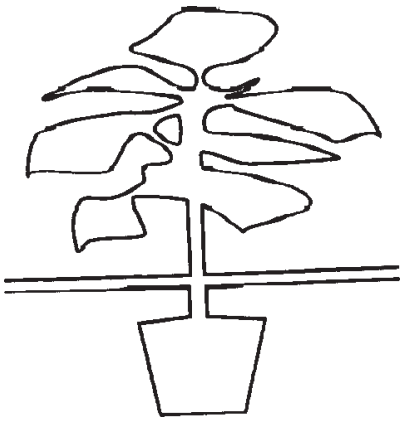

Figure 4. Set transplants in the ground slightly deeper than they grew in their containers.

Be sure to protect young transplants against heat, cold, and damaging winds during the first 2 to 4 days after transplanting. When unfavorable conditions threaten, place boxes, baskets, plastic milk jugs, or flower pots over the transplants (Figure 5). Do not leave the protectors over the plants longer than necessary, however. If it gets warm during the day, remove the protectors to provide proper ventilation for the plants. A shingle stuck in the ground at a slant on the south side of a plant can serve as a sunshade. See figure 5 below.

Buying and Sowing Seeds

Old seeds bought at bargain prices may turn out to be more trouble than they are worth. In most cases, only about half will germinate and emerge through soil. The seedlings produced will often be weak and grow very slowly. Make sure the seeds you purchase were produced for the current gardening year. The seed packet is stamped with a statement that indicates the year for which they were packed.

Bulk vegetable seed sold by the ounce or pound in garden centers and farm feed stores is shipped to the store in a container or bag with a date and germination rate label attached. Look for this information before making a purchase. Seeds with higher germination rates should be your first choice. See Table 2 for information on estimating your seed requirements.

The garden soil should contain enough moisture at seeding to initiate germination. If it does not, water the soil thoroughly (4 to 6 inches deep) and allow it to dry enough to be workable before seeding. If you prefer, water can be applied directly to the open furrow before depositing the seeds in the soil. Be sure to apply enough water in the seed furrow to moisten the soil 3 to 4 inches deep. Once the soil in the bottom of the furrow is properly moistened, plant the seeds and cover firmly with dry soil.

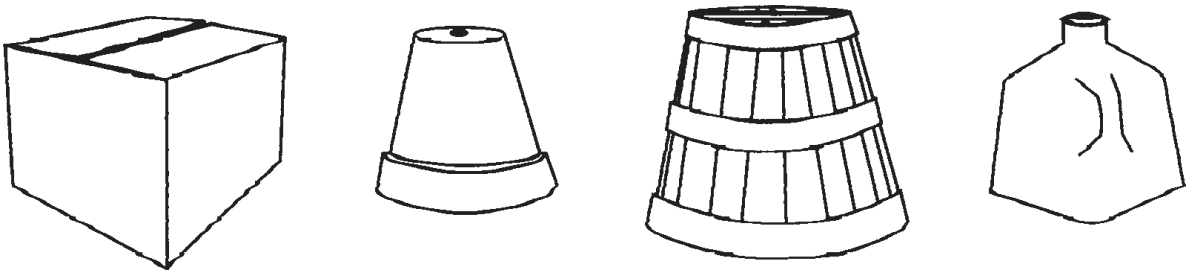

Figure 5. Protect young transplants from unfavorable conditions by placing boxes, baskets, plastic milk jugs, or flower pots over them.

In the spring when the soil is cooler, poor germination is likely to occur if the vegetable seeds are planted too deep. As a general rule, plant the seeds no deeper than three to four times their greatest diameter.

Be alert to the problem of soil crusting, the formation of a hard, crusty layer at the soil surface. This crust can prevent seedlings from emerging if it occurs shortly after seeding. Soil crusting normally occurs after a heavy rain or the use of an overhead sprinkler. The problem can be alleviated in several ways: (1) by incorporating 2 to 4 inches of organic matter (such as compost or decayed leaves) into the soil before planting; (2) by covering seeds with organic matter (compost, old sawdust, or peat moss) rather than soil; and (3) by not using an overhead sprinkler for watering (and hope that a heavy rain will not occur before the seedlings have emerged).

Mark straight rows to make cultivation, spraying, and harvesting easy. To mark a straight row, drive two stakes into the ground at either end of the garden and draw a string taut between them. Shallow furrows suitable for fine seeds can be made by drawing a hoe handle along the string (Figure 6).

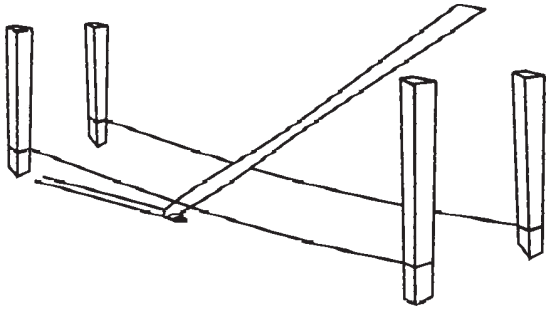

Figure 6. Make straight rows by stretching a string between two stakes. Then make a planting furrow for small seeds with a hoe or rake handle.

For deeper furrows, use a corner of the hoe blade. Early in the spring, sow the seeds shallowly so plants will come up quickly. Later in the summer, sow the seed deeper to ensure a good moisture supply (Figure 7).

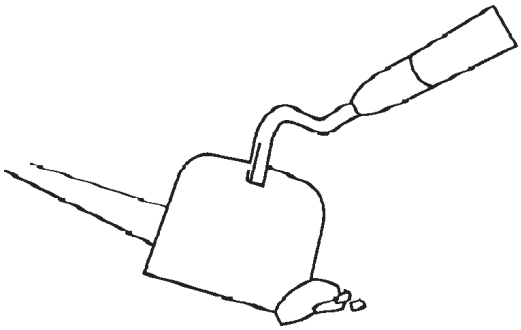

Figure 7. Sow larger seed by making a deeper furrow with the edge of a hoe.

Small seeds are difficult to distribute thinly and evenly (Figure 8). They are easier to space if thoroughly mixed with dry sand or dry pulverized soil before planting. When planting vegetables with small seeds, such as lettuce and carrots, sprinkle some radish seeds in the row. The radishes come up quickly and mark the row. They make more room for the remaining vegetables when pulled.

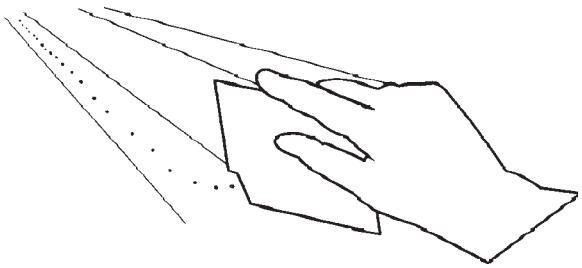

Figure 8. To sow small seeds, tear off a corner of the seed packet, then move the packet along the furrow while tapping it with the index finger.

Suggested Varieties for Vegetable Gardens

Seed or Plants	Amount Per Person Per Year	Suggested Varieties
Asparagus (crowns)	10	Mary Washington, Jersey Giant, Jersey Gem
Beans, snap	1/4 pound	Tenderette, Harvester, Astro, Roma (flat), Derby, Dandy
Beans, pole	1/4 pound	Kentucky Wonder 191, Blue Lake Stringless, Romano (flat), Kentucky Blue
Beans, bush lima	1/2 pound	Fordhook 242, Bridgeton, Early Thorogreen
Beans, pole lima	1/2 pound	King of the Garden, Carolina Sieva (small)
Beets	1/4 packet	Ruby Queen, Early Wonder, Red Ace, Pacemaker II
Broccoli[3,4]	15 plants	DeCicco, Packman, Premium Crop, Green Duke, Emperor
Brussels sprouts[3,4]	25 plants	Long Island Improved, Jade Cross Hybrid
Cabbage (plants)[3,4]	25 plants	Round Dutch, Early Jersey Wakefield, Red Express, Red Rookie, Sweetbase
Cabbage, Chinese	1/4 packet	Pak Choi, Mei Ching, Jade Pagoda, China Pride
Cantaloupe	12 plants	Classic, Magnum 45, Ambrosia, Honey Brew
Carrots	1/4 packet	Danvers Half Long, Spartan Bonus, Little Finger, Thumbelina, Scarlet Nantes
Cauliflower[3,4]	25 plants	Early Snowball "A", Violet Queen, Snowcrown
Collards[3,4]	25 plants	Vates, Morris' Improved Heading, Carolina, Blue Max
Corn, sweet	1 packet	Silver Queen, Senneca Chief, Honey 'n Pearl, How Sweet It Is, Bodacious, Merit
Cucumbers, pickling	1/4 packet	Carolina, Calypso, Liberty (mtns.), County Fair '83
Cucumbers, slicing	1/4 packet	Poinsett, Sweet Slice, County Fair '83, Salad Bush, Fanfare
Eggplant (plants)[3,4]	2 plants	Florida Highbush, Special Hibush, Ichiban, Rosa Bianco
Kale	1/4 ounce	Green Curled Scotch, Early Siberian, Vates, Dwarf Blue Curled Scotch, Blue Knight
Kohlrabi	1/4 ounce	White Vienna, Grand Duke Hybrid
Lettuce (leaf)	1/4 packet	Grand Rapids, Salad Bowl, Buttercrunch, Red Sails, Romulus
Lettuce (head)	15 plants	Great Lakes, Ithaca
Mustard	1/4 ounce	Southern Giant Curled, Tendergreen, Savannah
Onions (seed)	1/4 ounce	Texas 1015, Granex 33, Candy
Onions (sets or plants)	50	Ebenezer, Excell, Early Grano
Okra	1/4 packet	Clemson Spineless, Lee, Annie Oakley, Burgundy
Peas (edible-podded)	1/2 pound	Sugar Snap, Mammoth Melting Sugar, Snowbird, Sugar Bon
Peas, garden	1/2 pound	Wando, Green Arrow, Freezonian, Tall Telephone
Peas, southern	1/2 pound	Dixilee, Mississippi Silver, Colossus, Hercules, Mississippi Purple Hull
Peppers, sweet (plants)[3,4]	4 plants	California Wonder, Yolo Wonder, Pimento, Mexi Bell, Jingle Bells, King Arthur
Peppers, hot (plants)[3,4]	2 plants	Red Chili, Cayenne, Hungarian Yellow Wax, Super Chili, Super Cayenne, Mitla
Potatoes (Irish)	10 pounds	Kennebec, Red Pointiac, Yukon Gold, Superior
Pumpkins	1/4 packet	Autumn Gold, Howden's Field, Spookie (small), Baby Bear, Connecticut Field
Radishes	1/4 packet	Early Scarlet Globe, Cherry Belle, Snowbells, White Icicile
Radish, Diakon	1/4 packet	April Cross, H.N. Cross
Rutabagas	1/4 packet	American Purple Top, Laurentian
Spinach	1/4 packet	Hybrid 7, Dark Green Bloomsdale, Tyee Hybrid
Squash, summer	1/4 packet	Seneca Prolific (yellow), Zucchini Elite (green), Sun Drop, Goldbar, Sunburst
Squash, winter	1/4 packet	Sweet Mama, Early Butternut, Spaghetti, Cream of the Crop, Table Ace, Lakota
Sweetpotatoes[4]	75 plants	Porto Rico 198, Jewel, Pope
Swiss chard	1/4 packet	Lucullus, Rhubard Chard
Tomatoes (plants)[3,4]	15 plants	Whopper[5], Mt. Pride, Celebrity[5], Better Boy[5], Husky Gold, Patio, Big Beef[5]
Turnips	1/4 ounce	Purple Top White Globe, Just Right, Tokyo Cross Hybrid, White Egg, All Top
Watermelons	1/2 ounce	Congo, Sweet Princess, Golden Crown, Yellow Doll, Tiger Baby

[1]Dates shown are for the upper coastal plain and lower piedmont. In western North Carolina delay planting 10 to 20 days in spring and plant 10 to 20 days earlier in fall. In eastern North Carolina plant 7 to 14 days earlier in spring and 7 to 14 days later in the fall.

[2]At these temperatures germination and emergence should be rapid. Planting at lower soil temperature would delay or prevent germination.

[3]Seeding depths and soil temperatures are given for gardeners who wish to grow their own plants.

[4]Set plants with at least 50 percent of their length below ground.

[5]Carries resistance to verticillian wilt, fusarium wilt, and root-knot nematodes.

Suggested Planting Dates[1]	Distance Plants (inches)	Planting Depth (inches)	Min. Soil Temp. (°F)[2]	Approx. No. of Seeds Per Ounce	Days to Maturity
Nov. 15–Mar. 15	15	6.0	—	—	2 years
Apr. 15–July 15	3	1.0	60	100	50–55
Apr. 15–July 1	6	1.0	50	100	65–70
May 1–July 1	6	1.5	65	70[3]	65–80
May 1–June 15	6	1.5	65	70[3]	75–95
Mar. 15–Apr. 15; July 15–Aug. 15	2	0.5	50	1,600	55–60
Mar. 15–31; July 15–Aug. 15	18	0.5	45	9,000	70–80
July 1–15	20	0.5	45	9,000	90–100
Feb. 1–Apr.1; Aug 1–15	12	0.5	45	9,000	70–80
Mar. 15–Apr. 1; Aug. 1–15	12	0.5	50	9,500	75–85
Apr. 20–June 1	24	1.0	70	1,000	85–99
Feb. 15–Mar. 1; July 1–15	2	0.25	45	23,000	85–95
Mar. 15–31; Aug 1–15	18	0.5	45	10,000	55–65
July 15–Aug. 15	18	0.5	45	8,000	60–100
Apr. 15–June 1	12	1.5	50	150	85–90
Apr. 20–May 15; Aug. 1–15	10	1.0	65	1,000	40–50
Apr. 20–May 15; Aug. 1–15	10	1.0	65	1,000	40–50
May 1–31	24	0.5	70	6,000	80–85
Mar. 1–Apr. 1; Aug. 15–Sept. 1	6	0.5	45	10,000	40–50
Mar. 1–Apr. 15; Aug. 1–Sept. 1	4	0.5	55	8,000	50–60
Mar. 1–Apr. 1; Aug. 1–Sept. 1	6	0.25	45	25,000	40–50
Feb. 15–Mar. 15; Aug. 15–31	10	0.25	45	25,000	70–85
Mar. 1–Apr. 1; Aug. 1–Sept. 15	2	0.5	40	15,000	30–40
Jan. 15–Mar. 31; Sept. 1–30	4	0.5	50	9,500	130–150
Feb. 1–Mar. 15; Sept. 1–15	4	—	—	—	60–80
May 1–31	12	1.0	70	500	60–70
Jan. 1–Mar. 1	1	1.0	40	200[3]	60–70
Jan. 1–Mar. 1	1	1.0	40	200[3]	65–70
May 1–July 1	4	1.0	70	125	55–65
May 1–31	18	0.5	65	4,500	75–80
May 1–31	15	0.5	65	4,500	75–80
Feb. 15–Apr. 1	10	5.0	40	—	95–120
Apr. 15–June 15	48	1.5	70	110	115–120
Feb. 1–Apr. 1; Aug. 15–Sept. 15	1	0.5	45	2,000	25–30
Feb. 1–Apr. 1; Aug. 15–Sept. 15	1	0.5	45	2,000	60–75
Feb. 1–Apr. 1; July 1–Aug. 1	4	0.5	45	12,000	70–80
Feb. 15–Mar. 15; Aug. 1–15	6	0.5	45	2,800	50–60
Apr. 15–May 15; Aug. 1–15	24	1.5	60	300	50–60
Apr. 15–May 15; Aug. 1–15	36	1.0	60	300	70–95
May 15–June 15	10	—	70	—	95–125
Mar. 15–May 1	6	0.5	50	1,600	60–70
Apr. 20–July 15	18	0.5	60	10,000	75–85
Feb. 1–Apr. 15; Aug. 1–31	2	0.5	60	13,000	55–60
Apr. 15–June 1	60	1.5	70	250[3]	90–100

Hill and Drill Planting. Seeds that are large enough to handle can be planted by hilling or row planting (drilling). Hilling is placing several seeds in one spot at definite intervals. Squash, pumpkins, and melons are often planted this way. Once the seeds germinate, the hills are thinned, leaving one or two plants per hill, depending on the vegetable (Figure 9A). Drilling is spacing seeds more or less evenly down the row (Figure 9B). Beans and peas are planted this way. After germination, extra plants are removed to give the desired spacing.

In hilling, always plant more seeds than the desired number of plants. In drilling, plant the seeds closer than the desired final spacing. If your seeds are one or more years old, plant them thicker than you would fresh seeds. Planting extra seeds allows for poor germination and loss of seedlings to disease and insects.

Once you place the seeds, cover them with soil. Firm the soil (but do not pack it) around the seeds with the flat blade of the hoe, the wheel of a garden plow, or with your foot. Be careful not to plant seeds too deep. Seeds that are covered with too much soil may never come up.

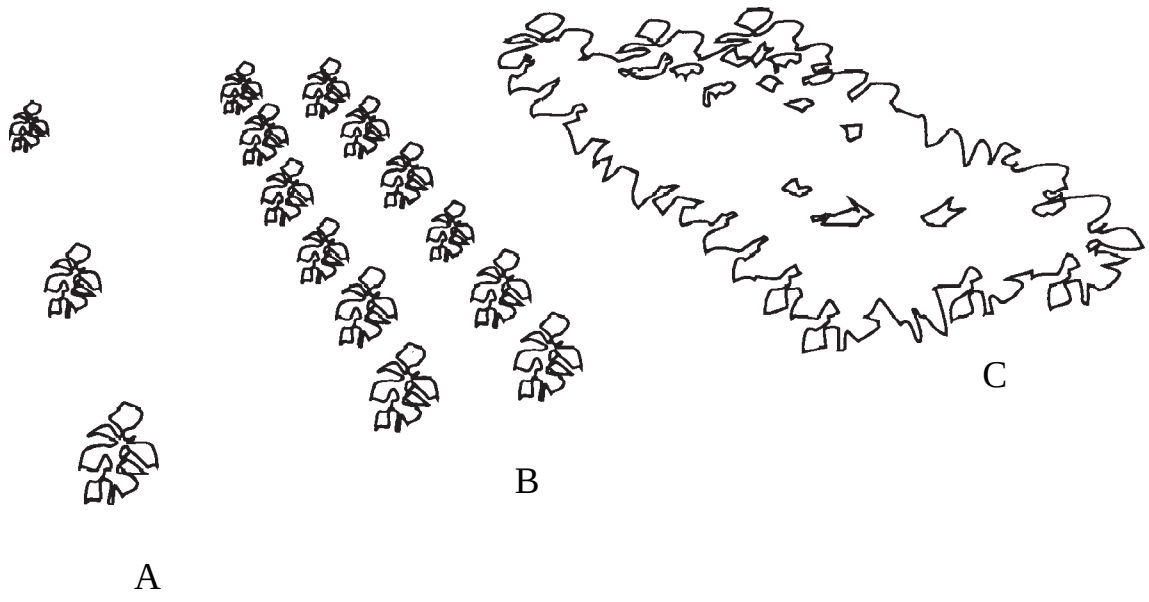

Figure 9. (A) Large seeds can be planted in hills; plants are later thinned to one or two per hill. (B) With the drilling method, seeds are spaced evenly along a row; seedlings are thinned to provide adequate space for growth. (C) In wide-row planting, seeds are scattered in a band 10 to 30 inches wide.

Wide-Row Planting. Wide rows are formed by broadcasting the vegetable seeds in a band 10 to 30 inches wide rather than in a single row. The resulting spacing between plants is much closer (Figure 9C). Wide-row gardening offers two advantages:

- Two to three times more food can be produced in the same amount of space for the work performed.

- The close spacing of the plants allows them to serve as a living mulch canopy that shades the soil, thus discouraging weeds, keeping the soil cool, and conserving soil moisture.

Crops such as radishes, carrots, beets, onions, leaf lettuce, peas, and beans are best suited to planting in wide rows. Other vegetables such as tomatoes, eggplant, sweet corn, and melons should be planted in single rows.

Thinning Seedlings

Thinning vegetable seedlings is one of the most disheartening jobs you will have to perform. However, thinning provides a better environment for the remaining seedlings by giving them the proper space for good growth and development. Some of the reasons for thinning are:

- It reduces competition among the seedlings for soil nutrients and water.

- It can reduce some early disease problems by providing better air circulation around the plants.

- It provides conditions that are more nearly ideal for growing healthier vegetables of the desired weight, size, and shape.

- Vegetable plants that are properly spaced produce higher yields.

Start thinning when the plants have one or two pairs of true leaves. Normally, the plants will be about 3 inches tall. The ideal time for thinning is when the soil is damp and soft but not excessively wet. If the soil has become dry, water the site for an hour or more before you start thinning. Evening is a good time to thin because the remaining plants have the cool, dark night to recover from any disturbance. Crops that have been sown thickly should be thinned so that there is enough room to put a finger between the plants. Practically every vegetable that is directly seeded will benefit from thinning. However, thinning is a must for leaf lettuce, beets, radishes, carrots, spinach, and turnips.

Fall Gardening

Growing a productive fall vegetable garden takes thoughtful planning and good cultural practices. Use the following guidelines to help ensure a bountiful harvest of fall vegetables.

August is the main planting time for fall gardens. Vegetables that have a 60- to 80-day maturity cycle should be planted around August 1. Seeding of shorter-season vegetables, such as turnips and leafy greens, can be delayed until September 1. Keep in mind that the planting dates can be as much as 10 to 20 days earlier in western North Carolina and 7 to 14 days later in the east. Note: Tomatoes and peppers must be planted by mid-July for fall production. The dates given are for the lower piedmont and the upper coastal plain (Raleigh area). Be sure to adjust the planting dates for your specific location.

Before preparing the soil for a fall garden, you must decide what to do with the remains of the spring garden. In most cases, the decision is not difficult because the cool-season crops have already matured and the warm-season vegetables are beginning to look ragged. About the only spring crops worth leaving are tomatoes, eggplant, peppers, and okra; everything else should be destroyed.

The soil should be tilled to a depth of 6 to 8 inches. A good seedbed is necessary to get good stands in the fall. Lumpy soils with unrotted organic matter cause the soil to dry faster, resulting in poor stands. The soil should be tilled far enough ahead of planting (10 to 14 days) to allow crop residue to decompose. If needed, additional organic matter (leaves or compost) may be incorporated into the soil before fertilizing and planting.

Vegetables that may be grown in the fall garden are snap beans, beets, broccoli, Brussels sprouts, cabbage, cauliflower, carrots, collards, cucumbers, kale, kohlrabi, leaf lettuce, mustard, radishes, rutabagas, spinach, turnips, squash, and southern peas.

Seeds should be planted deeper in the fall when the moisture level is lower in the soil. In many cases, the planting depth may be 1 1/2 to 2 times as deep as for spring planting of the same crop.

Direct seeding (planting seeds rather than using transplants for crops like broccoli and collards) is often used in the fall. However, the success of this planting method depends on having enough moisture available to keep the young seedlings actively growing after germination. If you do not have an irrigation source available, you would be wise to buy vegetable transplants from a local garden center.

The methods for thinning plants and protecting them from sun in the fall garden are the same as described in previous sections on spring gardens.

It is not uncommon for insects and diseases to get their share of the fall garden. Most problems with insects and diseases result from a buildup in their populations from spring and summer. There is hope of keeping these pests at tolerable levels, however, if a few strategies are followed. First, review pertinent literature on insects and diseases from the local Extension Service office so you can determine when a problem is severe enough to warrant treatment. Second, strive to keep fall vegetables healthy and actively growing; healthy plants are less susceptible to insects and diseases. Third, check the plants frequently for insect and disease damage. When sufficient damage is detected, use an approved pesticide.

Be sure the garden receives 1 inch or more of water each week. Failure to provide adequate moisture stresses the plants and reduces yields. It is drought, not heat, that damages vegetables. Organic mulches (straw, leaves, or compost) will help to conserve moisture and reduce weed growth. See the following section on watering for more information.

Fall vegetables need extra nitrogen just as do spring crops. Most crops will benefit from an application of nitrogen about midway through the maturity cycle. See the earlier section on soils and fertilization.

Watering

All vegetable gardens need at least 1 inch of water each week. Determine when to water by examining the soil rather than the plants. Gardens with sandy soil must watered more frequently than those with a high percentage of clay. Generally, if the soil is dry when scratched to a depth of 1 to 2 inches, watering is necessary. On the other hand, if adequate moisture is available, the next watering can be scheduled for at least two days later.

Avoid watering the soil often for short periods of time. Shallow waterings promote the development of roots in the top 1 to 2 inches of soil rather than at a greater depth. This limited root development does not pose any real threat to plant growth early in the season because adequate moisture is generally available and needs for water are low. As the weather gets hotter and moisture is farther away from the soil surface, however, you will be forced to water the garden at frequent intervals (every two to three days) just to keep the plants from wilting. At this stage in the plants' life visible evidence indicates that they are suffering from a lack of water.

Sprinklers. If you use a portable lawn sprinkler, be sure to keep the application rate low enough that water does not run off the soil. Water applied too fast will not soak into the soil. Also make sure that the vegetable plants do not interfere with the application pattern. Often this requires mounting the sprinkler on a small platform above the plants.

A garden takes about 75 gallons of water per 100 square feet (taking evaporation losses into account). When watering, wet the soil to a depth of 6 inches. After some experience you will learn how long it takes for water to reach that depth. One way to check is to dig into the soil with a long trowel or shovel to see how far the water has penetrated into the root zone. Another way is to measure how long it takes to apply 1 inch of water by placing small, straight-sided containers in a grid pattern over the area being watered. Check the containers every 30 minutes until they contain 1 inch of water. As a general guide, the average house spigot must be left running approximately 1 1/2 to 2 hours to apply 1 inch of water to 1,000 square feet.

Drip and Trickle Irrigation. A variety of drip and trickle irrigation systems are available through garden centers and mail-order catalogs. A soaker hose is the least expensive and easiest to use. These systems operate at low pressure and deliver small amounts of water to the soil very slowly. A problem that sometimes occurs is clogging of the small holes in the lines if the water comes from a spring. Do some comparison shopping before purchasing a drip system.

Weed Control and Mulching

Gardens infested with weeds produce fewer vegetables because the weeds compete for the available soil nutrients, water, air, and sunlight. Weeds also provide a home for insects and diseases.

A steel hoe is one of the most effective weapons in fighting the war against weeds. When used properly, it is rather accurate, very selective, always effective, and inexpensive. You may even find hand hoeing enjoyable work. You will not be able to control all weeds with the hoe alone, however. Weeds at the base of the plant must be pulled by hand. Do not allow weeds to become well established before they are removed because pulling large weeds can damage the root systems of vegetable plants. You can decrease the amount of hoeing you must do by using mulches and herbicides in your weed control program. Mulches help to retain soil moisture and reduce weed growth. They fall into two categories—organic types that decompose naturally in the soil, and inorganic types that do not decompose and therefore must be removed after serving their purpose.

Organic mulches are by far the most common. Typical examples are bark chips, compost, ground corncobs, chopped cornstalks, grass clippings, leaves, manure, newspapers, peanut shells, peat moss, pine needles, sawdust, straw, and wood shavings. Organic mulches are most useful in conserving soil moisture and reducing the soil temperature by 8° to 10°F during the summer. For this reason, they should not be used too early in the spring. If mulches are applied to cold garden soils, the soil will warm up more slowly and plant maturity will be delayed. On the other hand, organic mulches can reduce soil crusting. After the soil warms in the spring, an organic mulch may be applied to a depth of 2 to 4 inches around well-established plants. Be sure that there is adequate moisture in the soil before applying the mulch. Mulches such as sawdust, wood shavings, and corncobs can use up some of the soil nitrogen as they decompose. To compensate, you should add 1 to 2 cups of 8-8-8 or 10-10-10 fertilizer to each bushel of sawdust, wood shavings, or corncobs before applying them over the soil.

Inorganic mulches such as plastic (clear or black) are easier to use if applied before

planting. Soil moisture should be high before these filmlike materials are placed over the soil. The strips of plastic are applied by placing them over the prefertilized row to be planted, then burying the edges to prevent the wind from blowing them away. Short slits are then made in the material with a pocket knife for depositing seeds or planting transplants.

Using clear plastic results in a soil temperature increase of 8° to 10°F. The soil warms faster with clear plastic than with any other type of mulch. Because clear plastic does not exclude light, germination of weed as well as crop seeds is stimulated. The plastic must be removed as soon as the seedlings emerge through the soil.

Black plastic results in a soil temperature increase of 5° to 6°F early in the growing season and reduces the weed population. This material is highly recommended for crops that produce fruit on the ground, such as melons, cucumbers, squash, and tomatoes.

The choice of an organic or inorganic mulch depends on the season and what purpose the mulch is to serve. Organic mulches are best if the goal is to conserve moisture and reduce soil temperatures during the summer. They can also help to reduce soil crusting. The greatest value of inorganic mulches is their ability to increase soil temperature very early in the growing season when the soil is cool.

Herbicides are the other weed control aid you can employ. No single herbicide will control weeds in all vegetable crops. Also, it is difficult to apply relatively small amounts of the herbicide evenly to the garden surface. Miscalculation or miscalibration of the application equipment can cause some areas of the garden to be treated with too much or too little of the herbicide, which can lead to growth problems for some vegetables.

Dacthal (DCPA) and Treflan (trifluralin) are the two herbicides labeled for use with the broadest range of vegetables in the home garden. Dacthal may be purchased as a granular and wettable powder. It is generally applied to the soil surface after planting. Treflan may be purchased in granular and liquid forms. Unlike Dacthal, Treflan must be applied to the soil surface and then incorporated into the top 1 to 2 inches of soil by raking or rototilling. Although herbicides are available, the best weed control method for most home gardens is probably a steel hoe used in conjunction with a mulch.

Insect and Disease Control

For information on pest identification and control, consult your county Extension Service agent and the booklets listed at the end of this publication.

Harvesting

The nutritional content, freshness, and flavor that vegetables possess depend on the stage of maturity and the time of day at which they are harvested. Overmature vegetables will be stringy and coarse. When possible, harvest vegetables during the cool part of the morning and process them as soon as possible. If for some reason processing must be delayed, cool the vegetables in ice water or crushed ice and store them in the refrigerator to preserve flavor and quality. Here are some brief guidelines for harvesting vegetable crops:

Asparagus—Harvest the spears when they are at least 6 to 8 inches tall by snapping or cutting them at ground level. A few spears may be harvested the second year after crowns are set out. A full harvest season will last 4 to 6 weeks during the third growing season.

Beans, Snap—Start harvesting before seeds develop in the pod. Beans are ready to pick if they snap easily when bent in half.

Beans, Lima—Harvest when the pods first start to bulge with the enlarged seeds. Pods must still be green, not yellowish.

Broccoli—Harvest the dark green, compact cluster or head while the buds are shut tight,

before any yellow flowers appear. Smaller side shoots will develop later, providing a continuous harvest.

Brussels Sprouts—Harvest the lower sprouts (small heads) when they are about 1 to 1 1/2 inches in diameter by twisting them off. Lower leaves along the stem may be removed to hasten maturity.

Cabbage—Harvest when the heads feel hard and solid.

Carrots—Harvest when the roots are 3/4 to 1 inch in diameter. The largest roots generally have the darkest tops.

Cauliflower—Exclude sunlight (blanch) when the curds are 1 to 2 inches in diameter by loosely tying together the outer leaves above the curd with a string or rubber band. Harvest the curds (heads) when they are 4 to 6 inches in diameter but still compact, white, and smooth. The head should be ready 10 to 15 days after tying.

Collards—Harvest older, lower leaves when they reach a length of 8 to 12 inches. New leaves will grow as long as the central growing point remains, providing a continuous harvest. Whole plants may be harvested and cooked if desired.

Corn, Sweet—Silks begin to turn brown and dry out as the ears mature. Check a few ears for maturity by opening the top of the ear and pressing a few kernels with a thumbnail. If the liquid exuded is milky rather than clear, the ear is ready for harvest. Cooking a few ears is a good way to test for maturity.

Cucumbers—Harvest when the fruits are deep green, before yellow color appears. The length should be 2 to 3 inches for sweet pickles, 5 to 6 inches for dills, and 6 to 8 inches for slicing. Pick 4 to 5 times per week to encourage continuous production. Mature cucumbers left on the vine will stop production of the entire plant.

Eggplant—Harvest when the fruits are 4 to 5 inches in diameter and their color is a glossy purplish black. (A white variety of eggplant is also available.) The fruit is getting too old when the color starts to dull or become bronzed. Because the stem is woody, cut—do not pull—the fruit from the plant. A short stem should remain on each fruit.

Kale—Twist off the outer, older leaves when they reach a length of 8 to 10 inches and are medium green in color. Heavy, dark green leaves are over- mature and are likely to be tough and bitter. New leaves will grow, providing a continuous harvest.

Kohlrabi—Harvest when the thickened stems or bulb (the edible part) is 2 to 3 inches in diameter by cutting off the plant just below the bulb. Stems become woody if left too long before harvest.

Lettuce—Harvest the older, outer leaves from leaf lettuce as soon as they are 4 to 6 inches long. Harvest heading types when the heads are moderately firm and before seed stalks form.

Muskmelons (Cantaloupe)—Harvest when the stem slips easily from the fruit with a gentle tug. Another indicator of ripeness is when the netting on skin becomes rounded and the flesh between the netting turns from a green to a tan color.

Mustard—Harvest the leaves and leaf stems when they are 6 to 8 inches long; new leaves will provide a continuous harvest until they become strong in flavor and tough in texture from temperature extremes.

Okra—Harvest young, tender pods when they are 2 to 3 inches long. Pick at least every other day during the peak growing season. Overmature pods become woody and are too tough to eat.

Onions—Harvest when the tops fall over and begin to turn yellow. Dig the onions and allow them to dry out in the open sun for a few days to toughen the skin. Then remove the dried soil by brushing the onions lightly. Cut the stem, leaving 2 to 3 inches attached, and store in a net-type bag in a cool, dry place.

Peas—Harvest regular peas when the pods are well rounded; edible-podded varieties should be harvested when pods are well rounded but before seeds are more than one-half of their full size if the pods are to be eaten; harvest when seeds are fully developed but still fresh and bright green if pods are to be discarded. Pods are getting too old when they lose their brightness and turn light or yellowish green.

Peppers—Harvest sweet peppers with a sharp knife when the fruits are firm, crisp, and full size. Green peppers will turn red if left on the plant. Allow hot peppers to attain their bright red color and full flavor while attached to the vine; then cut them and hang them to dry.

Potatoes (Irish)—Harvest the tubers when the plants begin to dry and die down. Store the tubers in a cool, high-humidity location with good ventilation, such as the basement or crawl space of the house. Avoid exposing the tubers to light. Greening, which denotes the presence of dangerous alkaloids, will occur even with small amounts of light.

Pumpkins—Harvest pumpkins and winter squash before frost and after the vines dry up, the fruit color darkens, and the skin surface resists puncture from your thumbnail. Avoid bruising or scratching the fruit while handling it. Leave a 3- to 4-inch portion of stem attached to the fruit and store it in a cool, dry location with good ventilation.

Radishes—Harvest when the roots are 1/2 to 1 1/2 inches in diameter. The shoulders of radish roots often appear through the soil surface when they are mature. If left in the ground too long, they will become tough and woody.

Rutabagas—Harvest when the roots are about 3 inches in diameter. The roots may be stored in the ground and used as needed if properly mulched.

Spinach—Harvest by cutting all the leaves off at the base of the plant when they are 4 to 6 inches long. New leaves will grow, providing additional harvests.

Squash, Summer—Harvest when the fruit is soft, tender, and 6 to 8 inches long (3 to 4 inches across for patty pans). The skin color often changes to a dark, glossy green or yellow, depending on variety. Pick every two to three days to encourage production.

Sweetpotatoes—Harvest the roots when they are large enough for use before frost. Avoid bruising or scratching during handling. (Damaged sweetpotatoes rot easily in storage.) Ideal storage conditions are a temperature of 55°F and a relative humidity of 85 percent. The basement or crawl space of a house may suffice.

Swiss Chard—Harvest by breaking off the developed outer leaves 1 inch above the soil. New leaves will grow, providing a continuous harvest.

Tomatoes—Harvest the fruits at the most appealing ripeness stage—up to dead red ripe. (There are some yellow varieties of tomatoes.) Flavor is best at room temperature, but ripe fruit may be held in the refrigerator at 45 to 50°F for 7 to 10 days.

Turnips—Harvest the roots when they are 2 to 3 inches in diameter but before heavy frosts occur in the fall. The tops may be used as greens when the leaves are 3 to 5 inches long.

Watermelons—Ripe watermelons produce a dull thud rather than a sharp, metallic sound when thumped. Other ripeness indicators are a deep yellow rather than white color where the melon touches the ground, brown tendrils on the stem near the fruit, and a rough, slightly ridged feel to the skin surface.

Composting

Composting is a way of recycling organic waste materials that you would ordinarily discard. When these materials are placed into a compost pile with soil, water, and certain other materials, they decay into a rich humus that you can use as mulch or work into garden or potting soil to improve its structure.

The organic materials most often composted are leaves, grass clippings, straw, weeds (before they have gone to seed), and plant parts from vegetable and flower gardens. Avoid using diseased material or plants that have been treated with weed killers. Do not include meat scraps and bones because they attract rodents and dogs. Avoid pine straw because it decays slowly.

The texture of organic material affects its rate of decay. Smaller particles decompose faster than larger ones. When possible, put the material through a shredder or run over it with a lawn mower before putting it onto the compost pile.

It is usually best to locate the compost pile in the backyard where it can be screened from view. Most gardeners prefer to make compost in a bin constructed of fence wire, treated wood, or concrete. If you use the bin method, make the structure large enough to provide for two bins so that the compost can be turned from one bin into the other periodically. Each bin should be 3 to 5 feet wide, 4 to 6 feet high, and any convenient length. One side of each bin should be removable for convenience in building up the compost material and in removing it. Rectangular bins are usually easier to use.

Start the compost pile by putting a 6- to 8-inch layer of organic material (leaves, straw, or grass clippings) at the bottom of the pile. Sprinkle the layer with water and add a layer of soil about 1 inch thick. Next spread 1 cup of 8-8-8 fertilizer and 1 cup of ground limestone for each 10 square feet of surface area. One or 2 inches of horse manure can be used in place of commercial fertilizer. The fertilizer or manure provides nutrients for the microorganisms that help decompose the organic materials. Repeat this process of adding 6 to 8 inches of organic matter, water, fertilizer, and ground limestone as many times as needed to use up the available compost materials.

Since moisture hastens decomposition, make a saucer-shaped depression in the top of the pile to catch rainwater. Also, wet the pile thoroughly during dry weather. The material will decompose faster and the mixture will be better if the compost is shoveled from one pile to another about every two months.

The finished compost should be ready in less than four to six months, depending on how well the microbial activity is sustained through proper nutrition, aeration, and moisture. When ready for use, the compost will be a dark brown color and friable; that is, it will crumble readily when turned over. For additional information, see Chapter 9, Part II, *Composting a Guide to Managing Organic Yard Wastes*.

Common Garden Problems

It sometimes helps to understand what has gone wrong with a particular crop so you can avoid making the same mistake again next year. Here are some common garden problems and recommendations for preventing them:

Seedlings die shortly after emergence. This problem is most likely to occur with beans, peas, vine crops, and sweet corn. The presence of soil-borne fungi and planting in cold, wet soils are the main causes. The situation can usually be avoided by planting treated seeds in warm soil.

Broccoli flowers before the heads mature. This situation is likely to occur if the plants have been stunted by poor growing conditions or if the plants have been set out too late in the spring. Broccoli needs cool weather for best head formation.

Cabbage heads split. Certain varieties are more prone to this condition than others. However, heavy rains after theheads are almost mature will often cause splitting. Twisting or pulling the cabbage head to

break some of the roots will decrease the amount of water the cabbage absorbs and thus reduce splitting.

Corn ears do not fill properly. Poor pollination due to hot, dry weather is likely the cause. Since corn is pollinated by wind, it is advisable to plant corn in blocks of three to four rows rather thanone long row. Too much nitrogen in the soil, low potassium levels, and insects feeding on the silks may contribute to the problem.

Bitter cucumbers. Older plants, low fertility, drought conditions, and high temperatures contribute to bitterness in cucumbers. Maintaining adequate moisture, mulching the soil, and fertilizing properly will delay or possibly prevent bitterness. Most bitterness can be removed by peeling off a thicker portion of the skin during preparation.

Cantaloupes with poor flavor. Poor taste in cantaloupes is caused by too much water during the last week of vine growth. Try to avoid watering the plants just before harvest. Nothing can be done, of course, about excessive rainfall during this critical period.

Poor fruit set of vine crops. Poor pollination is the problem. Squash, cucumbers, and other vine crops produce both male and female blossoms. It is normal for vine crops to produce 10 or more male blossoms before female blossoms are formed. The male blossoms drop without any fruit production. Fruit set usually starts once the female blossoms develop. Bees are needed to transfer the pollen from male to female blossoms. Remember, blossoms of vine crops are open only one day for pollination.

Tomatoes flower without setting fruit. Temperature extremes—too high or too low—will prevent fruit from forming. Generally, night temperatures below 60°F and day temperatures above 90°F will keep tomato plants from setting fruit.

Tomatoes rot on the blossom end. This type of rot is caused by lack of calcium in the blossom end of the fruit. It can be reduced by proper liming and fertilization, mulching, and maintaining a uniform moisture supply.

Proper Use of Pesticides

WHEN USING PESTICIDES, ALWAYS FOLLOW LABEL DIRECTIONS. The label explains how to use a pesticide properly and safely. Use any pesticide only on those crops listed on the label. Use the recommended rate and apply the pesticide at the time and in the manner stated on the label.

Obey all precautions listed on the label for using a pesticide safely; for example:

"Keep out of reach of children"
"Keep away from pets"
"Do not use near fire, sparks, or flame"
"Do not inhale, ingest, or allow to get on skin"
"Do not store near food, feed, seed, or animals"
"Do not contaminate water supplies"
"Wear protective clothing called for on the label"

If you need more information on pesticides, contact these sources:

Emergency Medical Advice:
Carolinas Poison Control Center
P.O. Box 32861
Charlotte, North Carolina 28323-2861
Phone 1-800-848-6946

Pest Control:
Your county Cooperative Extension Center.

Regulations, Violations:
Pesticide Section
N.C. Department of Agriculture
P.O Box 27647
Raleigh, North Carolina 27611
Phone (919) 733-3556

Pesticide Education Programs:

Pesticide Education Specialist
Campus Box 7609
North Carolina State University
Raleigh, North Carolina 27695-7609
Phone (919) 515-3113

Health-Related Matters:

Pesticides Program
Division of Epidemiology
Environmental Epidemiology
1912 Mail Services Center
Raleigh, North Carolina 27699-1912
Phone (919) 733-3410

Disposal Advice:

Hazardous Waste Disposal, Food and Drug Protection Division
North Carolina Department of Agriculture
4000 Reedy Creek Road
Raleigh, North Carolina 27607
Phone (919) 733-7366

For Additional Information

The following North Carolina Cooperative Extension Service publications can be obtained from your county Extension Center or by writing to Communication Services, Campus Box 7603, North Carolina State University, Raleigh, NC 27695-7603. Single copies are free except as noted. Make checks payable to: N.C. State University.

Quick Reference Home Vegetable Gardening Guide, AG-12, 4p. (Planting guide with list of suggested varieties; updated annually).
Insect Control for Vegetable Gardeners, AG-19, 12p.
Careful Soil Sampling, AG-372, 2p.
Insect and Related Pests of Vegetables: Some Important, Common, and Potential Pests in the Southeastern United States, AG-295, 181p. For sale only; $7.00. Check payable to NCSU must accompany order.
Insect Pests of Vegetables, AG-404, 29p.
Using Pesticides Safely: A Guide for Homeowners (unnumbered), 8p.

Recommendations for the use of agricultural chemicals are included in this publication as a convenience to the reader. The use of brand names and any mention or listing of commercial products or services in this publication does not imply endorsement by the North Carolina Cooperative Extension Service nor discrimination against similar products or services not mentioned. Individuals who use agricultural chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage regulations and examine a current product label before applying any chemical. For assistance, contact your county Cooperatvie Extension Service agent.

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