

Vegetable Gardening



in the Golden Crescent

Texas Agricultural Extension Service • The Texas A&M University System • Daniel C. Pfannstiel, Director • College Station, Texas

So You Want to Grow a Garden?

So you want to grow a garden. Maybe it is because you like to be outdoors next to the good earth, letting the fertile soil run through your fingers. Maybe it is because you like the taste of vegetables right off the plant. Maybe it is for the satisfaction of having nurtured a beautiful living thing where before only bermuda and crab grass grew. Or maybe it is because you dropped a hundred dollars on your last trip to the supermarket.

In any case, you want to grow a garden. But where do you start? Simply looking at the pretty seed packets at your local discount department store will not do the job. That is where too many would-be tillers of the soil have launched ill-fated attempts at gardening. Do it right. Think. Plan.

First determine where to put the garden. If you are a beginner with an average size family, you will not need a lot of space. Perhaps a plot 20 x 20 feet or less is sufficient. Whatever the size, you need to think in terms of four basic requirements.

First, you need sunlight. All vegetables need some sunlight; most must have full sunlight. Unless you are planning for leaf crops like broccoli, collards and spinach, you will want every ray of sunshine that is available.

So the garden cannot be in the shade of hedges, shrubs or trees. Not only do these bigger plants compete for light, but they also gobble up nutrients and water necessary for healthy vegetables.

The second consideration is proximity. Put your plot as near the back door as possible. Make bringing home the fruits of your labor a pleasant chore.

The out-of-sight, out-of-mind principle applies here. A garden does not demand constant care and attention, but it thrives better if you visit it once a day. If you do not check it regularly, insects, diseases or lack of water can destroy your efforts in less than a week. So plant the garden where watching it will not be a hassle.

Soil is the third consideration. Exact soil type is not that important. Ideally, soil should be fertile, easy to till and have just the right texture — a loose, well-drained loam.

If your backyard soil does not

meet these specifications completely, do not panic. You can remedy it without breaking your back.

If possible, avoid areas infested with johnsongrass and other ugly weeds. Avoid putting your garden on a rocky ledge or in a poorly drained area. All of these things cause gardening difficulties.

The fourth consideration is water. Put your garden near a

spigot. Mother Nature does not always provide rain when needed. At least 1 inch of rain or supplemental watering is required per week. Assuming you still want a garden, you are ready for the planning stage. The first step is selecting vegetables you want to grow. If you like tomatoes and beans, plan to plant them. With few exceptions, you can plant whatever you like.

The second step is the tough part, but it is worthwhile. Make a rough diagram of the garden with a chart showing deadlines you might otherwise put off until tomorrow, next week or miss altogether. The chart can also show the kind of vegetables you are going to plant, the distance between rows and plants, amount of fertilizer to use and planting dates.

IS WINTER REALLY OVER?

Lack of frost signals the beginning of a safe period for growing vegetables such as beans, corn, cucumbers, eggplant, Southern peas, peppers, squash, tomatoes and watermelon. All of these vegetables are very sensitive to frosty conditions and must not be planted until all danger of frost is past, unless some sort of frost protection is provided.

The average length of these frost-free periods is relatively stable in most areas. The problem arises in determining when these periods begin and end. Meteorological information collected for many years indicates the "average first frost-free date" and "average last frost-free date." The term "average" is misleading.

Average means that which has occurred most often or normal. As most Texans know, normal weather is the unexpected rather than the expected occurrence. Unfortunately, extremes are also averaged in. For instance, mid-March is the beginning of the average frost-free period in the spring for South Central Texas, and nor-

mally the first frost of the fall occurs in mid-November. Yet many farmers remember when vegetables have frosted as late as April and as early as October. These same farmers also remember years when the first frost-free day occurred in early February and the first frost of the fall was in December. You can now begin to appreciate the farmers' situation.

Any time one tries to outwit Mother Nature, it is a tremendous risk. Yet successful gardening depends on just that. For instance, if one waits until well past the average first frost-free date to insure success with such tender crops as tomatoes and beans, a complete failure may result. The failure will be caused by the later bloom date due to later planting. Tomatoes blooming during hot temperatures have improper fruit set and reduced yields.

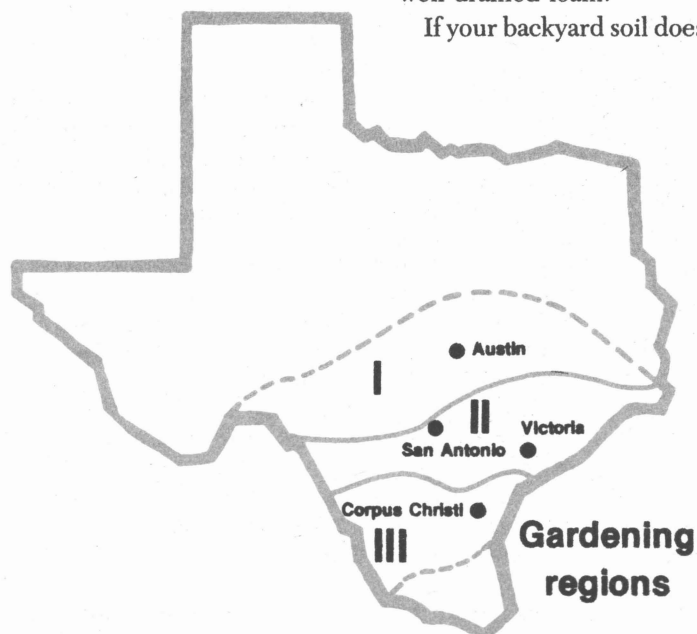
The answer to this dilemma is to plant frost-susceptible crops according to the average first frost date, but remember to protect them if a late cool period occurs. Home gardeners can cover plants with cans,

blankets, a cage-garbage bag system or boxes on frosty nights.

Do not plant Southern peas (black-eyed peas), sweet potatoes and okra until well after the first frost-free date. These crops are extremely susceptible to cold temperatures and do not grow properly in cold soils. Wait 2 or 3 weeks after the first frost-free date.

It is also very important that cool-season, frost-tolerant crops be established well before the first frost-free date. This is especially important in the spring as cool-season vegetables do not grow well in the hot temperatures which follow soon after the last frost. These vegetables include beets, broccoli, cabbage, carrots, chard, collards, kale, lettuce, mustard, onions, Irish potatoes, radishes, spinach and turnips.

As you can see, growing vegetables is not as easy as one might imagine. Timing is a major key to success. With proper timing, adapted varieties and a slight assist from Mother Nature, anyone can be a successful gardener.



RECOMMENDED VARIETIES

- Bean, bush** — Contender, Topcrop, Itasco, Greencrop, Blue Lake, Tendercrop
- Bean, pinto** — Pinto 111, Luna
- Bean, pole** — Stringless Blue Lake, Kentucky Wonder, Dade, Romano
- Bean, Lima bush** — Jackson Wonder, Henderson Bush, Fordhook 242
- Bean, Lima pole** — Florida Butter, Sieva (Carolina)
- Beets** — Detroit Dark Red, Green Top Bunching Asgrow Wonder
- Broccoli** — Waltham 29 (fall only); Green Comet (spring and fall)
- Brussels sprouts** — Jade Cross, Catskill
- Cabbage** — Globe, Early Round Dutch, Greenback, Golden Acre, (red) Red Acre, (savoy) Drumhead; (hybrids) Round-up, Superette, Rio Verde, Gourmet
- Cabbage, Chinese** — Michihli
- Cantaloupe** — Perlita, Rio Gold, Smith's Perfect, TAM Uvalde
- Carrot** — Imperator, Danvers 126, Nantes, Red Core Chantenay
- Cauliflower** — Snowball (fall only), Snow Crown (spring and fall)
- Chard** — Lucullus
- Collard** — Georgia
- Corn, sweet** — Calumet, Bonanza, Merit, Golden Security, Buttersweet; (white) Silver Queen, Country Gentleman
- Cucumbers** — (picking) National Pickling, Piccadilly, Crispy, Salty; (slicers) Palomar, Ashley, Poinsett, Straight 8, Cherokee
- Eggplant** — Florida Market, Black Beauty, Highbush
- Garlic** — Texas White
- Kale** — Vates, Dwarf Blue Curled
- Lettuce** — (head) Great Lakes strains, Valverde; (leaf) Black Seeded Simpson, Salad Bowl, Ruby, Oakleaf; (butterhead) Summer Bibb, Tendercrisp; (romaine) Valmaine
- Mustard** — Tendergreen, Florida Broadleaf
- Okra** — Clemson Spineless, Louisiana Green Velvet, Dwarf Green, Emerald
- Onion** — (bulbing) Granex (yellow and white), Eclipse, Grano 502; (green) Beltsville Bunching, Crystal Wax, Ringmaster
- Parsley** — Moss Curled, Evergreen
- Peas, Southern** — Blackeye No. 5, Brown Sugar Crowder, Burgundy, Champion, Cream 40, Knuckle Purple Hull
- Pepper, sweet** — Yolo Wonder, Keystone Giant, Rio Grande 66
- Pepper, hot** — Long Red or Thin Cayenne, Hungarian Wax, Jalapeno
- Potato, Irish** — (white) Kennebec; (red) Red Lasoda; (russett) Norgold
- Potato, sweet** — Centennial, Jewel
- Radish** — Cherry Belle, Early Scarlet Globe, White Icicle; (winter) Black Spanish, White Chinese
- Rutabaga** — American Purple Top
- Spinach** — Early Hybrid 7, Dixie Savoy, Bloomsdale; (summer production) New Zealand, Malabar (Basella alba)
- Squash** — Early Prolific Straightneck, Goldneck, Dixie Hybrid Crookneck, White Bush Scallop, Zucco, Zucchini; (winter) Acorn, Butternut
- Tomato** — (large fruited) Homestead, Spring Giant, Walter and nematode-resistant Nematex, Terrific, Better Boy, Bonus, Big Set; (small fruited) TAMU Saladette, Small Fry, Tumbling Tom
- Turnip** — Purple Top White Globe, Just Right; (greens) Seven Top, Crawford
- Watermelons** — Charleston Gray, Peacock, Klondike, Crimson Sweet, Sweet Princess, Jubilee.

MAKE YOUR SOIL EASY TO MANAGE

Absolutely nothing can be as discouraging during spring vegetable planting time as a hard-to-manage soil. Gardeners all over Texas are constantly amazed at what they are expected to grow vegetables in. Basically, though, most soils are not bad for gardening purposes if properly prepared.

Clays, sands or loams can all be improved by adding high levels of organic matter. This is a real key to growing vegetables in the garden. If the garden soil is a heavy clay, the addition of

organic matter improves drainage and aeration and allows for better root development. If the soil is a sandy type, adding liberal amounts of organic matter helps it hold water and nutrients. Organic matter also serves as a food source for beneficial soil fungi and bacteria.

Where do you get organic matter? Organic matter may be peat moss, compost, grass clippings, barnyard fertilizer, shredded bark, leaves and even shredded newspapers.

Add enough organic matter to physically change the soil's structure. Ideally, at least one-third of the final soil mix should be some type of organic matter. To accomplish this, spread a 2- to 4-inch layer of organic matter over the garden surface and till the soil to a depth of at least 6 to 12 inches.

As organic matter decomposes, it releases plant nutrients and also makes many soils more mellow and easier to work.

Another problem with many soils is its pH. Most vegetables will tolerate a relatively wide range of soil pH, but frequent applications of acidifiers for alkaline soil, or lime for acid soil, will certainly improve plant growth. A soil test is an invaluable tool in determining the pH of your garden soil and in letting you know what to apply to correct the condition.



A well-prepared soil makes gardening an easy chore.

Plan for Success

It is surprising how easy it is for a person to appear to be an expert gardener and still fail to provide the family with adequate vegetables. A home garden that delivers 10 times the number of green beans one can eat; dumps beets, carrots and turnips into the kitchen for a short time; and then closes up for the rest of the year is an expensive luxury. Many gardens appear quite attractive and highly productive, but often produce too much of one vegetable and not enough of another. Avoid this situation by going into the spring gardening season with a plan.

Plan by honestly listing vegetables your family will eat and the quantity your family will use. Consider the ability and willingness of your family to care for production surpluses.

Choosing vegetables to grow in your garden differs from selecting produce at the market. Perhaps your soil is simply too tight and heavy to grow good carrots. It is a good idea to check with your county Extension agent or successful gardeners to determine what vegetables grow best in this area of the state.

Particular favorites you will want to plant are tomatoes, beans, lettuce and squash. You might consider trying some vegetables your family does not particularly like, such as spinach. They may change their mind once they taste home-grown, twice-as-tasty, garden-fresh spinach. Children may discover they like eggplant once they pick it themselves. Do not over plant items you do not believe will appeal to your family, but do try a few.

In choosing vegetables for your garden, consider ones high in vitamins. Information on the vitamin content of fresh vegetables is available from many sources. With the time from garden to table being as short as half an hour, one does not have to worry about vitamin losses from long storage.

After determining what vegetables to plant, estimate the amount your family might

consume each week. You can, therefore, determine the number of feet of row needed for each vegetable. A 25-foot double row of beets, carrots and turnips is a beautiful garden sight but not a lot of plants. By figuring four beet, carrot and turnip plants to the foot of row, you will have more than 600 items. This may be a considerable amount for a small family, especially if all produce is ready for harvest at the same time.

The ideal garden plan calls for continuous ripening of small quantities of vegetables over a long period. The perfectly planned home garden should deliver some salad, leaf and root vegetables almost every day of the year. Of course, this perfect garden is not usually possible, but with proper planning, one might be surprised how long the harvest period can be extended.

For an excellent harvest, give careful thought and sufficient space to vegetables which furnish a succession of produce over a long period. Leaf lettuce

can be cropped almost continuously by removing and consuming the outer leaves as they mature. Crop Swiss chard the same way, and usually, one planting will last practically all year. Pole beans, if picked, watered, fertilized and kept disease- and insect-free, will bear for a long time. This is also true for tomatoes, eggplants and peppers.

Multiple planting also spreads out the harvest. Theoretically, the growing season of cold-susceptible vegetables is governed by the date of the last killing frost in the spring and the first killing frost in the winter. Actually, seeds can be planted a month or more before the frost-free date in the spring. Take sweet corn for example. February is the earliest safe planting time for sweet corn. If the entire crop is planted then, the harvest will cover only a short period in May or June, depending upon the variety. Instead, make the first garden planting and then plant more in the garden 2 or 3

weeks later. You will be picking fresh corn for a longer period. This same situation applies with green beans, lettuce and numerous other crops.

Transplant broccoli seedlings about 2½ feet apart in a row of early-planted lettuce or beets in the spring. The beets and lettuce will mature and be out of the way by the time the slower growing broccoli starts to shade them. This also can be done by planting slow growing crops, such as tomatoes and peppers, in earlier planted rows of lettuce, green onions, spinach and radishes.

Maximum production from a small backyard garden requires a considerable amount of thought, attention and planning. The best plans are worthless unless carried out at the proper time. In planning your garden, note the time when certain planting operations should take place. Information on optimum planting dates and days to harvest are available from numerous gardening publications.

PROPER TIMING

Proper timing is possibly the most important factor to successful spring gardening. Regardless of variety selected or cultural practices used, if a gardener does not do the right thing at the right time, any chances of success are diminished.

To estimate when planting should begin, the average first frost-free date must be established. March 15 is the average frost-free date for the area south of a line from Del Rio to Uvalde, San Antonio, Austin and Beaumont. This will be referred to as Region II. North of this line is Region I with a first frost-free date of April 10. See map of regions on page 1.

Gardeners south of a line from Eagle Pass to Pearsall, Pleasanton and Refugio in Region III should enjoy frostless days as early as February 15.

Remember that these are "average" first frost-free dates for each region. "Average" means that frost can occur later, so emergency plans should be made to protect early plantings.

With these frost-free dates in mind, a gardener can decide what frost-susceptible vegetables to plant and when. He also can decide whether to use transplants or seeds.

The following chart indicates regional dates during which plants can be grown directly from seeds sown in the garden area. The chart insures success only if recommended, fast-maturing varieties are used.

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DIRECT SEEDING CHART FOR SPRING

Vegetables	Austin, Hill Country and Region I	San Antonio, Victoria and Region II	Laredo, Corpus Christi and Region III
Asparagus	After Feb 15	After Feb 1	After Jan 15
Beans, snap bush	Apr 1-May 5	March 5-May 5	Feb 10-May 5
Beans, snap pole	Apr 1-May 5	March 5-May 5	Feb 10-May 5
Beans, Lima bush	Apr 1-Apr 25	March 5-Apr 25	Feb 10-Apr 25
Beans, Lima pole	Apr 1-Apr 20	March 5-Apr 20	Feb 10-Apr 20
Beets	Feb 15-May 1	Feb 1-Apr 20	Jan 15-Apr 1
Broccoli	Feb 15-March 20	Feb 1-March 1 (Green Comet only)	Jan 15-Feb 25 (Green Comet only)
Brussels sprouts	Feb 15-March 10	Not recommended	Not Recommended
Cabbage	Feb 15-March 10	Feb 1-March 1	Jan 15-Feb 10
Carrots	Feb 15-March 10	Feb 1-March 1	Jan 15-Feb 10
Cauliflower	Feb 15-March 10	Not recommended	Not recommended
Chard, Swiss	Feb 15-May 1	Feb 1-Apr 20	Jan 15-Apr 1
Collard (kale)	Feb 15-Apr 10	Feb 1-March 25	Jan 15-March 1
Corn, sweet	March 1-Apr 20	Feb 25-March 20	Feb 5-March 1
Cucumber	Apr 1-Apr 30	March 5-Apr 15	Feb 10-Apr 10
Eggplant (transplant)	Apr 10-May 1	March 10-Apr 10	Feb 20-March 15
Garlic (cloves)	Not recommended	Not recommended	Not recommended
Kohlrabi	Feb 15-March 10	Feb 1-March 1	Jan 15-Feb 10
Lettuce (leaf)	Feb 15-May 15	Feb 1-May 1	Jan 15-Apr 15
Muskmelon (cantaloupe)	Apr 25-May 1	March 15-May 1	Feb 20-May 1
Mustard	Feb 15-May 15	Feb 1-May 1	Jan 15-Apr 15
Okra	Apr 25-June 15	Apr 1-July 15	March 15-July 30
Onion (plants)	Feb 15-March 10	Feb 1-March 1	Jan 15-Feb 10
Parsley	Feb 15-March 10	Feb 1-March 1	Jan 15-Feb 10
Peas, English	Feb 15-March 1	Feb 1-Feb 15	Jan 15-Feb 1
Peas, Southern	Apr 20-May 15	March 25-Apr 15	March 5-Apr 10
Pepper (transplant)	Apr 10-May 1	March 15-Apr 10	Feb 20-March 15
Potato, Irish	March 10-Apr 1	Feb 15-March 1	Jan 15-Feb 15
Potato, sweet (slips)	Apr 25-May 30	Apr 10-May 30	March 15-May 30
Pumpkin	Apr 25-May 20	Apr 1-May 20	March 10-May 15
Radish	Feb 15-May 20	Feb 1-May 20	June 15-May 20
Spinach	Feb 15-Apr 1	Feb 1-March 15	June 15-March 1
Squash, summer	Apr 1-May 5	March 5-May 5	Feb 10-May 5
Squash, winter	Apr 1-Apr 25	March 10-Apr 25	Feb 15-Apr 25
Tomato (transplant)	Apr 10-May 1	March 15-Apr 10	Feb 20-March 15
Turnip	Feb 15-May 20	Feb 1-May 20	June 15-May 20
Watermelon	Apr 25-May 1	Feb 20-May 1	Feb 20-May 1

NUTRIENT KNOW-HOW

Fertilizer is the primary source of plant nutrients. Applied at the proper time and in the proper amounts, fertilizer is very important especially in home gardens where one is seeking maximum production, often from a small area.

To know how much fertilizer to apply, you must understand what nutrients are present in each bag of fertilizer. This information is contained in the fertilizer analysis, which always lists the three major nutrients on the container.

Let us examine a bag of 10-20-10 fertilizer. The first number is always nitrogen. The first 10 means that 10 percent of the material in the fertilizer bag is nitrogen. In other words, 100 pounds of a 10 percent nitrogen fertilizer provide 10 pounds of nitrogen.

The second number in our example is phosphorus. For our purposes, 100 pounds of 10-20-10 fertilizer provide 20 pounds of phosphorus.

Potassium is the third number on the bag. This particular analysis, which supplies as

much potassium as nitrogen, has 10 pounds for each 100 pounds of fertilizer.

Not many gardeners use 100 pounds of fertilizer at a time. However, the important thing is the relative amounts of nutrients for 1 pound of 10-20-10. The higher the numbers on the bag, the less fertilizer you need to supply the same amount of nutrients.

With an understanding of the fertilizer analysis, one can determine how to get the best deal for the money. Look at the price per pound. In most cases, the larger the bag, the lower the price per pound of nutrients in the bag. Likewise, a higher analysis fertilizer such as 10-20-10 or 12-24-12 is often a better buy than a lower analysis such as 5-10-5.

Apply fertilizer at rates recommended for your area. Usually 2 to 3 pounds of complete fertilizer per 100 square feet applied before planting are adequate. Spread the fertilizer evenly over the garden and mix it into the soil.

Rotate Vegetable Families

Experienced vegetable gardeners know the value of proper crop rotation. They are aware that certain vegetables planted year after year in the same plot decline in productivity. Consider factors that interact to affect the soil's productive potential if you wish to plant many kinds of vegetables in the same garden each year. Important factors to consider in planning a proper crop rotation are: soilborne diseases, nematodes, soil insects, organic matter, toxic chemical residues and levels of essential mineral elements.

Each family of vegetables has unique effects on the soil, and most vegetables within a given

family fall prey to the same diseases and insects. Most vegetables planted in home gardens belong to nine distinct families. It is important to know that the pea or legume family includes peas and beans of all kinds. Beets, chard and spinach belong to the goosefoot family. The mustard family has many members: cabbage, collards, Brussels sprouts, kale, cauliflower, broccoli, kohlrabi, rutabaga, turnip, cress, horseradish and radish. Carrots, parsley, celery and parsnip all belong to the parsley family. The nightshade family encompasses potatoes, tomatoes, eggplants and peppers. The gourd family claims the vinecrops: summer squash, winter squash, pumpkin, watermelon, cantaloupe and cucumber. Chicory, endive, salsify, dandelion, lettuce, Jerusalem artichoke and globe artichoke are all included in the composite family. The lily family includes onions, garlic, leeks and chives. Sweet corn is a member of the grass family.

In a small garden, rotate families of vegetables where only a few plants of each kind are planted. For example, treat tomatoes, peppers, eggplants and potatoes as a single group in a rotation.

Effectively control common vegetable diseases that survive in soil and attack vegetables by timely rotation coupled with a preventive fungicide program. For example, anthracnose and

fusarium root rot fungi build up in beans and peas unless there is a span of 2 to 3 years between plantings on the same plot. Tomato bacterial canker persists in a viable state for 3 years, once it is introduced into the garden soil. Some vegetable varieties resist or tolerate infection by certain fungi and bacteria. A gardener who knows his soil harbors a harmful organism can often select a resistant variety.

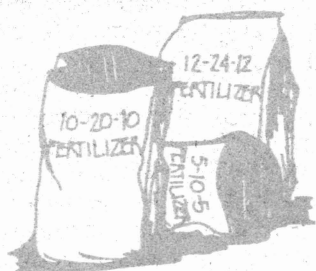
Tomatoes, potatoes and carrots are very susceptible to injury by the root knot nematode and favor the build up of this problem in soils. Corn and other grasses suppress this condition.

Wireworms and white grubs thrive in grass turf, and a new garden plot usually contains many active soil insects. Sweet corn, watermelons and winter squash are better choices than root or tuber crops for newly tilled soil.

Try to follow a crop that supplies a large amount of organic matter with one that favors decomposition of organic matter. Sweet corn produces much coarse crop refuse. Pumpkins, winter squash and watermelons favor the decay of crop refuse. It is important to precede shallow-rooted crops requiring close cultivation, such as lettuce, beets and other greens with clean-culture crops such as tomatoes, peppers or summer squash, which tend to extend their roots deeply into the soil.

	Analysis in percent			Remarks
	N	P	K	
Blood	10	1.5	0	A very rapidly available organic fertilizer
Guano, bat	6	9	3	Partially decomposed bat manure from caves
Guano, bird	13	11	3	Partially decomposed bird manure from islands off coast
Bonemeal	4	22	0	Main value is nitrogen as most of the phosphorus is not soluble
Bonemeal (steamed)	2	27	0	As a result of steaming under pressure, some nitrogen is lost, but more phosphorus is soluble for use by plants.
Cotton seed	6	2.5	2	Generally very acid. Useful in alkaline soils
Cattle manure	0.5	0.3	0.5	Although manures in general are low in fertilizer, when used in relatively large amounts to improve soil structure, damage may occur because of too much fertilizer.
Chicken manure	0.9	0.5	0.8	
Horse manure	0.6	0.3	0.6	
Sheep manure	0.9	0.5	0.8	
Swine manure	0.6	0.5	0.4	
Peat (reed or sedge)	2	0.3	0.3	Best used as a soil conditioner rather than as a fertilizer
Rice hulls (ground)	0.5	0.2	0.5	Low in fertility. Helps improve soil structure
Wood ashes	0	2	6	Quite alkaline. Should not be used on high pH soils

WHAT'S IN THAT STUFF?

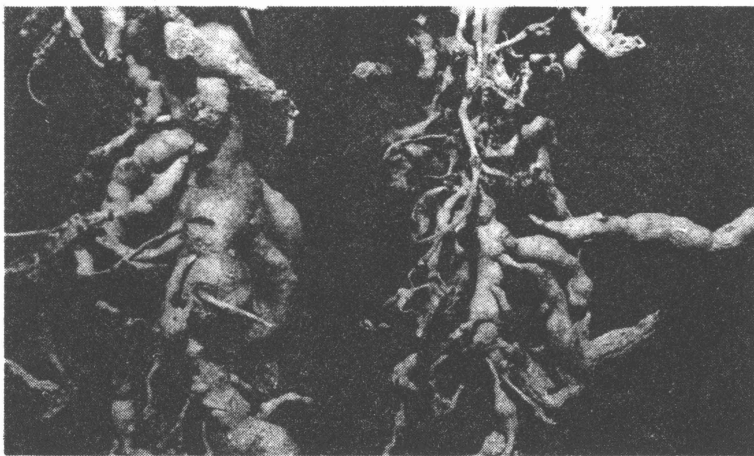


TIPS ON TILLING

Even though gardening is considered by many to be one of the best forms of exercise available, many gardeners will be looking for an easy way to work up that stuff in the backyard, loosely termed soil. Many prefer the shovel or the spading fork and really enjoy getting out and working up the ground. But others look for simpler and easier ways to handle the same chore. Often this involves borrowing a rotary tiller from a neighbor or renting one for a couple of hours or the whole day. Buying one for a small garden is not economical.

The following tips on tilling a garden should make the job much easier:

- Leave a row untilled between passes. Two reasons for this are: wide turns are much easier to negotiate with a tiller than "about faces," and the machine will not be pulling itself and you toward the next row (which it will do if you come close to the overlapping rows).
- In tilling heavy clay soil or breaking up ground for a new garden, reduce engine speed. The tiller digs better and bucks and bounces less.
- When tilling the garden the first time, don't try to work it to its maximum depth in the first pass. Set the brake stake for half the depth you desire. Then reset it to full depth and go over the ground a second time.
- Till only when the soil is slightly dry and friable. Tilling soil that is too wet leaves large clods that harden as they dry. Also, clumps of mud clinging to the blades upset the tiller's balance, causing undue wear on you and the machine.
- Do not clean mud, roots or debris from the tines while the engine is running, even through it may not be in gear. To be extra safe, make certain the shift selector is in "neutral" and the spark plug wire is disconnected.



Nematodes cause knotty roots and unproductive gardens.

Stop That Falling Over

Damping off of garden vegetables is common in most Texas gardens. Although it is caused by several fungi, pythium is one of the more prevalent. A plant is susceptible to damage from this disease complex from the minute the seed is placed in the soil until it begins to produce true leaves. The older a seedling is, the less likely it is to be damaged by the fungi complex.

The damping off symptom varies with age and developmental stage of the young seedling. Damage may first occur as the fungi attacks the germinating seed. The infected seed becomes soft, mushy and fails to germinate.

Young seedlings can be attacked before they come through the soil. Losses occurring during this period are known as preemergence damping off. Losses occurring after the seedling emerges are called postemergence damping off. Mostly the same group of fungi are involved in all stages of damping off.

Stems of young plants attacked by damping off become water-soaked and slightly darker in color near the ground. As the lesions or spots enlarge, cells of the plant stems collapse, and the seedling rapidly dies. When the cells collapse, the plant breaks from the weight of the top.

As the seedlings mature, they are less susceptible to damping off. On older seedlings, lesions or spots occur on the stem, yet the plant is not killed. It will, however, be weakened, and damage may occur later from wind breaking the plants.

The severity of the disease is directly proportional to the soil moisture and is greatest when the soil is near saturation. Moisture affects the movement of the disease. It also reduces the plant's ability to repel the fungi due to the lessened amount of oxygen and lower soil temperatures in a water-logged soil.

Nematodes, because of the nature of their feeding, injure the young plant's root system. This slows the growth of the young seedling which increases

the susceptible period. The wound from the feeding also serves as an infection site for the damping off fungi.

- If possible, plant the garden in a well-drained area.
- Plant on a raised bed (6 inches minimum).
- Plant when soil temperature is suitable for maximum seed germination and seedling development (refer to seed packet).
- Use captan as a preplant fungicide whenever possible.
- Plant only good quality seed which have been treated with a protective fungicide.
- In severely infected gardens, it may be necessary to apply Vapam® as a preplant treatment.

A SOLUTION TO A KNOTTY PROBLEM

Nematodes are small, worm-like animals that live in the soil and feed on decaying organic material, insects, fungi, bacteria or other nematodes. Some forms, however, are plant parasites. This is the group one must control if vegetables are to be grown successfully. Nematode control is based on several different techniques.

"Drying out" the soil or summer fallowing is one method. To do this, the garden must be free of any plants or plant roots, spaded or rototilled regularly during the late summer months and kept dry. To live, nematodes require a layer of water around soil particles. When this layer is removed, the nematode dies. Rototilling or spading the soil helps remove soil moisture at a faster rate and also exposes the nematodes and their eggs to the sun's rays which decrease the number of nematodes. When summer fallowing, tree roots growing into the garden will reinfest the site. Cut and remove or allow to decompose if the treatment is to be satisfactory. For this reason, locate a garden away from trees or other permanent plants which send roots into the garden area.

Plant rotation is another method of reducing nematode losses. The principal nematode in gardens is the root knot. This nematode is somewhat restricted in its host range. This characteristic is advantageous to the home gardener who can benefit by alternating nonhost with root knot host plants annually.

The only nonhost vegetables are onions, garlic, tomatoes (resistant varieties), shallots, Mississippi Silver Southern pea, Jewel sweet potato and sweet corn. All other vegetables are susceptible.

Root knot resistance is a plant characteristic that plant breeders have been searching for in wild plants of the world. In Peru, they found a tomato with this characteristic. It has now been crossed with the commercial tomato of the United States, and varieties are now available which are nematode resistant. Big Set, Bonus, Terrific, Better Boy and Small Fry are all commercially available and produce well in Texas.

Use Vapam® for chemical control. If used properly, Vapam® controls nematodes for one crop; then the soil must be retreated. Follow label directions regarding the use of Vapam®.

Complete elimination of the nematode population is impossible with any chemical now available. Chemical treatment enables the young plant to get established and set a crop before the population builds up. If the soil is not treated, the young plant never gets established.

Nematodes are an important limiting factor in gardening. A survey made last year in Texas indicated that 60 percent of the gardens surveyed had a nematode problem. For a successful garden take steps to control this problem.

WHAT'S BUGGING YOUR SOIL?

Few gardeners realize how much damage soil insects cause. Poor plant stands from insect damage often are attributed to bad seed or poor cultural practices.

A number of different insects are classified as soil-inhabiting pests that damage plants in home gardens. Most of these pests attack the seed itself or the tender shoots soon after germination. A few continue to damage plants until they are several inches high.

The very nature of soil pests makes their detection difficult; however, the severity of a soil insect problem may often be detected by a soil inspection 2 to 4 weeks before planting. Take soil samples from several areas in the garden and examine for the presence of insect larvae.

Wireworms and false wireworms are probably the most important soil insect pest in home gardens. Several species are involved but all are similar in habits. Wireworms are long, cylindrical, golden-brown to yellowish and are rather hard-bodied. Full grown larvae may

be more than an inch in length. These insects eat seed, cut into small shoots and often bore into stems, roots and tubers. Wireworms attack many plants including potatoes, onions, corn, carrots, peas, beans, turnips and melons.

White grubs, often called grubworms, are also common in the home garden. These pests are about 1 inch long when full grown. They have a curved or "C" shaped body and are white with a brown head. White grubs feed on roots of corn, beans, peas and other vegetable crops. These larvae are often collected for fish bait.

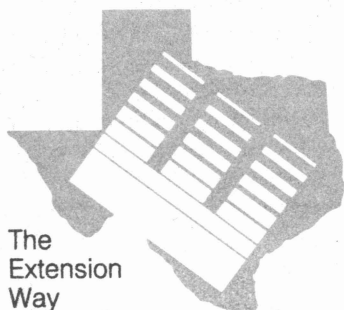
Soil maggots are larvae of small flies. These maggots develop in the soil and feed on a number of plants. Damage includes feeding on seed and seedlings and feeding on or tunneling into roots and tubers. Some species causing damage in home vegetable gardens include the seed corn maggot, cabbage maggot, onion maggot, carrot rust fly maggot and sugar beet root maggot. These pests attack and damage many

root and cole crops such as cabbage and broccoli.

Several species of cutworms attack the vegetable garden, causing extensive damage. Cutworms are night feeders and are seldom seen during the day. These pests cut off small plants at or near the ground level and feed on the tender stem. Many plants are attacked by cutworms, but they are especially damaging to tomatoes, pepper and corn.

Rootworms are small, slender, whitish larvae that feed on plant roots or bore into the feed on seedling crowns. They are especially damaging to corn but feed on other seedlings too.

Mole crickets are brown and velvety with strong front legs developed for digging. They feed on tubers, roots and underground stems. Occasionally they feed on fruit in contact with the soil. Mole crickets damage peanuts, strawberries, potatoes and many other garden vegetables. Many of these soil insects can be controlled by applications of diazinon liquid or granules before crops are planted.



The
Extension
Way

SEEDING FOR SUCCESS

Use fresh, high quality seed purchased from a local garden center or mail order seed catalog. Seed may be saved from the previous year, but it is not generally recommended because they may not germinate well.

The soil should be moist at planting time, but not too wet. Squeeze together a handful of soil. If it crumbles readily rather than sticking together, proceed with the planting operation.

OVERPOPULATION

Thinning vegetables is one of a gardener's most important follow-up activities. Most gardeners use more seed than necessary for a good plant stand. This is a good idea as some of the seed may not germinate and grow. Those extra seeds will insure enough plants.

Having too many plants in an area is just as bad, if not worse, as too few. The good gardener realizes that plant thinning or removal is necessary to insure a successful garden. He knows a limited amount of plant food exists in the soil, and he must decide whether he wants many unproductive, crowded plants or a few properly spaced, maximum-producing plants. See table on page 12.

Gardeners know they should thin vegetables, yet it's very difficult to destroy the very plants one has worked so hard to grow. To make the job less painful, try a periodic thinning process. For example, if snap beans are to be thinned to 3 to 4 inches between plants, thin the small plants until they are 1½ to 2 inches apart. Then allow the remaining plants to continue growing until they begin to crowd. At that stage, complete the thinning process so plants are the recommended distance apart. This system avoids the necessity of replanting because you initially thinned your plants to 4 inches apart and a cutworm, dog or bird thinned them to 8 to 12 inches apart.

When removing larger plants, use a knife or clippers to cut the stem at ground level. This thins the plant population effectively and does not damage root systems of the remaining vegetables as happens when pulling out unnecessary plants.

Size of mature vegetable plants dictates distance needed between plants. For instance, larger plants such as broccoli, cauliflower, cucumber, eggplant, cantaloupe, okra, squash and tomatoes require 24 inches or more between plants. Smaller vegetable plants such as beans, beets, carrots, lettuce, onions, Southern peas, spinach and turnips require only 2 to 6 inches between plants. Cultural techniques of caging or staking also influence spacing of larger plants.

Most vegetable seeds are planted by dropping the seed into shallow furrows or rows. Make furrows with a hoe handle or the corner of the hoe blade. Measure the distances between the rows with a yard stick. Most vegetable gardens are planted in rows 18 to 36 inches apart.

Plant the seed more thickly than needed in case some do not germinate. Thin later to obtain the proper distance between plants. Cover the seeds and firm the soil lightly using the bottom of the hoe blade. Avoid planting small seeds too deeply. The moisture content of the soil should be sufficient for seed germination. During dry periods, apply additional water to insure germination and a good stand.

When in Doubt Pull It Out

Home vegetable gardens are highly susceptible to high winds, heavy rains and hail from spring thunderstorms. Damage is often widespread, and if it occurs, decisions must be made on whether to leave the damaged plants in the garden or replant.

Some plants such as squash, cucumbers and beans are often heavily damaged. They generally recover slowly, if at all, so it is often best to replant. If there is sufficient room, the least damaged plants can be left while the remainder of the crop is replanted.

Most vegetable seed germinate rapidly once the soil warms, so replanting is often the best alternative. Of course, if transplants are available, several weeks of valuable growing time can be gained.

Often it may be too late to replant lettuce, carrots, cauliflower and other cool-season vegetables. Replant these areas with warm-season crops.

Whether gardeners leave damaged plants to recuperate or whether they decide to replant, the overall delay in home vegetable production usually means closer attention to care and maintenance. Insects become more active as the growing season progresses, so check plants more closely and take control measures as the situation warrants. Also, watering becomes more critical as the growing season enters the hot summer months.

Adversity from weather damage tests the true spirit of the home gardener. It makes gardeners realize that vegetable production has its problems and that all the fresh produce at the supermarket doesn't just happen. Hopefully this brings all home gardeners closer to nature and to living things and instills in them the will to try again.



Raised gardens are attractive and often solve many soil-related problems.

TO MULCH OR NOT TO MULCH

Mulching is simply defined as "any material spread on the garden to protect plant roots from heat, cold or drought; reduce weed problems; and keep fruit clean."

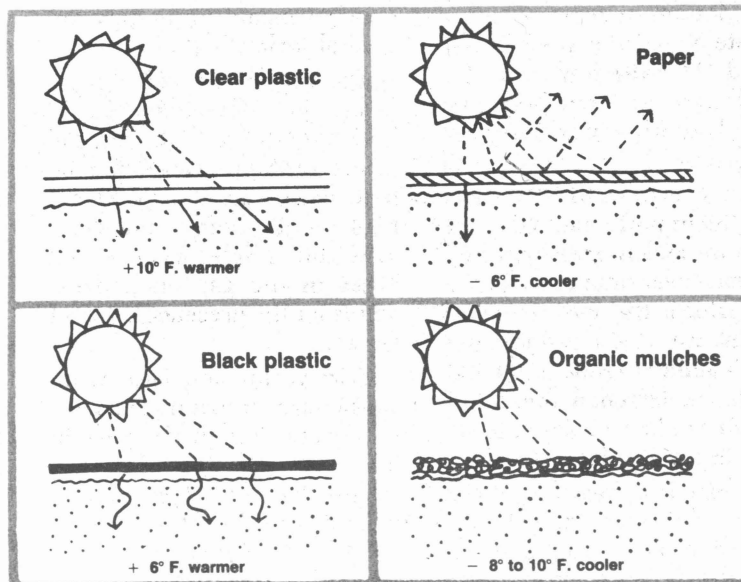
Clear plastic - results in an early warming of the soil. It actually warms the soil more than most other mulches. The problem with using clear plastic as a garden mulch is it stimulates weed seed germination and growth. Clear plastic can be placed over seeded rows to stimulate early germination. Remove the plastic as soon as seedlings emerge. If weeds are not a problem, clear plastic is an excellent mulching material.

Black plastic - results in a warmer soil early in the season and also greatly reduces the weed population (will not control nutgrass). Adequate soil moisture should be available when black plastic is applied. Cut holes through the plastic after it is applied over the bed to allow for seeding or transplanting. Water by using drip systems or water soakers beneath the plastic, furrow watering or sprinkling. If sprinklers are used, it may be necessary to cut T-slits in the plastic to allow water penetration.

Paper - various types of paper are used as mulches, with newspaper by far the most common. Several sheets of newspaper laid flat over the surface of the row works well as a mulch. However, it reduces soil temperature. Paper mulch used early in the spring when soil is cold results in delayed maturity of many vegetables such as tomatoes, peppers,

squash, etc. Use paper to greater advantage by applying after the crops are growing and the soil is warm. This delayed effect is not as great for cool-season, spring-planted crops such as lettuce, broccoli, cabbage, etc. As with the black plastic, apply the paper when the soil contains good moisture. Unlike plastic, the paper deteriorates and does not need removing at the end of the gardening season.

Organic mulches - organic mulches are by far the most common. Benefits of organic mulches occur primarily in the summer by reducing soil temperature and saving soil moisture. Do not use organic mulches too early in the spring. If applied to cold garden soils, the soils warm up slower and maturity is reduced. Also, frost hazards may occur as solar radiation cannot warm the soil and be given off as heat during the night and early morning. Mulches composed of organic matter help prevent soil crusting, control weeds, prevent erosion, lessen fruit rot, save moisture and reduce summer temperatures. After the soil warms, apply organic mulches at a depth of 1 to 2 inches around growing plants. When organic materials are used such as leaves, rice hulls, etc., it usually is necessary to increase the amount of garden fertilizer by about one-fourth to compensate for the nutrients used by micro-organisms during the breakdown process. At the end of the season, turn under the organic mulches to improve the soil's physical condition.



GET IT UP ON A BED

If you have not had much luck with your gardening efforts in the past, your soil may be the problem. Tight, heavy, poorly drained soils are common in many areas of Texas. With good management practices and the addition of liberal amounts of organic matter, many of these soils can be improved to where they raise satisfactory home-grown vegetables. But, if you are interested in a quick, highly productive vegetable garden, consider constructing a raised garden. Raised gardens are often the simplest solution to a difficult soil problem.

Some of the advantages of raised gardens are:

- Yields are increased because the depth of top soil is often increased.
- Raised gardens filled with a good soil or soil mix drain faster and warm up quicker.
- Water usually soaks in rather than running off.
- Soil compaction is generally eliminated or at least reduced.
- Weeds, soil insects and soilborne diseases are lessened since recommended treatments are more effective in raised gardens.

Raised gardens do not necessarily have to be expensive. Frames to help retain the soil can be constructed of railroad ties, bricks, flagstones or other materials. Small raised gardens might be constructed from 2 × 8's or 2 × 10's.

PESTICIDES: Read the Label

When buying a pesticide and again before using it, be sure to read the label carefully.

A pesticide label contains a considerable amount of beneficial information.

It identifies the pest for which the material is effective. Use the pesticide to control only those pests listed.

Rate of material to use is also given. Follow this rate, for if you exceed the recommended rate and problems occur, the company is no longer responsible. Also, you waste material and stand a chance of polluting an area with a chemical.

The pesticide label also lists the interval to use in applying the materials. This may vary with materials but generally it is between 3 and 21 days.

How soon can you eat a crop after a material has been applied? That information is also found on the label. On many labels, special precautions are given such as washing fruit or not spraying past a certain development stage. Follow these warnings closely.

TOMATOES:



Keep 'Em Caged

A proven method of growing tomatoes involves using cages to support the plant rather than staking and pruning.

Cages are nothing more than cylinders made of reinforcing wire, hog wire or similar material to support the plant and keep the fruit off the ground. The cylinder should be 18 to 20 inches in diameter and 2½ to 5 feet tall. Concrete reinforcing wire is generally considered best and is available in rolls of varying lengths, most commonly in 5-foot widths. It takes a 5½-foot length to make a tomato cage 18 inches in diameter. Cages are held together by bending and crimping the ends of the wire around one of the vertical wires.

Place the cages over the tomato plants when they start to bloom and set fruit. One plant inside each cage is recommended. For support, snip off the bottom ring of the cage and push the cage into the ground. It is highly advisable to support the cage with wooden or metal stakes to keep the cage from falling over later in the season.

Plants grow naturally within the cages, and no pruning is necessary.

Cages also protect the plants from cold temperatures or high winds. If the weather looks bad, take a plastic trash bag and put it over the cage. Fasten bags to the cages with common clothespins. The bottom of the bag (top of the cage) can be cut out or left as is. If plants are to be protected for a considerable time, use a light-colored bag open at the top. Close the top of the bag in cold weather. Remove the bags when good weather occurs.

Reports indicate that tomatoes can be grown successfully on the outside of the cages. A larger cage, perhaps 3 to 3½ feet in diameter is used, and four tomato plants are spaced evenly around the cage. Fill the cage with compost and apply water down through the compost, leaching the compost "tea" into the soil around the plants. Apply additional ferti-

lizer to the compost and soil around the plants as needed.

As the plants grow, tie them to the cage for support. Pruning the plants to a single stem is necessary.

To many Texans, gardening means growing tomatoes. This can be a fascinating and rewarding backyard venture, or it can be a very frustrating one. A sickly tomato plant that produces few, if any, fruit certainly does not help anyone's gardening spirit. For gardeners growing tomatoes for the first time, some simple advice might help avoid common pitfalls.

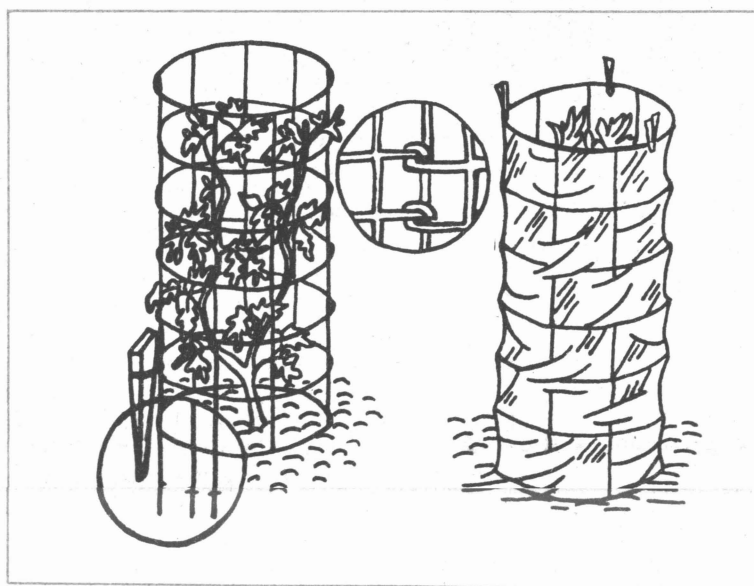
First, gardeners should grow tomatoes only if plants can be placed in an area that receives sunlight at least 6 hours a day. Tomato plants placed between tall shrubs, under trees or between buildings simply won't produce much of a tomato crop.

Secondly, good soil is essential for good growth and high yields. Often poor soil can be improved with liberal amounts of organic matter and proper fertilization. A dark, heavy clay or even a fine sand can be improved by working 3 to 4 inches of organic matter into the soil where tomatoes are to be planted. If only a few tomato plants are to be grown, prepare a space at least 2 feet square for each plant. Work the soil to a depth of at least 12 inches. Mix liberal amounts of organic matter and a small amount of fertilizer such as 10-20-10 or 12-24-12 into the soil.

Variety selection is of utmost

importance and a key to successful tomatoes. Select varieties that resist many common diseases. Spring Giant, Big Set or Bonus or the small-fruited Small Fry are excellent for this area of Texas.

Grow plants at home or purchase at local retail outlets. When buying transplants, check closely for suspicious spots on the leaves, which could be one of many foliage diseases common to tomatoes. Short, stocky, dark green plants are best. An ideal transplant should be just about as tall as it is wide. Avoid tall, spindly transplants that already have blooms or fruit. When trans-



Cages provide plant support and can be covered with plastic for wind and frost protection.



Caged tomato plants do not require pruning, and the ripening fruit is protected from sunburn and bird damage.

BOTTOMS TURNING BLACK?

Nearly every year gardeners become very concerned when they notice the bottoms of their tomatoes turning dark. This is a condition called "blossom-end-rot." Blossom-end-rot is a common occurrence on tomatoes but is also a problem on other crops such as peppers and watermelons. Although it occurs anywhere on the fruit, it generally occurs at the blossom end or bottom. It occurs at almost any time during the fruit's development. It generally begins with small, irregular-shaped, water-soaked areas near the base of the fruit which darken and eventually look leathery. When severe enough, it actually appears to wrinkle and deteriorate as the fruit matures.

Why does blossom-end-rot occur? Researchers are not quite sure of the exact cause but most agree it is associated with a calcium deficiency and excessive water loss. It is certain that no pathogens are associated with its occurrence. Fungus or other types of disease may infect the bottom of the fruit after the occurrence of blossom-end-rot, but these are secondary in nature.

Blossom-end-rot is a "physiological" disorder of tomato fruit. Conditions which favor its occurrence result in water stress of the plant. These could be overly wet soils, soils that are too dry or drying winds which increase water loss from the foliage. Whenever these conditions occur, plants lose more water to the atmosphere through their foliage than is absorbed through their roots. This results in water loss from the plant and the fruit, resulting in a slight dessication of the blossom-end or the bottom of the tomato fruit. These cells die and the blackened area appears.

Visual symptoms associated

with blossom-end-rot often result from conditions that may have occurred several days or even weeks before the symptoms. Therefore, when gardeners begin to worry about the occurrence of blossom-end-rot, the cause may have occurred several weeks before the symptoms were observed.

What can be done about blossom-end-rot? Anything that maintains uniform soil moisture helps. A garden located in a well-drained soil goes a long way toward preventing "BER" that is associated with soggy or over-wet soil. A good mulching program also helps as it reduces water loss from the soil and makes it more available to the plant during dry periods. A uniform and consistent watering program is also vitally important.

One question associated with "BER" that always comes up is whether or not to remove affected fruit from the plant. Some feel that fruit exhibiting blossom-end-rot should be left on the plant. If they are removed, the problem appears on other fruit. Others feel the fruit should be removed because the tissue can decay and serve as a source of fungus disease later. These fruits require nourishment that could be used to produce top quality tomatoes. But by the same token, these fruits are still edible if the affected area is trimmed away and no secondary rot occurs.

What should the gardener do? The consensus among Texas horticulturists is to remove the fruit, allowing for development of first-quality fruit rather than maintaining a fruit with blossom-end-rot. Locate the garden in a well-drained area of the yard, use a good mulching program and maintain sufficient soil moisture for good growth.

King of the Garden



plants are set in the garden, plant them slightly deeper than they were growing originally. Completely cover the peat pots with soil to prevent a wicker effect of the peat and consequent plant death. Do not remove plants from peat pots or peat blocks, but rather plant the entire container. Keep the peat pots moist so roots will penetrate them as the plants grow. Thoroughly water the plants before setting them into the garden.

When setting tomato plants in the garden, use a starter solution to assure adequate fertility during early growth

stages. Purchase starter solutions at local garden centers or make your own by mixing 1 to 1½ level tablespoons of a complete garden fertilizer preferably high in phosphorus in a gallon of water. Apply about 1 cup of the starter solution in the transplant hole before planting.

For best results, set the transplants in the garden on a cloudy day or late in the afternoon. Protect the plants from adverse conditions such as high winds or excessive heat for at least a week after transplanting.

For best results stake, trellis or cage all tomato varieties. Any

method is good if it keeps the fruit off the ground. Fruits that contact the soil often develop fruit rot.

Dust or spray the tomatoes for insects and diseases when necessary. Once the plants start to set fruit, apply small amounts of garden fertilizer periodically to insure continued production.

Harvest the fruits at full maturity. If for some reason tomatoes are harvested before full development of color, do not refrigerate the tomatoes but allow to ripen at room temperature.

TOMATOES — FUN AND FRUSTRATING

There is a lot of satisfaction in harvesting plump red tomatoes from your garden. But nothing is more frustrating than finding a dead plant or even a wilted one.

Many gardeners recall some of those frustrating experiences they had last year. It is a sure bet that many gardeners will experience similar frustrations this year.

What problems can gardeners expect this year? And most of all, what can be done about them?

Here is a checklist of problems, causes and cures:

- *Young plants dying soon after planting.* Cause: Fertilizer burn or soil-borne disease. Cure: Thoroughly mix fertilizer into soil; treat for soilborne diseases and do not over-water.
- *Stunted plants that are pale to yellow.* Causes and cures: Low soil fertility; poor soil drainage (drain and add organic matter); shallow or compacted soil (work soil deeper); insects or diseases (identify and use control measures); and nematodes.
- *Stunted plants with purplish color.* Causes: Low temperature and lack of phosphorus. Cure: Plant at recommended time and add phosphorus fertilizer.

- *Spots, molds, darkened areas on leaves and stems.* Causes and cures: Diseases (identify, spray or dust and use resistant varieties); chemical burn (use recommended chemical at recommended rate); and fertilizer burn (keep fertilizer off plants).
- *Wilting plants.* Causes and cures: Dry soil (water); too much water in soil (drain); nematodes and diseases (use resistant varieties if possible).
- *Weak, spindly plants.* Causes and cures: Too much shade (remove shade or quit gardening); too much rain (hope for sunshine); plants too thick (thin out plants); and too much nitrogen (avoid excessive fertilizer).
- *Failure to set fruit.* Causes and cures: High or low temperatures (follow recommended planting time); too much nitrogen (avoid excessive fertilization); insects (identify and use control measures); and cloudy weather (hope for sunshine).
- *Tomato leaf curl.* Causes and cures: Heavy pruning in hot weather (do not prune in hot weather); and disease or insects (identify and use control measures).
- *Dry brown to black rot on blossom end of tomato.* Cause: Low soil calcium and extremely dry or wet soil. Cure: Add gypsum and water or improve drainage.
- *Misshapen tomatoes (catfacing).* Cause: Cool weather during blooming. Cure: Plant at recommended time.
- *Abnormal leaves and growth.* Causes and cures: 2,4-D weed killer (don't use sprayer that has previously applied 2,4-D and don't allow spray to drift to garden); and virus diseases (remove infected plants to prevent spreading; control insects that transmit).

Spots, Specks and Mold

Tomatoes have a rough time because the foliage is attacked by a number of fungal diseases such as early blight, septoria leafspot and leaf mold. Of these three, septoria leafspot appears to be the most common disease.

Septoria Leafspot

This is one of the most destructive foliage diseases of tomatoes. It may attack tomatoes at any time; however, it generally causes problems after the fruit begins to mature. In checking plants for this disease, look at the older foliage. The fungus is characterized by circular lesions with gray centers surrounded by dark margins. With age, the spots become covered with tiny, black specks from which spores grow. Lesions are smaller and more numerous than the early blight organism. The fruit is rarely affected, but stems and blossoms are attacked. The disease overwinters on old tomato vines and wild relatives of the tomato family. The fungus is most active when temperatures are between 60° and 80° F. and during periods of high humidity. Apply fungicide containing benomyl at recommended intervals to control this disease.

Early Blight

Early blight is a fungal disease of tomatoes that causes early plant defoliation. It reduces fruit size and quality. This fungus is characterized by irregular, brown spots that first appear on older foliage. With age, the spots show concentric rings forming a target pattern. A yellow, diffuse zone is formed around each spot. Although spotting is observed throughout the year, it is most common during the fruiting period. The organism is favored by high humidity and high temperatures. To control apply a maneb fungicide at 7- to 10-day intervals during periods of high humidity.

Leaf Mold

Leaf mold is a disease that previously was a problem mainly in greenhouse tomatoes. It is now a serious problem on many new varieties. First appearing as a whitish spot on the foliage's upper surface, it enlarges and becomes yellow. An olive-

green, velvety coating is formed on the undersurface of the leaf. Symptoms occur on older foliage and can cause severe defoliation. High humidity and temperatures of 65° to 80° F. favor this disease. Maneb is the most effective fungicide for this disease.

Tomato Varieties

A number of high quality tomato varieties are available with resistance to many diseases. Two of the more important diseases are fusarium wilt and root knot nematodes.

Fusarium wilt is a fungal disease that causes wilting followed by rapid death of plants as they reach the fruiting stage. Chemical control is not effective. Use resistant varieties if this disease is to be eliminated.

Root knot nematodes are another serious problem in many Texas gardens. Although fumigation is used, resistant varieties plus fumigation insure the best production. If

tomatoes are the only vegetable to be grown, resistant varieties are sufficient for control. Root knot nematodes form galls or swellings on the root system that stunt tomatoes and make them appear poorly fertilized.

Three important letters follow certain tomato variety names. "VFN" means they are resistant to verticillium wilt, fusarium wilt and root knot nematodes. Examples of VFN tomatoes are Big Set, Bonus and Better Boy. If only "VF" is used, the varieties are resistant to fusarium wilt and verticillium wilt. Spring Giant is an example of a VF tomato.



Healthy plants of recommended varieties are a must for high yields of quality fruit.

WHAT TO DO ABOUT WEEDS

Weeds are a problem in home gardens just as they are in large fields, because they compete with desirable plants for water, soil nutrients, sunlight and air. They also harbor many insects and diseases.

Hand-hoeing is still the best answer for the home gardener. It is inexpensive, quite selective, accurate, effective and, for some, even enjoyable. A great deal of emotional satisfaction comes from leaning on a hoe handle while viewing a clean, freshly hoed row where weeds stood only minutes before. While hoeing, some hand pulling is usually necessary near the base of the plants. Some damage may occur to vegetables if weeds grow large before being pulled. Other alternatives are mulching and using herbicides.

Mulching controls weeds by keeping light away from seedlings and providing a mechanical barrier to emergence. It works best against weeds that come up from seed each year. Weeds that come through the mulch are easily spotted and can be pulled from the moist soil.

Good mulching materials include compost, straw, leaves, hay, wood shavings, bark, paper and plastic sheeting. Black polyethylene film is the most popular synthetic material used. Clear plastic is unsatisfactory because it allows light to enter, encouraging weed growth.

Exercise care to have the soil moist before applying all mul-

ches, particularly plastic sheeting. While straw and leaves may be raked back to feed and water plants, plastic sheeting is fairly permanent once applied. Apply most of the fertilizer before applying the mulch.

Currently, herbicides have limited value in home vegetable gardens. While such chemicals work well in single-crop situations, it is more difficult to use them where a wide assortment of vegetables occupy a small space. Perhaps the best use of a herbicide is a preplanting treatment with an all-purpose chemical such as Vapam®. This can be safely applied to rid soils of nematodes and fungi, as well as most weeds.

Herbicides applied at time of planting or after vegetables have emerged are more difficult to employ and probably should not be used by the average home gardener. Such herbicides may work well with some crops but may damage more sensitive ones. Carefully follow application methods and use only the correct amounts. Although it is possible to use herbicides in the garden by grouping vegetables for tolerance to certain chemicals and diligently following all label precautions, chemical weed control may still be too sophisticated for the average vegetable gardener to use safely. If using a garden herbicide, a product containing dacthal is the safest and most effective.

WHEN TO WATER

In most areas of Texas successful gardening depends on a good source of water. Although gardens can be grown without water, success is enhanced greatly if a water faucet is nearby.

To many folks, one of the most enjoyable aspects of home gardening is watering. It can be quite enjoyable to see a vegetable garden respond to a drink during the heat of midsummer. Even though watering is a great deal of fun, it often is associated with many problems. Poor yields, poor quality, poor fertility, bitter fruit, sunscald, disease problems and a dozen other things can be related to poor and improper watering.

Many home gardeners enjoy watering their garden as a form of relaxation. It is not unusual, therefore, that many home gardens are watered two, three or more times a week. Unfortunately, this is one of the worst things a gardener can do as it results in poor root development and a less than successful home garden. Light, frequent waterings have a tendency to cause a concentration of roots in the top inch or two of garden soil. This underdeveloped root system does not pose any serious problem early in the season when plants are relatively young and sufficient moisture is usually available. As the season progresses and moisture becomes less available, the limited root system needs frequent watering. Consequently, the

home gardener is forced to water several times a week just to keep the plants from severely wilting, resulting in inefficient nutrient uptake and the common occurrence of diseases. To prevent these problems provide adequate early and mid-season watering.

Water the garden by examining the garden soil. Look at the surface, and if it appears dry, scratch the surface to a depth of about an inch to determine if moisture is present. If the soil is relatively dry, watering is necessary. If sufficient moisture is available an inch beneath the soil, wait a couple of days before applying additional water. Also consider the type of garden soil. Obviously, a light, sandy soil that drains well requires more frequent watering than a heavy soil which holds water.

The amount of water to apply is another mystery that confronts home gardeners. Really soak the soil when you water. Determine the amount for each and every garden and apply water until the soil seems well watered. Then dig down and see if the soil is wet to a depth of at least 6 inches. If moisture is available at this depth, adequate moisture has been applied. If, after digging down 3 or 4 inches, the soil is relatively dry, apply additional water. After several times, the gardener learns by experience when adequate water has been applied. Usually an inch or two of water

applied once a week sufficiently waters most vegetable gardens.

Adequate watering at the right time with the right amount is more important than the method used. Most home gardeners prefer the furrow or flood system for applying water; other gardeners prefer the sprinkler. There are advantages and disadvantages to each method. The primary advantage for furrow watering is that individual rows can be watered, whereas this is not generally possible with the sprinkler. The advantage of a sprinkler is that large areas can be watered without moving the hose from row to row or from area to area. One disadvantage of the sprinkler system is that quite often wet foliage leads to disease problems. If the sprinkler system is chosen, water in the morning to allow the foliage to dry before cooler nighttime temperatures. Another method, used primarily in the more arid areas of the state, is drip irrigation, which is a satisfactory method of applying water to home vegetable gardens.

As mentioned earlier, when to water is more important than how the water is applied. Decisions on when and how much water to apply often are reflected in the amount of produce taken from the garden into the kitchen.

Close Encounters

Home gardeners should prepare themselves for close encounters with insects and diseases. When gardening in Texas, one should get ready for an abundance of pests.

These pests fit into two categories — apparent and unnoticed. The apparent category includes those pests that are visible after the initial invasion. They include pill (sow) bugs, tomato hornworms, potato beetles, stinkbugs and powdery mildew fungus.

The unnoticed category includes those sneaky pests which go undetected until they have practically killed precious garden plants. They include spider mites, loopers, nematodes, cutworms and most of the fungus diseases.

This category includes the most dangerous garden pests that are the trickiest to control as action must be taken to prevent annihilation before the damage is visible. If a gardener waits until he sees the pest's damage, any control measure probably will be ineffective.

The cutworm is a good example. Damage from this insect larva results in a plant lying on the ground after the stem has been eaten in two. Obviously, control measures are a bit late after such damage is observed.

DON'T BUG ME!

Insecticides are a valuable tool for the home gardener if used properly. All of them are poisonous and must be handled, used and stored safely. Do not allow children to apply or have access to pesticides. Store them in a locked area and *always* read and follow all directions on the container. *Always* store pesticides in their original container; *never* keep them in pop bottles or similar containers.

Dusts — Dusts control chewing and sucking insects. Apply when the wind is calm, and force the dust through the foliage to reach both sides of the leaves.

Sprays — Sprays are prepared by mixing liquid concentrates or wettable powders with water. Compressed air sprayers, trombone slide sprayers and garden hose attachment sprayers can be used successfully. If wettable powders are used, agitate the solution while spraying to mix the insecticide.

Garden Pests and Control Measures

Leafminers — The adult leafminer is a fly, but the damaging stage is a 1/8-inch long, yellow worm that makes long, slender, winding tunnels in leaves. Because there can be several generations each year, this insect pest can reduce plant vitality through foliage damage. **Control:** Apply diazinon only to the foliage of vegetable plants.

Spider mites — Spider mites are tiny, spiderlike, plant chiggers that feed on undersides of leaves of many garden vegetables and flowers. Most mites are about 1/32 inch long and live and feed in a web they produce on the leaves. They reproduce rapidly and can damage plants in a short time. Inspect plants frequently by examining the underside of leaves with a magnifying glass. **Damage and control:** Leaves appear "stippled" or dotted with yellow, and webbing is usually present on the underside of leaves. Spray plants with Kelthane® with 1 to 2 teaspoons of liquid soap added to the mixture. Repeat spray in 4 days. Sulfur also controls mites but do not apply to vine crops such as cucumbers and cantaloupes.

Aphids — Aphids (plant lice) suck sap from many vegetable plants and usually are found on the underside of leaves and on young stems. Aphids are generally yellow to yellow-green and less than 1/8 inch long. They may be winged, but most are wingless.

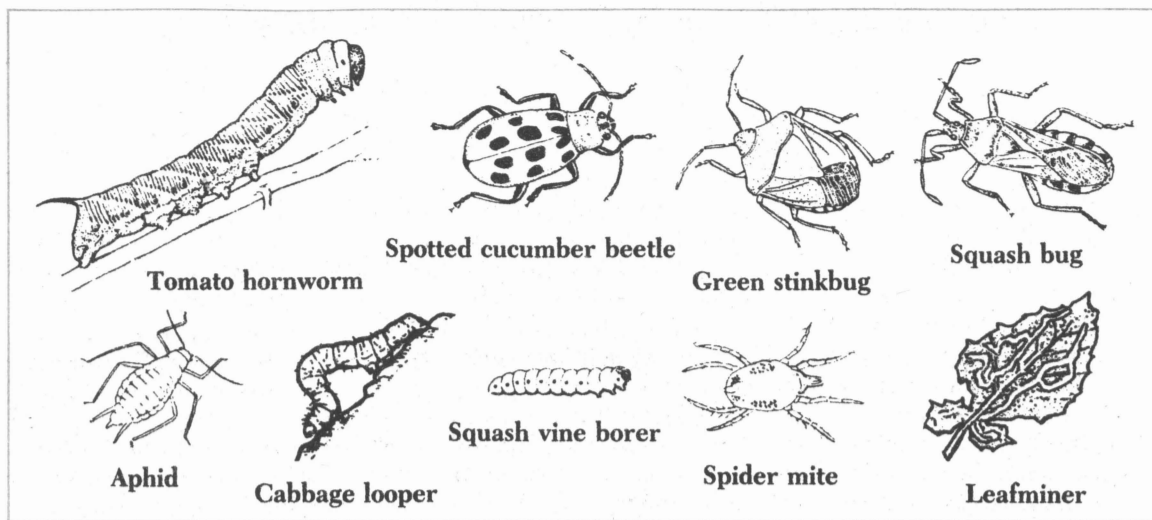
Leaves become dotted with yellow spots and may curl or become distorted. Aphids transmit plant diseases. **Control:** Treat with malathion or diazinon.

Stinkbugs — Stinkbugs may be red and black, gray or dark brown. The long, slender beak is inserted into the plant to suck sap from leaves and stems. Stinkbugs do little damage to okra, but can severely harm squash, tomatoes, potatoes and cabbage when several bugs are present on each plant. Large numbers produce wilting and dieback on tender shoots such as potatoes. **Control:** Apply malathion or Sevin® when adults are first seen on potatoes, squash and cabbage. If possible, hand pick and destroy stinkbugs.

Flea beetles — Flea beetles attack beans, peas, cabbage, eggplants, tomatoes, greens and numerous other crops. Some are striped, others are black, green or brown. These beetles have strong back legs and can jump like a flea. The casual observer may not see flea beetles as they are 1/16 inch and 1/8 inch in length. Flea beetles chew small round holes in leaves and damage plants when abundant. **Control:** Treat with Sevin® or malathion when holes begin appearing in leaves and beetles are present.

Cucumber beetles — Cucumber beetles may be striped, but usually are yellow with black spots. They are about 1/4 inch long and feed on almost all garden vegetables. Larvae (immature stage) feed on the roots. Beetles feed on stems and young leaves after seedlings emerge. They also feed on blooms and fruit such as cucumbers, squash and melons. **Control:** Apply Sevin® or malathion when beetles are damaging plants.

Worms or caterpillars — Worms (caterpillars) come in a variety of colors and shapes, but all damage plants by eating holes in leaves. They feed on tomatoes, cabbage, broccoli, cauliflower, greens and most garden vegetables. Entire plants may be eaten by these caterpillars if they occur in large numbers. **Control:** Control by using Dipel®, Thuricide®, Bio-Spray® or Biological Worm Killer®. These materials contain the bacteria (*Bacillus thuringiensis*) that kills only caterpillars and does not harm beneficial insects. Remember to add 1 to 2 teaspoons of liquid soap per gallon of spray mixture. The soap allows the mixture to spread on the leaf's surface. Good coverage of upper and lower leaf surfaces is necessary for best control.



Identification of Garden Diseases

The following information is a key for identifying the more common garden diseases. It is not designed to identify all problems; however, if you encounter one you cannot identify and it does not fit this key, contact your Extension agent for assistance. Diagnosis is best when plants are less than 50 percent damaged.

Leaves have definite spots, white growth or other abnormal symptoms:

- **Powdery mildew** — Upper side of leaves has white powdery growth; common on English peas, squash, cucumbers and beans.
- **Rust** — Leaves have reddish-brown, raised blisters, not more than 1/8 inch, that deposit a reddish-brown or orange color on white cloth when rubbed across a blister; common on beans and sweet corn.
- **Leaf spots** — Leaves and sometimes stems with distinct dark colored or tan spots 1/16 to 1 inch in diameter; common on most vegetable crops.
- **Virus** — Leaves with mosaic or mottled appearance, leaf distortion, puckering and stunting; fruit may also be affected.
- **Herbicide damage (2,4-D type)** — Leaves and stems twisted, deformed, excessively curled and leather without change in color; leaves may be abnormally long and narrow; leaf veins often are enlarged.
- **Soilborne problems** — Leaves lack above symptoms, but may have yellow to brown color that predominates on leaf margins and between major veins.

Plants (including seedlings) are stunted or wilted, or usually lower leaves turn yellow to brown. Yellowing and browning of leaves begin along leaf margins and in between major veins.

- **Seedling blight** — Seedlings stem rotted near soil line, or roots with obvious spots or rotting.
- **Root knot nematodes** —

Roots have swollen knots or galls and may be lacking feeder roots.

- **Sting or stubby root** — Seedling is stunted and yellow; roots are stunted or mostly absent; some rotting may follow these initial symptoms.
- **Southern blight** — White mold growth on outside of stem at or near the soil line; round, tan to dark brown structures about the size of a cabbage seed present on lower stem with mold growth; outer and inner stem discolored.
- **Fusarium wilt** — Slicing stem of tomatoes, sweet potatoes, watermelon, cabbage, beans or Southern peas lengthwise exposes two brownish streaks originating from roots; lower leaves often yellow; early yellowing of lower leaves on one side of plant only; plants may be wilted.
- **Bacterial wilt of tomato** — Slicing stem of tomato lengthwise exposes a brown inner stem; plants wilted and limp, but remain green; recovery from wilt does not occur during cool periods of the day or by early morning; white streaks of ooze are discharged within 3 minutes when a cut end of stem is held in water.
- **Other root or stem rots** — Lower stem and/or roots discolored without any characteristic structures or features.

The following diseases are possible culprits when fruit, tuber, edible root or edible part of plant is blemished or infected.

- **Soft rot** — Fruit or edible root is soft and slimy; has offensive odor; has wound damage or insect tunnels; no mold growth; common to tomatoes and peppers.
- **Stem anthracnose** — Snap beans and lima beans have brownish-red spots on leaves and pods.
- **Belly rot** — Underside of fruit in contact with soil

has sunken, craterlike spots; at first dry, but later slimy; common on cucumbers and squash.

- **Cottony leak or wet rot** — White or gray mold growing on fruit, also has soft slimy rot; common on cucumbers and squash.
- **Virus** — Fruit has alternating areas of greens and yellows; warts present.
- **Sunscald** — Side of pepper or tomato fruit facing sun with white or yellow wrinkled area; often entire side of fruit affected.
- **Blossom end rot** — Bloom end of tomatoes or peppers has sunken, dark areas.

At some time gardeners must spray or apply a pesticide to their vegetable plants to protect them.

Some gardeners make costly mistakes. These may range from plant damage caused by too much or too little spray material being applied, as well as subsequent damage from insects and disease. Improper care and replacement of spray equipment are also costly. Various kinds of sprayers are available, and it is important to know the proper maintenance.

Decide what kind of sprayer is needed. Garden size, location and layout and intended use of the sprayer influence the decision. Probably the main types of sprayers used are the compressed air and the hose-on. The compressed air sprayer is a mobile, self-contained unit that is pressurized by periodic pumping. These come in various gallon capacities and have either galvanized or longer-lasting stainless steel tanks. The hose-on sprayer is, as indicated, attached to the hose from which it receives its spray pressure.

Advantages and disadvantages of each sprayer type are easily identified by examining the physical nature of each.

PREVENT THE PROBLEM

Fungus and bacterial diseases cause more damage to Texas vegetable crops than any other pest. Plant diseases are difficult to detect before irreversible damage occurs. For this reason, use preventive spray applications to protect plants during periods of likely infection.

Most fungicides are not as toxic to man and animals as insecticides are. However, use extreme caution when applying any fungicide around fish ponds. If fish are in the area, cover the ponds thoroughly before applying.

Although gardeners may not know the technical names of the fungus and bacteria which destroy garden plants, they are painfully aware of the damage. Yellowing and death of tomato and potato foliage from the bottom of the plant occur in most spring growing seasons during wet, humid weather. This condition can be caused by several fungus leaf spot diseases. Fungicides, used to control vegetable diseases other than powdery mildew, are maneb, zineb, captan and folpet.

Generally use these at a rate of 1 1/2 tablespoons per gallon of water. Because of different formulations, read the label thoroughly to assure effective treatments. Begin applications when the plants show the first sign of disease and repeat at 7- to 10-day intervals. During periods of high humidity and

mild temperatures (75° to 90° F.), apply fungicides every 7 days.

When extreme temperatures (high or low) and low humidity occur, extend the interval to the longer period, or in some cases, discontinue until environmental conditions are more favorable for disease development.

Because of the various formulations available, always read the label to see that the crops to be treated and specific rates are given.

Powdery mildew, another group of diseases occurring on vegetables, is characterized by talcum white powder on the older foliage during hot weather. Members of the cucurbit family (cucumber, cantaloupe and squash) are especially susceptible. Compounds listed earlier do not effectively control powdery mildew; however, Karathane®, benomyl and folpet are effective. Folpet is less effective for controlling powdery mildew and fungal leaf spots than other materials.

Bactericides used in the home garden are limited to only a few compounds. Most compounds have a copper base, such as bordeaux mixture and copper oleate.

Read all labels thoroughly to make sure you are getting the correct ingredient and are using it properly.

EQUIPMENT FOR DEFENSE

Compressed air sprayers are completely portable. The sprayer's portability and proper application to the plants are directly proportionate to the strength of the gardener. In other words, a 5-gallon sprayer is heavy, and unless you are physically able, do not try it. If your garden is small, a 2-gallon sprayer is lighter and easier to handle. With smaller sprayers, the gardener can mix exactly the amount of pesticide needed and not waste or over-spray plants with extra mix.

Care of the compressed air sprayer is most important. Rinse the sprayer, tank, nozzle and hose after each use to avoid clogging. Store the compressed air sprayer bottom-side up with hose drained. This prevents water from settling and pooling in the bottom of the sprayer after rinsing. Improper storage can cause rusting in the tank that may flake and clog the nozzle. If you can afford stainless steel tanks, they will last much longer than the regular galvanized ones.

The hose-on sprayer is used and abused by many people. It is popular because it is light and does not need repressurizing by periodic pumping. Problems arise in mixing ingre-

dients, portability and calibration. Hose-on sprayers operate on the principle of siphoning a concentrated spray material and mixing this material with a stream of hose water. Problems can occur in siphoning and mixing the concentrated spray material. To be siphoned, it must be liquid, yet many insecticides and fungicides are in a wettable powder form. This powder can be suspended in water, but sometimes thorough mixing is a problem. Because the hose-on sprayer siphons suspensions rather than large particles, premix wettable powder pesticides in a small bowl. This insures that all large particles are broken up and will not clog the siphon hose.

Also remember you are mixing a concentrate spray for a hose-on sprayer. If the jar says 6 gallons, put enough concentrate material in the small sprayer jar to be siphoned and diluted into 6 gallons. Calibrate it periodically by using a gallon capacity container, filling the hose-on sprayer to the gallon mark and then spraying into the container. Theoretically, the sprayer should be empty when the container is full. If it is not, you may be putting out too much or too little spray material.

QUESTIONS AND ANSWERS

Q. — I have a garden full of flowering onions. What did I do wrong?

A. — You didn't do a thing wrong. Mother Nature's cold temperatures on onion plants, which were too large when exposed to cold, caused bolting or flowering. Flower stalks do not severely damage onions except in reducing their storage capacity. Bolted or flowering onion bulbs are generally smaller, too. Use the flowering onions in salads or use the bulbs as soon as possible after harvest.



Q. — We planted Irish potatoes in our garden this year. The bushes are large, but now the leaves have tiny black specks on them, and the plants look yellowish. What should we do? Also, when do we harvest?

A. — The black specks and yellowish plants are caused by a fungus disease called early blight. Use maneb, zineb or captan to prevent the spread of this foliage killer. Cracking ground under plants indicates large potatoes are present. Dig these carefully and leave the plant growing so smaller potatoes will grow larger. Harvest and use as many potatoes as possible before hot weather, as potatoes are hard to store during summer months.

Q. — What does the term "hybrid" mean when referring to vegetables, and why shouldn't we save seed from hybrid tomatoes, peppers, eggplants, etc.?

A. — The definition of a hybrid is "the offspring of plants of different genotypes, varieties, species or genera." Hybrid seed or plants, which you purchase, are the result of a controlled (both parents and parent characteristics known) crossbreeding process. The control-

led cross yields seed that produce plants with certain desirable characteristics such as disease resistance, nematode resistance, large fruit, small plant and/or firm fruit. Seed produced by the fruit of a hybrid plant may or may not possess the number and degree of desirable characteristics of the hybrid. Purchasing new seed or new plants each year insures that desirable characteristics are present.

Q. — My family has been enjoying our fireplace during the cold weather, and we have an abundance of wood ashes. I have been scattering them around our fruit trees and in my garden, but I am worried that I may have used too much. How much should I use?

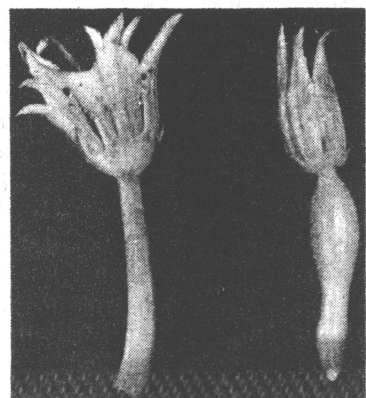
A. — Wood ashes contain very small amounts of mineral elements and are very alkaline. In many areas, alkaline soil is already a problem and does not need help in becoming more alkaline. Applying small amounts of wood ashes is not harmful to acid soils, but avoid excesses.

Q. — Leaves of some of my tomato plants are curling. What can I do?

A. — Tomato leaf curl can be caused by sucking insects, nematodes on the roots, plant stress, high nitrogen fertilization or variety. Plant stress is lack of water caused by a malfunctioning, diseased root system or poor watering habits and lack of adequate mulch. Sucking insects are easily seen unless the illusive spider mite is involved. Detect nematodes by examining roots for swellings or knots. Certain varieties are also notorious for leaf curling.

Q. — Each year my squash blooms profusely, but seldom produces any squash to eat. What is wrong?

A. — Squash plants produce both male and female



blooms. For fruit set to occur, pollen must be transferred from the male to the female bloom. Pollinating insects, mostly bees, carry out this important job with the result being fresh squash for the kitchen. When treating the garden for insects and diseases, spray and dust during the late afternoon to avoid killing the bees.

Q. — Are the dead grass clippings that I am getting from dethatching the lawn good for mulching my garden?

A. — Yes, but be sure they are dead. Otherwise, you will be sprigging your garden with grass. This makes an excellent mulching material; because this grass is in small, chopped pieces, it breaks down easier. As with all organic mulches which decompose, remember to add additional nitrogen fertilizer or manure to feed those fungi responsible for decomposition. Otherwise, they rob your soil and vegetables suffer.

Q. — What is a good way to keep seed left from this year's garden?

A. — Leave seed in original packets or labeled envelopes and place in an "air-tight" container such as a wide-mouthed jar. For long-term storage, securely wrap 2 tablespoons of powdered milk in tissue paper and place in the bottom of the jar. Powdered milk acts as a desiccant and lengthens storage "life" of garden seed. Place the jar in the refrigerator until next gardening season.

Q. — My eggplant has done a peculiar thing. During its early production, the fruit was delicious. Now the fruit we harvest is bitter and has brown areas on the fruit. Is this a fungus?

A. — You are not having fungus problems, but Mother Nature is giving you a bit of trouble. Bitter fruit is caused by plant stress and subsequent slow growth stimulated by hot, dry summer conditions. The brown area is caused by sun scalding of the fruit. If the scalding is not too severe, remove it and eat the eggplant.

Q. — My cucumber is going crazy! I think it has crossed with a nearby squa'sh because the

cucumbers which I am harvesting are round rather than long as they were earlier in the season. The plants also have a white, powdery substance on their leaves. Am I having a sex problem as well as talcumed cucumber leaves?

A. — You have problems but not sexual in nature. Round cucumbers are caused by improper pollination and fertilization of the small fruit. This occurs during hot weather because of poor pollen viability. The white powder on cucumber and squash leaves is a fungus called powdery mildew. It occurs on older leaves and can be controlled by using a benomyl (systemic fungicide) fungicide every 10 to 14 days. Foliage and plants infected with powdery mildew are probably past their most productive period and should be removed.

Q. — The skins on my tomato fruit are much tougher than they were earlier in the season. The tomatoes are ripening when they are smaller in size, also, even though I am watering and side dressing with fertilizer. What is the problem?

A. — One fellow says tomato skins get tougher to repel insects. If that were the case, they would be tough all year! Regardless of how well you water, mulch and fertilize, hot weather stresses tomato plants. The stress of rapid plant transpiration causes cracking fruit, blossom-end-rot and tough skins.

Q. — My tomato fruit have small yellow specks on the surface. When peeled, these yellow specks form a tough spot which must be cut off before eating the tomatoes. I also have large translucent areas on my tomato fruit. What's going on? Is this a variety flaw?

A. — Your problem is not a varietal one but rather one of an insect and environmental origin. The yellow speckling is caused by sucking stinkbugs and/or water fluctuations. The translucent areas are sun scalds. Heat destroys the color pigments of the tomato when exposed to direct, intense sunlight. This damage does not make the tomato inedible.

Q. — Is it true that organically grown vegetables are better and more nutritious?

A. — Contrary to popular belief, research shows no nutritional advantage of organically fertilized vegetables over those grown with chemical fertilizers. The same plant nutrients supplied by chemical fertilizers are derived from organic fertilizer, and these nutrients must be in an ionic form before they can be absorbed by the roots. With an equal amount furnished from either type of fertilizer, the nutritional composition of the produce is the same. The wonderful flavor from garden vegetables is also the same. This fine flavor is mainly due to freshness and a mature harvest.

Q. — I have heard many people talk about washing frost off plant leaves to protect them. Is this a good technique?

A. — You answer this question. Take a glass, put it in the freezer for several hours, immediately fill with hot water and you will have your answer. Do not do this experiment with your favorite glass because it will not be usable afterwards. It will shatter exactly as frozen plant cells do when warm faucet water strikes them. The best way to prevent cell damage after a light freeze is to attempt to slow-thaw these cells. This is accomplished by covering plants with a sheet or blanket to shield them from the warming sun rays, which do the same harm as warm water. This technique also works on certain ornamentals such as petunias.

Q. — What is the best way to determine when a cantaloupe is ready for harvest?

A. — This is probably one of the easiest questions to answer since the cantaloupe itself tells you when it is ready to harvest. It is ready to harvest when the stem reaches the "slip" stage. Slip means that the stem easily separates from the fruit. When a cantaloupe is thoroughly ripe, the stem automatically slips. To avoid over-ripening, harvest cantaloupes before they separate from the vine. The best way to check cantaloupe matur-

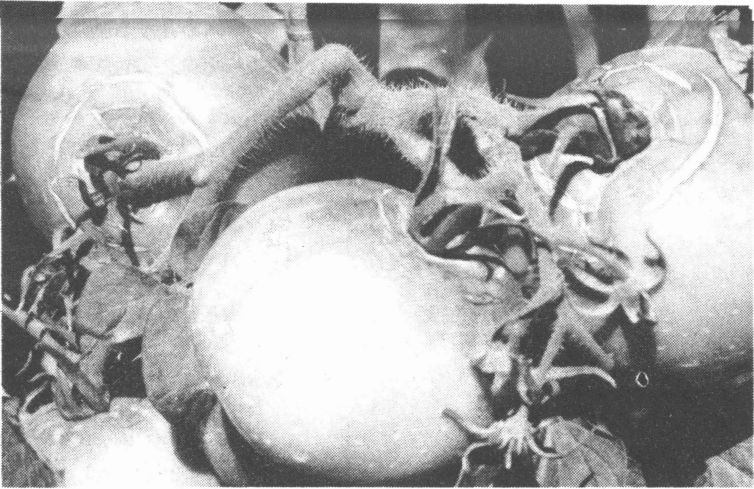
QUESTIONS AND ANSWERS

ity is to place your thumb beside the stem and apply pressure gently to the side. If the stem separates easily, the cantaloupe is ripe.

Q. — Most of the time my yellow squash is tough or has hard seed in the middle. What is wrong?

A. — Squash is one of those crops which matures very rapidly requiring only 5 to 7 days from flowering to maturity in hot weather. The key to high quality is timely harvest, every other day in hot weather. Good yellow summer squash should be about 1½ to 2 inches in diameter at the base and pale yellow in color. Dark yellow or yellow-orange squash with a firm rind is over mature. Remove it from the plant and discard. If over-mature fruits are not removed, the plant stops yielding.

Q. — It is discouraging to go to the garden and see large tomatoes practically ruined by cracking. What causes a tomato to crack and is there anything I can do to prevent it?



A. — Cracking is a physiological disorder caused by soil moisture fluctuations. When the tomato reaches the mature green stage and the water supply is reduced or cut off, the tomato begins to ripen. At this time a cellophane-like wrapper around the outer surface of the tomato becomes thicker and more rigid to protect the tomato during and after harvest.

If the water supply is restored after the ripening process begins, the plant resumes translocation of nutrients and moisture into the fruit. This causes the fruit to enlarge, which splits the wrapper around the fruit, and results in the cracking you observe.

The single best control

for cracking is to supply constant and regular water. It is helpful to apply a thick layer of organic mulch to the base of the plant. This serves as a buffer and helps prevent soil moisture fluctuation. Water your plants thoroughly every week. This is especially important when fruits are maturing. Some varieties are resistant to cracking, but unfortunately, their yield and quality are generally less than other varieties.

Q. — I planted sweet potatoes this year for the first time; how can I tell when they are ready for harvest?

A. — Sweet potatoes are ready for harvest when the fleshy roots reach the size you prefer. The only way to determine if roots have reached the proper size is to dig a few and check to see if they are as large as you like. Sweet potatoes generally are ready for harvest during September and October. Harvest them before the first freeze to prevent chilling injury to the roots.



seed for his breeding program.

Q. — What is this vegetable advertised as a "topato?"

A. — The word "topato" is a patented name used for a tomato plant and potato plant growing in very close proximity. Many home gardeners who read the ads conclude that one advertised plant would produce potatoes on the root and tomatoes on the branches. When the home gardener orders a topato, he gets a potato seed piece which has been holed out. This potato shell is filled with planting medium or a type of soil substitute. A packet of tomato seed is also included with the potato shells.

The idea is to plant a tomato seed in the center of a potato shell. Then, plant the shell in the garden soil. The idea being that the potato plant would produce tubers, and the tomato plant would yield tomato fruits. Provided both the potato seed piece and the tomato seeds germinate and produce, this works although obviously the tomato plant produces tomatoes and the potato plant produces potatoes.

Q. — I transplanted some squash and okra, which I purchased at a local nursery. It is stunted looking and just sitting there. What should I do?

A. — Please do not waste your garden dollars! Always plant crops such as beans, beets, cantaloupes, carrots, chard, collards, corn, cucumbers, kale, mustard, okra, peas, radishes, spinach, squash, turnips,

and watermelons from seeds. These plants are very difficult to transplant and are not worth the time, bother and expense of transplanting. In spring, transplant slower-maturing crops such as broccoli, cabbages, eggplants, onions, peppers, sweet potatoes and tomatoes to beat the hot temperatures. In the fall some of these can be seeded directly into the garden area.

Q. — Can you tell me why many of the ears of corn I grew in my garden are underdeveloped at the tip end?

A. — This condition is quite common not only in gardens but also in large commercial plantings. Several explanations have been given for the cause of this condition such as a nutrient deficiency, loss of foliage from disease with a correspondingly lower food-manufacturing capacity, cool temperatures during ear maturity periods and low moisture and drought conditions.

Corn is pollinated by windblown pollen from the male flowers or tassels at the top of the plant being transferred to the female flowers or silks about midway up the stalks. Each kernel develops from one pollinated silk. Silks develop first near the middle and base of the ear; those at the tip develop last. When unfavorable conditions occur, such as those mentioned, kernels pollinated first take precedent over those pollinated last. This often results in failure of the kernels near the tip to develop properly.

Q. — I want to grow a few rows of sweet potatoes in my garden. How do I get seed or plants?

A. — Sweet potatoes are started vegetatively from transplants or vine cuttings rather than from seeds. Transplants, which are also called slips, usually grow from bedded roots. A vine cutting is obtained by cutting off a 10- to 12-inch section of a vine growing in the field. Purchase slips or transplants from local garden supply stores or from other outlets dealing in certified, disease-free potato slips.

Q. — About the time my tomato fruits start to ripen and turn red, I lose at least half my crop from bird damage. What can be done to prevent this problem?

A. — Bird damage is common in all areas of Texas and gardeners will try almost anything to reduce or eliminate the problem. Scarecrows, aluminum strips, tin foil plates and various types of noisemakers work for a while until local birds become accustomed to seeing these objects or hearing the noises. One method that works quite well is to take old nylon stockings and cut them into pieces 10 to 12 inches long. Tie a knot in one end of the stocking and slip the open end over the entire cluster of tomatoes. Secure the end above the tomato cluster with a rubber band or twisty. Birds are not able to peck through the nylon stocking and your ripening tomatoes are protected. Slip the stocking off the cluster and harvest the ripe fruit; then replace it to protect later ripening fruit.

Q. — What insects will marigolds repel from my garden?

A. — Marigolds do not actually repel or prevent insect damage from adjacently grown plants. They probably get this reputation because of their supposed relationship with nematodes. This flowering plant is not a host for the root knot nematodes, one of the most serious pests encountered in gardening. It is a preferred host for one of the most destructive garden insects, the spider mite. Planting marigolds in a home garden is an invitation to almost sure disaster. The spider mite is one of the most difficult garden insects to control and can become almost as serious a problem as nematodes. Planting

marigolds in the garden does not control nematodes but insures a chance of spider mite problems.

Q. — I have planted squash and cucumbers in my garden. Do I need to worry about cross-pollination and resulting off-type fruits?

A. — Odd tasting fruit from vine crops are often believed to result from crossing plants such as cucumbers, cantaloupe and squash. In general, these crops will not cross-pollinate. Even if they do, the results of this cross do not show up until seeds from this year's fruit are planted in next year's garden. Do not save seeds from vining crops for next year's garden. Be assured that planting cucumbers along with squash in your garden will not result in off-flavor fruit.

Q. — My tomato plants look great. They are dark green, vigorous and healthy. However, flowers are not forming any fruit. What is the problem?

A. — Several conditions cause tomatoes to fail to set fruit. Too much nitrogen fertilizer, high nighttime temperatures (above 70° F.), low temperatures (below 50° F.), irregular watering, insects such as flower thrips and planting the wrong variety may result in poor fruit set. Anyone of these can cause poor fruit set, but combinations are even more damaging.

Q. — What could be causing the leaves of my garden vegetable plants such as tomatoes to turn brown along the edges?

A. — Leaf burn or scorch generally indicates some form of root injury in many home gardens caused by heavy amounts of fertilizer applied too near plant roots. This injury often results in browning and die back of the ends and margins of the leaves. Other possible causes are root injury from nematodes, insects or physical injury from wind or cultivation. Also, over-watering or under-watering along with various types of diseases might cause leaf-tip burn.

Q. — Why are some beans able to climb and others are not?

A. — Pole type beans are characterized by what is called an "indeterminant" or vining growth habit, whereas, bush bean varieties are "determinant" in habit. In the vining type, flowers form in the axles of the leaves and stem, thus the stem continues to grow longer, more or less indefinitely. In the determinant-type growth, the main growing point terminates in a flower cluster thus preventing further stem elongation. Beans that climb do so by virtue of their twining stems. Absence of tendrils or tendril leaves in beans helps distinguish beans from peas. Pole

beans do not have the ability to climb until they are well along in their growth.

Q. — How important is variety selection when canning and freezing vegetables such as tomatoes, cucumbers, beans, etc.?

A. — If you intend to make pickles, grow pickles. If you intend to grow cucumbers for salads, then grow slicing cucumbers. Tomatoes for canning are basically the same as those for fresh consumption. A lot of questions have been asked regarding the acidity of tomato varieties but investigations by the USDA indicate very lit-

tle difference exists in the acid level of tomato varieties. Flavor differences of varieties that many gardeners call "low acid" are due to high sugar levels and not low acid levels. Determine variety selection by yielding ability, adaptation to your area and insect and disease resistance.

Q. — Why did my lettuce taste so bitter and start to grow tall so quickly? We did not get more than two harvests and lost the rest. What happened?

A. — Most home garden lettuce, especially the Bibb variety, goes to seed quickly in high tempera-

ture, long-day conditions. It quickly develops a bitter flavor in this kind of weather unless irrigated every few days. Buttercrunch, Salad-bowl, Ruby and Romaine tolerate more of these adversities than other varieties and remain sweet and tender longer. Try planting these next season for your summer lettuce.

Q. — Should tomato plants be staked, caged or left unsupported?

A. — There is no doubt that tomatoes grown in Texas should be supported in some manner. Whether you cage or stake them is a matter of personal preference. Regardless of the method used, plants with foliage and fruit supported off the ground will out-produce unsupported plants. Caging has several advantages and involves much less work than staking. Once the cage is placed over the plant, no further manipulation of the plant is necessary. The fruit are simply harvested as they ripen. Staking and pruning a plant to a single or multiple stem often results in sunburn when developing fruit is exposed to excessive sunlight. Other advantages of caging over staking include protection of fruit from bird damage by more dense foliage cover and less fruit rot because fruit does not contact the soil.

Q. — I used potatoes purchased at the grocery store as seed for planting, and they rotted without ever sprouting. Why?

A. — Many potatoes sold for fresh market consumption have been treated with chemicals to prevent sprouting in storage. These chemicals also prevent sprouting after planting. Another possibility is that the potatoes you purchased in the store were from this year's crop and had not been stored properly to break the rest period. Potatoes have a rest period that must be broken before the seed will sprout. Cool temperatures or extremely hot temperatures break the rest period and allow potato seed to sprout. Next time, plant certified seed that have been properly stored to induce sprouting.

QUESTIONS AND ANSWERS

PLANTING AND THINNING GUIDE

Vegetables	Seed or plants per 100 feet	Depth of seed planting in inches	Inches of distance between	
			Rows	Plants
Asparagus	66 pl, 1 oz	6-8, 1-1½	36-48	18
Beans, snap bush	½ lb	1-1½	24-36	3-4
Beans, snap pole	½ lb	1-1½	36-48	4-6
Beans, Lima bush	½ lb	1-1½	30-36	3-4
Beans, Lima pole	¼ lb	1-1½	36-48	12-18
Beets	1 oz	1	14-24	2
Broccoli	¼ oz	½	24-36	14-24
Brussels sprouts	¼ oz	½	24-36	14-24
Cabbage	¼ oz	½	24-36	14-24
Cabbage, Chinese	¼ oz	½	18-30	8-12
Carrot	½ oz	½	14-24	2
Cauliflower	¼ oz	½	24-36	14-24
Chard, Swiss	2 oz	1	18-30	6
Collard (kale)	¼ oz	½	18-36	8-16
Corn, sweet	3-4 oz	1-2	24-36	12-18
Cucumber	½ oz	½	48-72	24-48
Eggplant	½ oz	½	24-36	18-24
Garlic	1 lb	1-2	14-24	2-4
Kohlrabi	¼ oz	½	14-24	4-6
Lettuce	¼ oz	½	14-24	2-3
Muskmelon (cantaloupe)	½ oz	1	60-96	24-36
Mustard	¼ oz	½	14-24	6-12
Okra	2 oz	1	36-42	24
Onion (plants)	400-600 pl	1-2	14-24	2-3
Onion (seed)	1 oz	½	14-24	2-3
Parsley	¼ oz	½	14-24	2-4
Peas, English	1 lb	2-3	18-36	1
Peas, Southern	½ lb	2-3	24-36	4-6
Pepper	½ oz	½	24-36	18-24
Potato, Irish	6-10 lb	4	30-36	10-15
Potato, sweet	75-100 pl	3-5	36-48	12-16
Pumpkin	½ oz	1-2	60-96	36-48
Radish	1 oz	½	14-24	1
Spinach	1 oz	½	14-24	3-4
Squash, summer	1 oz	1-2	36-60	18-36
Squash, winter	½ oz	1-2	60-96	24-48
Tomato	50 pl, ½ oz	4-6, ½	24-48	18-36
Turnip, greens	½ oz	½	14-24	2-3
Turnip, roots	½ oz	½	14-24	2-3
Watermelon	1 oz	1-2	72-96	36-72

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