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Growing Fall Vegetables & Annuals in South Central Texas

TEXAS AGRICULTURAL EXTENSION SERVICE
THE TEXAS A&M UNIVERSITY SYSTEM
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Gardening regions for South Central Texas

CONTENTS

Introduction	3	Insects	12
Timing	3	Disease Prevention	14
Planning a Fall Flower and Vegetable Garden	5	Harvest for Highest Quality	15
Soil Preparation and Fertilization	6	Store Those "Extra" Vegetables	16
Vegetable Variety Selection	7	Preserving Your Vegetables	17
Establishing Vegetables in Summer Heat	8	Micro-Gardens for Mini-Places	18
Watering	9	Compost Pile Valuable	19
Strawberries	10	Emergency Procedure	20
Grow Spring-Flowering Bulbs	12	Problems in a Fall Garden	21

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GROWING FALL VEGETABLES AND ANNUALS IN SOUTH CENTRAL TEXAS

INTRODUCTION

Although it is the middle of the summer, now is the time to start getting things in shape for a fall flower and vegetable garden.

In this area of Texas, gardening can continue the year-round. It is always a tough decision to decide whether to terminate spring-planted vegetables or to try carrying them through until the first frost. In the northern areas of Texas many spring-planted crops such as tomatoes, eggplants and peppers can be grown until the first killing frost, provided the plants remain healthy. In the southern areas of the state, home gardeners should begin fall gardens anew rather than trying to carry spring-planted crops through the summer. During early fall, also plant flowering annuals which bloom in late fall, withstand winter temperatures and bloom again next spring. This means preparing the soil and getting transplants started as soon as possible. Most gardeners overlook the fact that the best time to plant many flowers and vegetables is during the late summer and early fall months.

TIMING

Proper timing is probably the most important factor in successful fall 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, one must know the average first frost date. November 20 is the average first frost date for the area south of a line from Del Rio to Uvalde, San Antonio,

Austin and Beaumont. This is referred to as Region II. North of this line is Region I with a first frost date of late October. Gardeners south of a line from Eagle Pass to Pearsall, Pleasanton and Victoria in Region III should enjoy frostless days until early December.

Remember these are "average" first frost dates for each region. "Average" means that frost can occur earlier, but, hopefully, it will be much later.

With these frost dates in mind, a gardener can decide which frost-susceptible vegetables to plant, when to plant and whether to use transplants or seeds. All flowering annuals recommended for fall planting are frost-tolerant and should be transplanted.

For instance, if a grower in Region I or II decides on July 12 that he wants tomatoes in a fall vegetable garden, he *must* use transplants. A gardener in Region III has a longer growing period, so he could plant tomato seeds directly into the garden area and still produce an abundance of fall tomatoes before frost.

Region I has earlier frosts and colder winters. For this reason certain annual flowers such as petunias should not be transplanted in the fall because of winter damage.

The following chart indicates regional dates during which vegetable plants can be grown directly from seeds sown in the garden area. If one decides to plant a certain crop which the chart indicates is too late to seed directly into the garden area in a specific region, then transplants *must* be used. The chart insures success *only* if recommended, fast-maturing varieties are used. Establish recommended annual flowers from transplants at recommended dates.

DIRECT SEEDING CHART

Vegetables	Hill Country and Region I	San Antonio and Region II	Laredo and Region III
Beans, snap bush	Aug. 1-Aug. 30	Aug. 13-Sept. 10	Aug. 13-Sept. 30
Beans, Lima bush	Aug. 1-Aug. 20	Aug. 13-Aug. 28	Aug. 20-Sept. 10
Beets	Aug. 15-Sept. 30	Sept. 1-Oct. 15	Sept. 15-Oct. 30
Broccoli	Aug. 1-Aug. 30	Aug. 20-Sept. 10	Sept. 1-Sept. 30
Brussels sprouts	Aug. 1-Aug. 30	Aug. 20-Sept. 10	Sept. 1-Sept. 30
Cabbage	July 1-Sept. 1	July 10-Sept. 10	Aug. 1-Oct. 1
Carrots	Aug. 1-Sept. 15	Aug. 20-Oct. 10	Sept. 15-Nov. 10
Cauliflower	July 30-Aug. 10	Aug. 11-Aug. 30	Sept. 1-Sept. 20
Chard, Swiss	Aug. 1-Sept. 1	Aug. 20-Sept. 30	Sept. 1-Oct. 20
Collards	Aug. 1-Aug. 30	Aug. 20-Sept. 10	Sept. 1-Oct. 20
Corn, sweet	July 30-Aug. 10	Aug. 13-Aug. 23	Sept. 1-Sept. 20
Cucumber	July 30-Aug. 30	Aug. 13-Sept. 10	Sept. 1-Oct. 1
Eggplant	June 1	July 1	July 15
Garlic (cloves)	July-August	August-September	September-October
Kohlrabi	Aug. 1-Aug. 30	Aug. 20-Sept. 10	Sept. 1-Oct. 1
Lettuce (leaf)	Aug. 1-Sept. 30	Aug. 20-Oct. 10	Sept. 1-Nov. 10
Mustard	Aug. 1-Sept. 30	Aug. 20-Oct. 10	Sept. 1-Nov. 1
Onion (seed)	not recommended	Oct. 15-Nov. 15	Nov. 15-Dec. 1
Parsley	Aug. 1-Sept. 30	Aug. 20-Oct. 10	Sept. 1-Nov. 1
Peas, southern	Aug. 1-Aug. 30	Aug. 13-Sept. 10	Sept. 1-Oct. 1
Pepper	June 1	July 1	July 15
Potato, Irish	Aug. 1-Aug. 30	Aug. 20-Sept. 10	Sept. 1-Oct. 1
Pumpkin	June 10-June 30	July 10-Aug. 1	Aug. 1-Sept. 1
Radish	Aug. 1-Nov. 1	Aug. 13-Nov. 25	Aug. 30-Dec. 1
Spinach	Aug. 15-Sept. 30	Sept. 1-Oct. 15	Sept. 15-Dec. 1
Squash, summer	July 30-Aug. 30	Aug. 13-Sept. 10	Sept. 1-Oct. 1
Squash, winter	July 1-July 30	July 10-Aug. 10	Aug. 1-Sept. 1
Tomato	June 1	July 1	July 15
Turnip	Aug. 1-Oct. 20	Aug. 13-Nov. 1	Aug. 20-Dec. 1
Annual Flowers	(transplant only)		
Alyssum	Sept. - Nov.	Sept. - Dec.	Oct. - Dec.
Asters	Sept. - Dec.	Sept. - Dec.	Oct. - Dec.
Calendula	Sept. - Dec.	Sept. - Dec.	Oct. - Dec.
Dianthus (Pinks)	Sept. - Dec.	Sept. - Dec.	Oct. - Dec.
Flowering cabbage and kale	Oct. - Nov.	Oct. - Dec.	Oct. - Dec.
Pansies	Oct. - Nov.	Oct. - Dec.	Oct. - Dec.
Petunias	not recommended	Sept. - Nov.	Oct. - Dec.
Phlox	Sept. - Nov.	Sept. - Dec.	Oct. - Dec.
Shasta daisies	Aug. - Oct.	Aug. - Nov.	Oct. - Dec.
Snapdragons	Sept. - Nov.	Sept. - Nov.	Oct. - Dec.
Stock	Sept. - Dec.	Sept. - Dec.	Oct. - Dec.
Viola	Oct. - Nov.	Oct. - Dec.	Oct. - Dec.

PLANNING A FALL FLOWER AND VEGETABLE GARDEN

Planning is important in a spring garden, but it is a necessity in a fall garden if maximum productivity is to be achieved.

Fall vegetable crops are categorized as long-term and short-term crops. Duration of these crops is dependent upon when the first killing frost occurs and the cold tolerance of the vegetables.

Plant long-term, frost-tolerant vegetables together. Frost-tolerant vegetables include beets, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, chard, collards, garlic, kale, lettuce,

mustard, onions, parsley, spinach and turnips. As mentioned earlier, all flowering annuals recommended for fall planting are frost tolerant.

Plant short-term, frost-susceptible vegetables together so that they can be removed after being killed by frost. Frost protection and the planting of a cereal rye cover crop are facilitated if such a grouping system is used. Frost-susceptible vegetables include beans, cantaloupes, corn, cucumbers, eggplants, okra, peas, peppers, Irish potatoes, sweet potatoes, squash, tomatoes and watermelons.

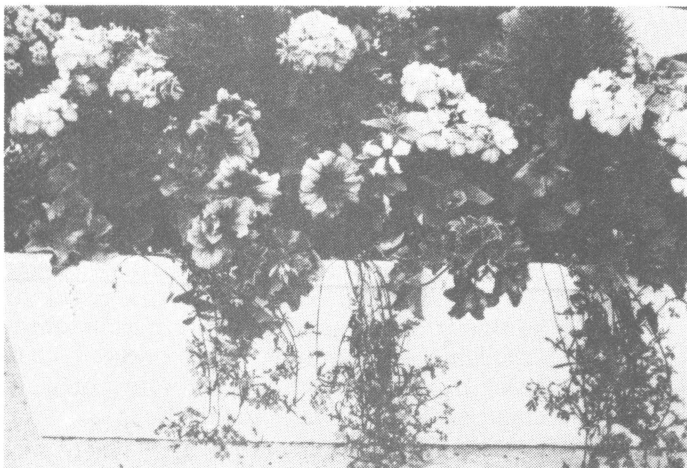
The table below indicates the relative maturity rate, average height and frost sensitivity of the crop (in feet) of various garden vegetables:

VEGETABLE MATURITY RATE HEIGHT IN FEET AND FROST SENSITIVITY

Quick (30 to 60 days)		
Beets (1½) FT*	Mustard (1½) FT	Summer squash (3) FS
Bush beans (1½) FS**	Radishes (½) FT	Turnips (1½) FT
Leaf lettuce (1) FT	Spinach (1) FT	Turnip greens (1½) FT
Moderate (60 to 80 days)		
Broccoli (3) FT	Corn (6) FS	Okra (6) FS
Cabbage, Chinese (1½) FT	Green onions (1½) FT	Parsley (½) FT
Carrots (1) FT	Kohlrabi (1½) FT	Peppers (3) FS
Cucumbers (1) FS	Lima beans, bush (1½) FS	Tomatoes, cherry (4) FS
Slow (80 days or more)		
Brussels sprouts (2) FT	Cauliflower (3) FT	Pumpkins (2) FS
Bulb onions (1½) FT	Eggplant (3) FS	Sweet potatoes (2) FS
Cabbage (1½) FT	Garlic (1) FT	Tomatoes (4) FS
Cantaloupes (1) FS	Irish potatoes (2) FS	Watermelon (1) FS
		Winter squash (1) FS

*FS indicates frost-susceptible crops which will be killed or injured by temperatures below 32° F.

**FT indicates frost-tolerant crops which can withstand temperatures below 32° F.



Planter boxes for fall annuals can be very attractive.

SPRING-FLOWERING ANNUALS
(Transplanted September through December in South Texas)

Plant	Height (inches)	Spread (inches)	Exposure	Comments
Alyssum Asters Calendula	4-8 10-24	12-24 10-24	Sun Sun	Fragrant Attractive cut flowers
Kale, flowering; cabbage, flowering	12	12	Sun	Ornamental foliage, very hardy, edible
Pansy	10	15	Sun	Hardy, wide color range, single color beds most showy
Petunia	8-12	12-24	Sun	
Phlox	6-12	12-15	Sun	
Pinks (Dianthus)	10	12	Sun	Single carnation, bright colors, hardy
Shasta daisy Snapdragon	6-36	6-24	Sun	Many varieties and colors
Stock	12-30	12-24	Sun	Spike flowers, good cut flowers
Viola	10	12	Sun	Wide color range



Pansies are one of the most cold-hardy annuals for fall planting.

SOIL PREPARATION AND FERTILIZATION

If you made a mistake by not properly preparing your garden soil last spring, now is the time to correct it. This should be done *before* establishing the fall garden, because soil problems encountered during the spring growing season can be expected in the fall also.

Heavy clay soils which are sticky when wet and as hard as a brick when dry are much easier to cultivate if a washed, coarse sand is added. Use a washed-type sand to insure calcium carbonate removal which makes garden soils even more alkaline. Add 3 inches of sand to the garden surface if the soil is to be tilled to a 10-inch depth.

Gypsum (calcium sulfate) added to a "sticky" soil makes it more workable. Gypsum is a neutral product which does not increase or decrease the soil's alkalinity. Not only is it a good soil conditioner but it also furnishes certain amounts of available calcium which may prevent such minor element disorders as blossom-end-rot of tomatoes and cabbage leaf-tip burn.

Also add fertilizer for the fall crop because spring fertilization has washed out of the soil or

FALL VEGETABLE VARIETIES FOR TEXAS

been used for plant growth. Use a balanced fertilizer such as 10-10-5, 15-10-10 or 16-20-0 at a rate of 2 pounds per 100 square feet. If manures are used, 20 to 50 pounds per 100 square feet should be adequate. Incorporate fresh manure into the soil several weeks before planting.

Thoroughly pulverize soils at least 10 inches deep. Mix the above ingredients into the garden area and add nematicide if necessary. A properly prepared soil insures a successful fall flower and vegetable garden rather than a disappointing failure.

Additional amounts of fertilizer will be needed later in the season to insure optimum plant growth and production. Add 1½ ounces (3 tablespoons) per 10 feet of row to cucumbers, cantaloupes, eggplants, okra, peas and beans, peppers, squash and tomatoes after the first fruits are set, after the first harvest and every 3 to 4 weeks thereafter.

Broccoli, cabbage, cauliflower, collards, kale, lettuce, mustard, spinach and turnip greens require 1½ to 2 ounces (4 tablespoons) of ammonium sulfate per 10 feet of row 2 weeks after transplanting or 4 weeks after sowing seed.

Flowering annuals require 2 ounces (4 tablespoons) of ammonium sulfate every 4 to 8 weeks for the life of the plants. Sandy soils need more frequent fertilization than heavy clay soil.

Crops such as beets, carrots, potatoes, radishes, turnips and watermelons do not need additional fertilization. Excessive amounts of nitrogen reduce yields or lower quality or both.

VEGETABLE VARIETY SELECTION

Proper variety selection and timing are essential to successful fall vegetable gardening. Select varieties which produce quality vegetables, are disease resistant, mature within a reasonable time and are adapted to fall growing conditions.

Because timely maturity of vegetables planted in a fall garden is so important, use only certain kinds of crops. This is especially true when considering frost-susceptible crops.

Grow bush snap beans rather than pole beans which require longer maturity periods. Select determinate, short-growing tomato varieties with short maturity periods rather than indeterminate, tall-growing varieties with longer maturity periods. By utilizing fast-maturing vegetables the fall vegetable garden will have an adequate harvest period before the first damaging frost.

Listed below are vegetable varieties most adapted to fall production:

- Bean, bush — Contender, Topcrop, Greencrop, Blue Lake, Tendercrop
- Bean, Lima bush — Jackson Wonder, Henderson Bush, Fordhook 242
- Beets — Detroit Dark Red, Green Top Bunching, Asgrow Wonder
- Broccoli — Waltham 29, Green Comet
- Brussels sprouts — Jade Cross, Catskill
- Cabbage — Early Round Dutch, Greenback, Golden Acre, (red) Red Acre, (savoy) Drumhead, (hybrid) Round-up, Superette, Rio Verde, Gourmet
- Cabbage, Chinese — Michihli
- Carrot — Emperor, Danvers 126, Nantes, Red Core Chantenay
- Cauliflower — Snowball, Snowcrown
- Chard — Lucullus
- Collard — Georgia
- Corn, sweet — Calumet, Bonanza, Merit, Golden Security, Buttersweet; (white) Silver Queen, Country Gentleman
- Cucumber — (pickling) National Pickling, Victory, Crispy, Salty; (slicers) Palomar, Ashley, Poinsett, Straight 8, Cherokee
- Eggplant — Florida Market, Black Beauty, High-bush
- 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; Buttercrunch, (romaine) Valmaine
- Mustard — Tender green, Florida Broadleaf
- 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, Mississippi Silver
- Pepper, sweet — Yolo Wonder, Keystone Giant, Canape
- Pepper, hot — Long Red or Thin Cayenne, Hungarian Wax, Jalapeno
- Potato, Irish — (white) Kennebec; (red) Red Lasoda; (russett) Norgold
- 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
- Squash — Early Prolific Straightneck, Hyrific, Dixie Hybrid Crookneck, White Bush Scallop, Zucco, Zucchini; (winter) Acorn, Butternut

Tomato — (large fruited) Spring Giant, Bonus, Big Set; (small fruited) Small Fry
Turnip — Purple Top White Globe, Just Right; (greens) Seven Top, Crawford

SELECTION OF FLOWERING ANNUALS IS DEPENDENT ON COLOR DESIRED RATHER THAN ADAPTATION OF VARIETIES.

ESTABLISHING VEGETABLES IN SUMMER HEAT

One problem faced by many home gardeners when starting a fall or summer garden is getting those so-called "winter" vegetable seeds to come up when planted during the heat of summer. Many popular, cold-hardy vegetables such as lettuce, carrots, broccoli and others germinate poorly when the soil temperature is high. So, the home gardener is faced with a real problem of trying to get seeds to germinate and grow during harsh, unfavorable conditions.

One direct way to avoid this problem is to set out transplants. Transplant vegetables such as tomatoes, peppers and eggplants to insure production before frost occurs. Cold-tolerant crops such as broccoli and cauliflower can be trans-



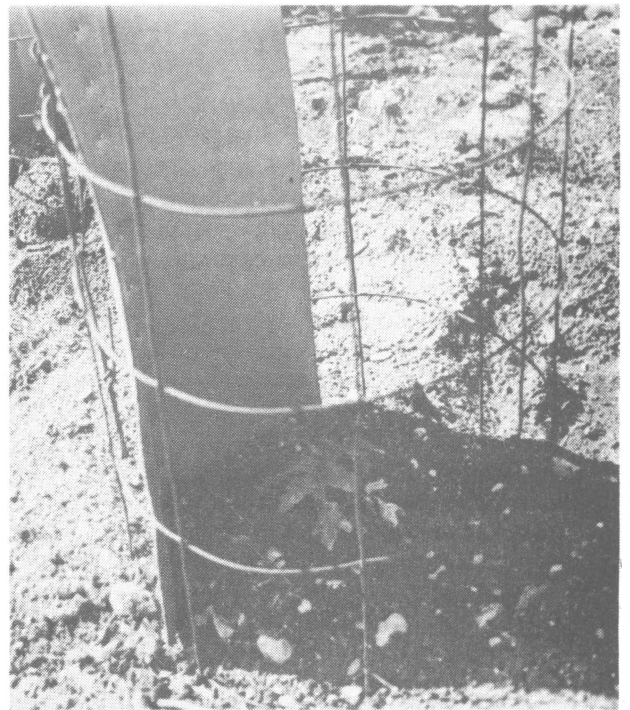
Use a "starter solution" to get transplants off to a good start.

planted or seeded directly into the garden area. Broccoli and cauliflower transplants insure early production and properly spaced plants.

Seed most vegetables, not mentioned above, directly into the soil. It is important to provide a better environment for seeds to germinate and grow into healthy, vigorous seedlings. In most areas of Texas, bed the soil before planting. This is especially true for fall gardens in areas where excessive rain occurs during the fall gardening season. After the garden has been bedded and the rows marked off, use a hoe handle or stick to make a seed furrow. The seed furrow varies in depth but usually is $\frac{3}{4}$ to 1 inch deep.

Next comes a very important step. After the seed furrow has been made, use a watering can or water hose to apply water *directly* into the seed furrow. Apply sufficient water to wet the loosened soil to a depth of 2 or 3 inches. In some cases this may necessitate applying water several times.

Always plant more seeds than needed. After the water has soaked in, scatter the seeds evenly along the furrow. After planting, do not cover the seeds with garden soil; use a material such as compost, potting soil, peat moss or vermiculite for a covering. By using such a medium, a better environment is provided for seeds to germinate and grow. This eliminates problems associated with soil crusting and poor aeration. Use a light colored material for a cooler seeding area. With a



Shade young plants to reduce the effect of heat from Texas summers.



Thin seeded crops to correct spacing for high yields and good quality.

material like compost, seeding depth is still important, but not critical. Small seeds planted a little too deep will still come up. In a few days, depending on the crop planted, seeds should germinate and begin to emerge. At this time do not allow the soil to dry out; apply additional water as needed.

Once plants have emerged, consider applying a protective shade or cover on the west side of the row to shield plants from intensive summer sun. This protection can be a board, cardboard or shade-type cloth. Once the plants are an inch or two tall, thin them to the proper spacing. From this time on, most crops continue to grow and thrive and produce a highly productive crop of fall and winter vegetables.

WATERING

A major problem confronting the fall gardener is dryness. Soils become dry from lack of water during July when decreased production, lack of interest and vacation activities cause many gardens to be neglected.

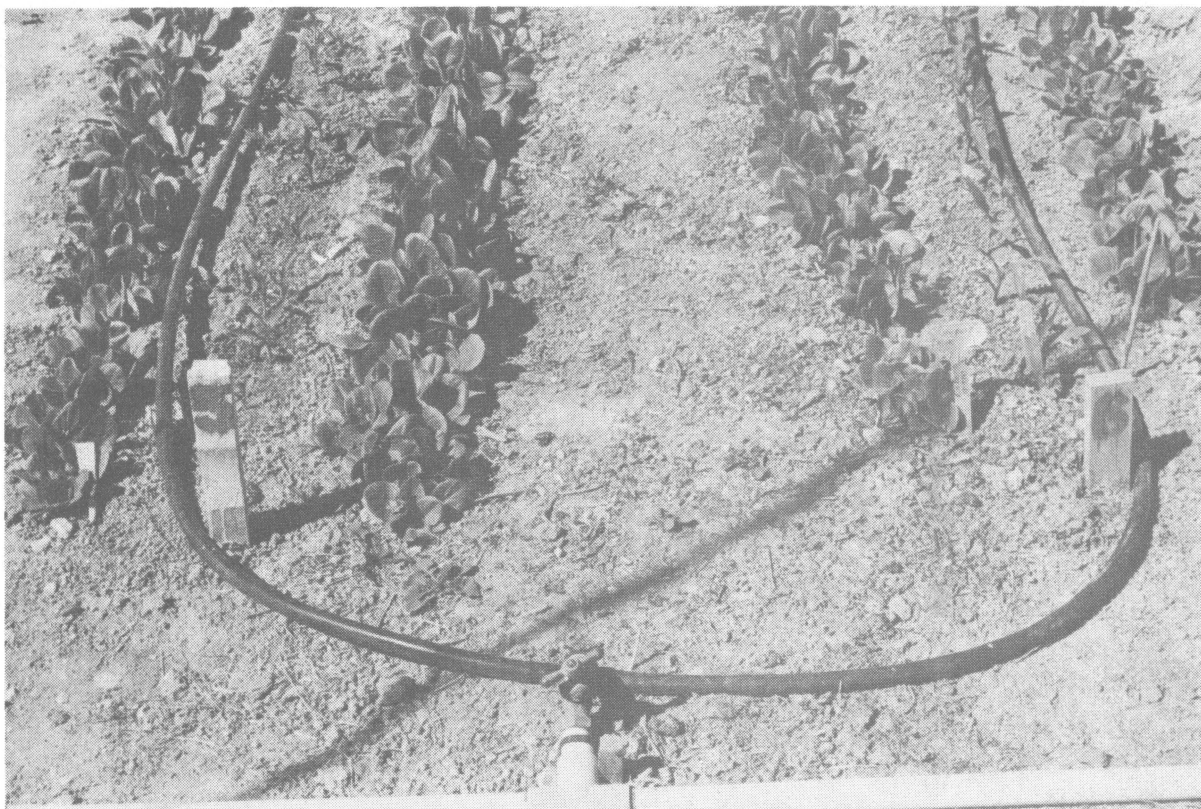
August seedlings and transplants of flowers and vegetables can withstand hot temperatures, but they cannot tolerate lack of sufficient soil moisture. Before garden areas are planted, water until the soil is moist to a 10-inch depth. This pre-irrigation insures proper seed germination and transplant survival.

Once a garden site has been preirrigated and plants are established and growing, adequate soil moisture must be available on a daily basis to insure plant survival during the hot days of summer. Three techniques can be used to water a garden — sprinkle, flood or drip irrigation.

Sprinkling involves using a lawn sprinkler and watering until the soil is soaked completely. If sprinkle irrigation is used on fall gardens, allow adequate time for water penetration before another location is watered.

Generally, sprinkle an area for at least 1 hour to insure a deep soaking and consequently deep root penetration and development. Use this type of thorough watering about once a week to provide adequate soil moisture for young plants.

Another technique utilized by many gardeners is flood or furrow irrigation. This involves making



Trickle or "drip irrigation" is an efficient method of watering fall vegetables and annuals.

rows or mounds of soil on which to plant. Rows are spaced at least 30 inches apart and must be firmed to encourage water movement to the top part of the row so that moisture reaches the roots of young plants. Ditches or furrows between these rows are "flooded" or filled with water, the soil absorbs the moisture and the plant roots growing in the rows have direct contact with the water. Deep soaking occurs and the technique encourages a well developed root system.

Both systems have certain disadvantages, the most obvious being water waste. Both systems involve wetting the entire garden rather than just the area where plants are growing. The sprinkle system has the added disadvantage of wetting the plant foliage which can cause foliage burn or encourage plant diseases.

A third system of continually supplying water directly to the plant root system in amounts needed to provide maximum growth is referred to as trickle or drip irrigation. Drip irrigation is a system which applies a small amount of water to the plant's root system.

Water drops on the soil surface without disturbing the soil structure so that water moves downward easily. This system encourages "deep" watering and thorough root development. The continuous water supply provided by a drip system prevents rather than corrects moisture stress

of plants. This is extremely important in fall gardens because of hot temperatures and potential stress situations which cause slower plant establishment and growth.

A continuous moisture supply which prevents plant stress increases yields and decreases physiological disorders such as blossom-end-rot on tomatoes and squash. By confining the moisture to the plant's root zone, a dramatic saving in water is possible. Weed growth is discouraged by lack of water because only root zones of desired plants receive adequate water. Nutrients are not washed from the soil by excessive watering. Since only part of the garden soil is wet, the garden is accessible at all times. However, this system involves additional equipment and installation.

Vegetables and flowers need adequate moisture during hot temperatures. Watering is an important factor in producing a fall garden, and proper watering makes the difference between success or failure.

STRAWBERRIES

If you are considering a fall flowerbed, do not overlook the strawberry as a possibility. It is one of those great plants which stays green all winter



Lettuce, strawberries and onions make attractive fall plantings.

and blooms in the spring. The advantage of a strawberry over a petunia or pansy is that the fruit produced by the flower can be eaten.

Strawberry culture in South Central Texas differs from the most familiar plant-in-the-spring-and-harvest-the-following-spring technique used in other parts of the country. Here they are planted the first part of September. After becoming established, plants begin to bloom and send out runners (to make new plants). Immediately remove all blooms and runners to encourage plant and leaf growth which causes heavier yields the following spring. Plants grow during South Texas winters and begin to bloom again in late February and early March. Harvesting large, luscious berries begins in late March and April. Remove the plants in June since hot Texas weather and pest infestations make carryover difficult.

The best way to produce acid-loving plants, such as strawberries, when plagued with alkaline soil conditions of South Central Texas is to construct an artificial plant bed or use well-drained containers filled with an acid potting mix. Construct pyramid beds out of stone or any edging material. Then *carefully* select the soil. It should be sandy and acid (pH of 4.5 to 6.5) and usually can be obtained from sand and gravel companies. Place soil about 8 to 10 inches deep in the con-

structed bed. Add as much organic matter (leaves, compost, sphagnum, peat) as possible.

Once the bed is prepared, locate plants. The best varieties for this type of system are Sequoia and Tioga which have been tested and proven by Texas strawberry producers. These varieties should be available at local nurseries in time for an early September planting.

Purchase and set out plants in September or October. Plants usually are available in nurseries through November but the earlier they are planted the longer the plants will grow before going into a semidormant winter condition. If plants have a long fall growth period, they form a stronger root system which increases spring production. Each plant should produce a pint of berries.

Space plants 12 inches apart for maximum yields. If you have an established strawberry bed, be sure to thin the plants in the fall until they are 12 inches apart to insure large berries next spring. Water regularly. Fertilize with 2 pounds of a balanced (10-10-5, 15-10-10 or 16-20-0) fertilizer per 100 square feet before planting and sidedress with 2 pounds in late January.

Strawberry plants do not normally freeze during the winter so frost protection is not necessary. Some plant foliage may turn yellow during the

winter and should be removed to prevent fungus problems. Plants will produce an abundance of new foliage, blooms and berries in the spring because of the strong root system established during the fall months.

Spider mites on foliage and sow bugs (pill bugs) eating ripe berries are the most serious insect problems encountered. Control spider mites with Kelthane® or sulfur and control sow bugs with approved baits around the edge of the strawberry bed. Use Captan® fungicide according to label instructions to prevent foliage diseases and fruit rots.

Hill Country gardeners (Region I) should use a plant-in-the-spring-and-harvest-the-following-spring technique. Use varieties such as Sunrise. Check with the local county Extension agent for specific recommendations.

GROW SPRING-FLOWERING BULBS

Everett Janne

Nothing is as exciting as the sudden appearance of the first flowers of spring — glistening white snowdrops and golden spurts of crocus, trumpeting yellow daffodils, fragrant hyacinths and spectacular tulips. All will grow beautifully in this area if given proper care.

Flower bulbs have chilling requirements which must be met before they come to life, develop roots and eventually bloom. In this area of Texas, it is necessary to create a cold period artificially. The vegetable drawer in the refrigerator provides an excellent place for this treatment.

Tulips, hyacinths, crocus, daffodils — in fact almost all hardy bulbs — should be pre-cooled at 40° to 45° F. Tulips require 6 to 8 weeks while the others can get by with 4 weeks, although six is better. Hyacinths and some daffodil varieties may not have to be pre-cooled, but why take a chance when the pre-cooling almost guarantees results.

Pre-cooled bulbs are advertised frequently, but unless they are kept in cold storage, the normal garden shop temperatures usually nullify the pre-cooling effect if they are not sold immediately.

Without pre-cooling, flower quality usually is poor and stems are extremely short. A word of caution, though — do not allow the bulbs to freeze while in cold storage.

Bulbs can remain in their original package provided they have air holes for circulation. Make sure all packages are marked clearly.

As a general rule plant when the soil begins to cool. This usually occurs in October-November for this area so purchase bulbs in August-September to insure an adequate cold storage

period. Delaying planting too long without pre-cooling results in reduced quality because bulbs need to develop an extensive root system in the ground before flowering begins.

Careful soil preparation rewards gardeners with much higher quality flowers. Digging individual holes for single bulbs is discouraged. Much better root growth is obtained by digging and preparing the entire bed area. If at all possible, prepare the soil to a depth of 10 to 12 inches. Roots of most bulbs form below the bulb; therefore, it is important to prepare the soil several inches below the bulb.

Remember that bulbs of the same type planted at the same depth emerge at the same time and thus flower uniformly. Plant about 1 to 2 inches deep with the "nose" pointing up.

Thoroughly water the bed immediately after planting bulbs. Be sure there is plenty of water available to the plants during the flowering period.

Because of the relatively warm Texas winters, consider tulips as annual plants and discard bulbs at the end of the blooming season.

INSECTS

Dr. J. W. Stewart

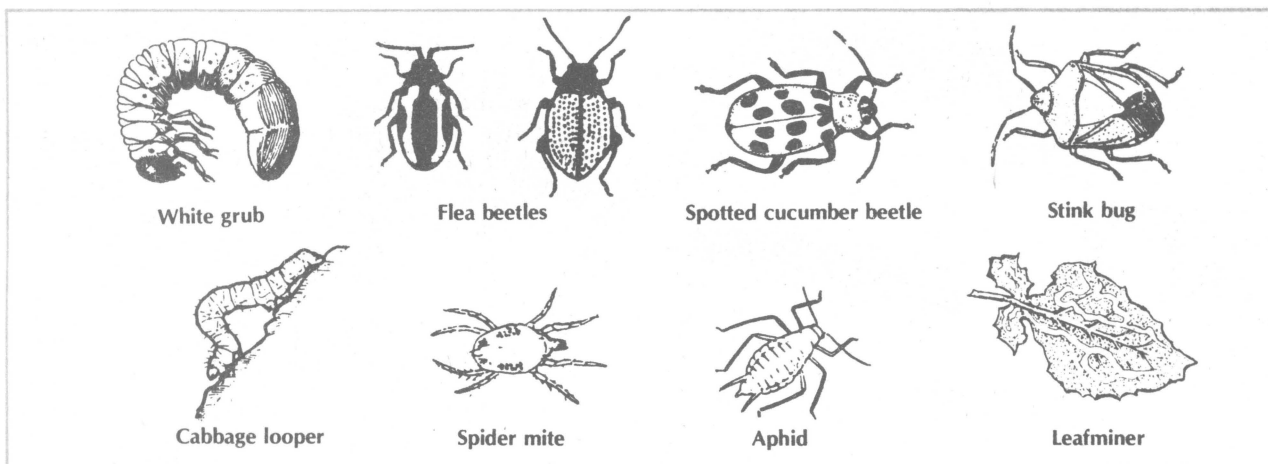
Controlling insect and mite pests is often necessary in the home flower and vegetable garden. Selecting the proper insecticide and using it wisely are essential for good control. Steps in dealing with insects include:

- Identify the pest.
- Determine the amount of injury.
- Decide if and what sort of control is needed.

Cultural Control

Cultural practices play an important role in reducing many insect problems in home gardens. The following practices will aid in controlling insect pests:

- Maintain a clean, closely mowed area adjacent to the garden or flower bed.
- Remove any trash, boards or old plant debris in the area.
- Keep soil at maximum fertility level and well watered.
- If only a few plants are involved, hand-pick larger insects and crush insect egg masses.
- Remove all plant debris following final harvest.



Chemical Control

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 container.

Dusts — Dusts will control chewing and sucking insects.

Apply dusts 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

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

White grubs — White grubs live in the soil and are larvae of May beetles or June bugs. They are a dirty white with brown heads and are $\frac{1}{2}$ to $1\frac{1}{2}$ inches long when full grown. They can severely damage underground plant parts with their feeding activity. *Control:* If planting vegetables in soils that have been growing grass or sod, treat with diazinon granules.

Spider mites — Spider mites are tiny, spider-like plant chiggers that feed on undersides of leaves of many garden vegetables and flowers. Most mites are about $\frac{1}{32}$ 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 will also control mites but must not be applied 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 $\frac{1}{8}$ 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 can damage plants when abundant. *Control:* Treat with Sevin® or malathion when holes begin to appear 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 seedling emerges. 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 will not harm beneficial insects. Make sure 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.

DISEASE PREVENTION

Dr. Jerral Johnson

If plant diseases are to be controlled, take preventive steps early. Since early disease development on plants often is invisible to the naked eye, prevention rather than control is necessary. A preventive spray program keeps you ahead of problems and helps insure success. Once disease symptoms occur on flowers, leaves, stems or fruits, fungicide applications will not eliminate the existing problems but will protect the surrounding plant parts from disease.

To provide continuous fruit and foliage protection, apply fungicide several times. For most fungicides and bactericides the protective period is 7 to 14 days. During periods of scattered showers and heavy dews, follow a 7-day interval between sprays and for dry periods follow a 14-day schedule. The fungicide maneb is effective against a large number of fungi associated with diseases in the fall. Fungicides such as Captan®, zineb and benomyl also are effective against certain diseases. Check the label for the exact har-

vest interval after application and diseases most effectively controlled.

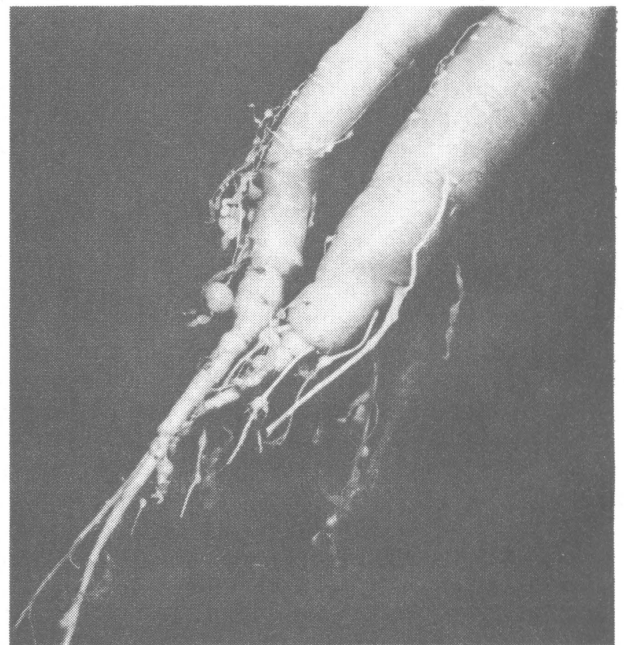
If soilborne fungi are a problem in flower beds, use the fungicide Captan® as a preplant treatment for fall transplants of flowering annuals. Work it into the top 3 to 4 inches of soil before planting at a rate of 3 to 6 ounces for every 1,000 square feet of planting bed. This treatment provides fungicidal protection to the young transplant during the first 1 to 2 weeks of life. A preplant treatment using Captan® is good insurance for fall flower beds.

What About Nematodes?

Nematodes are small, microscopic, worm-like animals that live in the soil and feed on the roots of developing plants. Their damage is observed as decayed spots on the roots, stubby roots, enlarged root tips, sparse root systems or galls on the roots. Although several types of nematodes are found in vegetable and flower gardens, the root knot nematode which causes galls or swellings on plant roots is the most damaging. Plants infested with root knot nematodes usually are stunted, yellow in color and often die prematurely.

Nematode control is based on resistant varieties, soil fumigation and cultural practices. Whenever possible, use resistant varieties in nematode-infested soil. Tomato varieties having resistance to root knot nematodes include Big Set, Bonus and the cherry tomato Small Fry.

Some cultural practices help reduce losses to nematodes. Rotations involving corn, onions and



Carrots grown in nematode-infested soils develop "knots" and are often misshapen.

garlic reduce nematode numbers as these crops are resistant.

A cover crop such as cereal rye grown during the winter months helps reduce nematodes. Do not use common rye grass as it may become a weed problem. After the first killing frost, plant the cereal rye in the garden area occupied by the cold-susceptible vegetables. Rye roots act as a trap crop for nematodes in the soil. A trap crop is one in which the nematodes enter the roots but due to the physiology of the roots, nematodes cannot undergo further development and will be killed. When the cover crop is worked into the soil 1 month before planting the spring garden the organic matter content is increased and an organic acid is produced which is toxic to nematodes.

Use of Vapam® in flower beds and gardens is the only effective chemical treatment currently recommended by the Texas Agricultural Extension Service for controlling nematodes. Apply Vapam® with a hose-on sprayer using 1 quart per 100 square feet of garden space. After applying Vapam® to the surface immediately wash the chemical into the soil by applying ½ inch of water to the garden area. Apply the water twice during the next 48 hours. Leave the soil undisturbed for 7 days before tilling. Wait an additional 2 weeks to plant the garden. If the Vapam® is applied during high temperatures and low humidity, additional watering during the first 48-hour period after treating increases the chemical's effectiveness and prevents excessive loss to the atmosphere.

The soil temperature should be below 90° F. when treating.

Vapam® is effective for only one growing season and the garden may need treating again next year. Nematode control with chemicals is based on reducing the number at the start of the season. They will, however, increase during the season if susceptible crops are grown in the garden.

The best nematode control is to keep them from being introduced into the garden. Avoid bringing in topsoil infected with nematodes. Avoid adding organic matter to the garden that might contain nematodes. Peanut hulls are a good source of nematodes and should be avoided.

HARVEST FOR HIGHEST QUALITY

Many gardeners do not know when to harvest homegrown vegetables. Proper harvesting at the right stage of growth is essential for good yields of quality vegetables from the fall garden.

Bean, snap — when pods are nearly full size but before seeds begin to show appreciable enlargement.

Beet, as greens — when leaves are 4 to 6 inches long; as *tops* and *small beets*, when beets are 1 to 1½ inches in diameter; as *beet roots* only, when roots are 1½ to 3 inches in diameter.

Broccoli — when flower heads are firm and fully developed but before individual flowers start opening; cut 6 to 7 inches below flower head.



Broccoli will produce side-shoots after the central "head" is harvested.

Brussels sprouts — when buds along the stem become solid, and thereafter as higher buds become firm. Remove leaves along stem to hasten maturity.

Cabbage — when heads become solid; to prevent splitting of mature heads, twist plants enough to break several roots and thus reduce water uptake from the soil; excessive water uptake causes splitting.

Carrot — when roots are $\frac{3}{4}$ to 1 inch or more in diameter; during cool, dry periods leave carrots in the ground for later harvest.

Cauliflower — when curds (heads) are 4 to 8 inches in diameter but still compact, white and smooth; exclude sunlight when curds are 2 to 3 inches across by covering them with an inverted cabbage leaf (this may need replacing once or twice), or by loosely tying the outer cauliflower leaves together above the curd; curds exposed to sunlight rapidly become discolored, rough in appearance and coarse in texture.

Chard — thin and use small plants when they become 6 to 8 inches tall; thereafter remove only outer, older leaves when 8 to 10 inches long; new leaves continue to grow for a continuous harvest of young, tender chard.

Collard — break off older, lower leaves when they are 8 to 12 inches long; new leaves continue to grow for a continuous harvest.

Kohlrabi — when "bulbs" (thickened stems) reach 2 to 3 inches in diameter.

Lettuce, leaf forms, when older, outer leaves are 4 to 6 inches long; **heading forms**, when heads are moderately firm and before seed stalks start; take older, outer leaves from either leaf or head lettuce as soon as these leaves are 4 to 6 inches long; new leaves provide a continuous harvest of tender, tasty leaves until excessive cold weather.

Mustard — when older, outer leaves are 6 to 8 inches long; new leaves provide continuous harvest until leaves are strong in flavor and tough in texture from hot weather.

Parsley — when older leaves are 3 to 5 inches long; continue to take older, outer leaves for fresh, tender parsley until heavy frosts in early winter.

Peas, regular varieties, when pods are fully developed but still bright green; **edible-podded varieties**, when pods are fully developed but before seeds are more than one-half full size if pods are to be eaten; harvest when seeds are fully developed but still fresh and green if pods are to be discarded.

Potato — when tubers are full size and have a firm skin; "new" potato tubers may be dug at any size, but generally are not harvested before the tubers are $\frac{1}{4}$ to $\frac{1}{2}$ inches in diameter.

Radish — when root is $\frac{3}{4}$ to $1\frac{1}{2}$ inches in diameter, thin radishes early to 1 inch between plants to insure rapid, uniform growth and crisp roots.

Spinach — when larger leaves are 4 to 6 inches long; pull larger, whole plants or harvest older leaves and allow new growth to develop.

Squash, winter types — when fruits are full size, the rind is firm and glossy and the bottom of the fruit (portion touching the soil) is cream to orange colored; light frost will not damage mature fruits.

Sweet potato — late in the fall *but before the first early frost*; lift to avoid cuts, bruises and broken roots; cure in a warm, well-ventilated place for 2 to 3 weeks and store in a cool, dry place.

Turnip — when roots are $1\frac{1}{2}$ to 3 inches in diameter but before heavy frosts in the fall.

STORE THOSE "EXTRA" VEGETABLES

Dr. Roland Roberts

Many people have an abundant harvest from their fall gardens which can be a valuable source of food throughout the winter if it is stored properly. In storing vegetables maintain the highest possible food value and eating quality, slowing the life processes of the vegetable to as low a point as possible. This is accomplished by carefully curing and then keeping vegetables at the proper temperature and relative humidity.

Winter squash and pumpkins will remain in good condition for several months if the skin is hardened by exposure to the sun and dry air for about a week to 10 days after the vines are killed. Then store the squash on benches or racks in the dark where cool, dry air circulates freely around them. Optimum conditions for squash storage are 55° to 60° F. and 70 to 75 percent relative humidity. If the stem has cracked to the fruit, remove it completely to prevent rot.

Irish potatoes keep 5 to 6 months when placed in 38° to 40° F. storage at 90 to 95 percent relative humidity. Tubers do not need cleaning.

Store root crops such as carrots, parsnips, beets, radishes, rutabagas and turnips in the garden soil. Simply draw the soil up to cover the shoulder of the root. A light mulch of straw or dry grass clippings applied to a depth of 2 to 3 inches keeps the soil from drying around the roots and prevents the crowns from freezing. Dig these root crops as needed.

Leave frost-hardy vegetables like collards, lettuce, Brussels sprouts, mustard, endive and parsley in the garden until very cold weather.

After night temperatures drop below 25° F. protect these crops by covering with a tarpaulin, sheet or plastic cover. Remove cover during the day to prevent overheating the plants.

Sweet potatoes can be enjoyed throughout the winter, but they require special handling and storage. Immediately after harvest sweet potatoes must be cured. The curing process allows a thick, secondary skin to form at 85° and 85 percent humidity. This curing process should last about 1 week and is completed when the skin no longer slips under finger pressure to expose the wet, raw interior of the potato. After the curing period is finished, store potatoes at 60° F. with a relative humidity of 75 to 80 percent. Do not allow sweet potatoes to stay in the soil during the fall. When the soil temperature drops below 55° the sweet potato roots are chilled and the surface skin begins to break down and become more susceptible to rot.

Precise conditions for vegetable storage are probably not available around the home, but by careful placement of various vegetables it is possible to provide nearly optimum conditions.

PRESERVING YOUR VEGETABLES

Shirley Johnson

FREEZING

Beans — green snap

Select only fresh, tender young beans. Wash, cut or snap-off the tips and sort for size. Freeze small beans whole if desired. Cut or break larger beans in blanching basket, lower basket into boiling water and cover. Keep the heat on high and begin counting heating time immediately.

Heat in boiling water —

Small beans — 2 minutes

Medium beans — 3 minutes

Large beans — 4 minutes

Plunge basket of heated beans into a large container of ice water or into running cold water. It takes about as long to cool vegetables as to heat them. When beans are cool, remove them from water and drain.

— Pack the beans into moisture-vapor-proof containers. Leave ½ inch head space.

Label container with name of vegetable, locker number, date packaged and maximum recommended storage date. Freeze immediately and store at 0° F. or below.

Broccoli

Select tight, compact, dark green heads with tender stalks free of woodiness. Wash, peel stalks

and trim. If necessary to remove insects, soak for ½ hour in a solution of 4 teaspoons salt to 1 gallon cold water. Split lengthwise into pieces so that flowerets are less than 1½ inches across. Heat in boiling water for 3 minutes. Cool, drain, package and freeze immediately.

Cabbage

Select fresh picked, solid heads. Trim coarse outer leaves from head. Cut into medium to coarse shreds or thin wedges, or separate head into leaves. Heat in boiling water for 1½ minutes. Cool, drain, package and freeze immediately.

Frozen Coleslaw

1 medium head of cabbage	3 ribs celery
1 medium onion	3 green peppers or 4 carrots

Press out all juice. Add ½ tablespoon salt. Let stand 1 hour. Bring to boil:

1 cup white vinegar	1 teaspoon mustard seed
½ cup water	
2 cups sugar	1 teaspoon celery seed

Boil 1 minute. Let cool to lukewarm. Add vegetables and freeze in airtight containers.

Carrots

Select smooth, tender, mild-flavored carrots. Remove tops, wash and peel. Leave small carrots whole. Cut others into ¼ inch cubes, thin slices or lengthwise strips.

Heat in boiling water —

Small whole carrots — 5 minutes

Diced or sliced — 2 minutes

Lengthwise strips — 2 minutes

Cool, drain, package and freeze immediately.

Okra

Select young, tender, green pods. Wash and sort according to size. Cut off stems without cutting into seed cells.

Heat in boiling water —

Small pods — 3 minutes

Large pods — 4 minutes

Cool and drain. Leave whole or slice crosswise. Package and freeze immediately.

Peas — Blackeye, Southern, Cream — Shelled

Select well-filled pods with tender peas. Wash, shell and sort according to size.

Heat in boiling water —

Small peas — 3 minutes

Medium peas — 4 minutes

Cool, drain, package and freeze immediately.

Peppers — Green

Wash, cut out stems, cut in half and remove seeds. If desired, cut into ½ inch strips or rings. Pack, leaving no head space, seal and freeze immediately.

Heated. Select firm, crisp, thick-walled peppers. Wash and cut into halves or ½ inch slices. Remove seeds.

Heat in boiling water —
Halves — 3 minutes
Slices — 2 minutes

Cool, drain, package and freeze immediately.

Squash

Summer. Use young squash with small seeds and tender rind. Wash and cut in ½ inch slices. Heat in boiling water for 3 minutes. Cool, drain, package and freeze immediately.

Winter. Use firm, mature squash. Wash, cut into pieces and remove seeds. Cook until soft in boiling water, pressure cooker or oven. Remove pulp from rind and mash or press through a sieve. Cool by placing pan containing squash in ice water and stir squash occasionally. Package and freeze immediately.

Tomatoes

Juice. Wash and trim firm, vine-ripened tomatoes. Cut in quarters or eighths. Simmer 5 to 10 minutes. Press through a sieve. If desired, add 1 tablespoon salt to each quart of juice for seasoning. Cool and pour into containers. Freeze immediately.

Stewed. Remove stem ends, peel and quarter ripe tomatoes. Cover and cook until tender (10 to 20 minutes). Place pan containing tomatoes in cold water to cool. Pack into containers. Seal and freeze immediately.

PICKLES AND RELISHES

Dill Pickled Okra

3 pounds uncut and washed young okra pods	1 quart water
6 small hot red peppers	1 pint white vinegar
Cloves of garlic	½ cup salt
Large heads of dill and stems or ½ teaspoon dill seed per pint	

Pack okra into hot pint jars with a pod of pepper, clove of garlic and head of dill or dill seed in each jar.

Make brine of water, vinegar and salt; heat to boiling. Pour over okra. Close jars. Process in boiling water bath 20 minutes. Start to count processing time as soon as hot jars are placed in actively boiling water. Yield: 6 pints.

MICRO-GARDENS FOR MINI-PLACES

Many people living in urban areas would like a garden but they feel that lack of space limits gardening activities. Regardless of where you live, you usually can have an enjoyable and productive vegetable garden by using containers. A "micro-garden" or container garden can be an attractive part of the landscape of an urban home or apartment, whether on a windowsill, patio, rooftop, balcony or doorstep.

These container-grown, mobile vegetables can be protected easily from "Blue Norther" cold snaps during fall months by moving them to warmer locations such as a garage. With Texas having its cold weather in short intervals during the fall, a gardener can protect plants during these periods, and growth and vegetable production are possible until Christmas or later. The mobility of container-grown plants enhances this possibility.

What can be grown on a doorstep? Most vegetables grown in typical backyard gardens also grow well in containers under favorable growing conditions. The most important factors for successful container gardening are sufficient sunlight, proper moisture, adequate fertility and, perhaps most important of all, tender loving care.

Most vegetables grow in containers, but some are more suitable than others. Since limited space encourages container gardening, the gardener should grow vegetables which will produce a large quantity of food for the amount of space and time required. Crops for container gardening include tomatoes, peppers, eggplants, squash, leaf lettuce, herbs and green onions. To add color to a patio or windowsill, plant ornamental peppers, red-leaf lettuce, red cabbage or flowering kale.

Various containers are suitable for growing plants, including bushel baskets, drums, gallon cans, wooden boxes, washtubs and plastic trash cans. Container size should vary with the plants and space available. Plant smaller vegetables in 8- to 10-inch pots and larger crops such as tomatoes, peppers and eggplants in 3- to 5-gallon containers.

Good drainage is important when growing vegetables in containers. A 3- to 5-gallon container should have at least four drainage holes.

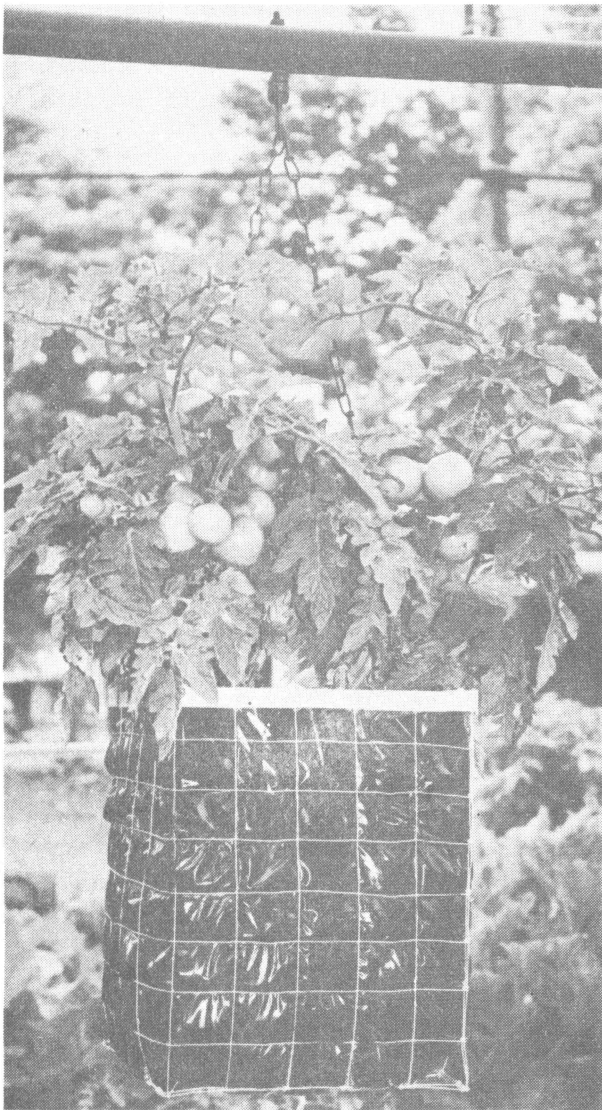
After obtaining a container fill it with a commercially prepared potting mix sold at local garden centers. The mix should drain well and contain no South Texas soil.

A real advantage of prepared potting mixtures or "soils" is that they do not contain native soils. When soils are eliminated, problems such as fun-

gus, root rots, alkalinity and nematodes also are eliminated. This enables successful culture of productive vegetable varieties such as the Spring Giant Tomato.

Many suitable types of soil mixes are available for growing vegetables in containers. A "synthetic soil" is ideal as it is disease and weed-free, holds moisture and yet is well-drained and lightweight. Make your own by mixing 10 tablespoons of limestone, 5 tablespoons of 0-20-0 (superphosphate) and 1 cup of garden fertilizer such as 15-10-10 or 10-10-5 to 1 bushel each of vermiculite and peat moss.

It is best to transplant healthy plants into containers rather than seeding. Purchase transplants at local nurseries or grow at home. When transplanting, avoid injury to young root systems.



Various containers hanging from swing sets or patios are suitable for growing plants.

Plants growing in containers require adequate fertility for vigorous growth and high yields. For best results prepare a nutrient solution and pour it over the soil mix. Many good commercial fertilizer mixes are available for solutions. Always use a water-soluble fertilizer to avoid excessive salt build-up in the container. Need for watering with the nutrient solution varies but generally two or three times per week is adequate. As plants mature, more frequent watering may be necessary, perhaps even daily. Use plain home tap water at least once a week to leach out material that accumulates in the soil mix.

Artificial mixes or "soils" are deficient in fertilizer elements so mix slow release fertilizer pellets into potting mixes before planting and supplement periodically with water-soluble fertilizers. If growers use water-soluble fertilizers on a weekly basis, slow release types are not necessary.

Vegetables grown in containers also are susceptible to attack by insects and diseases. Inspect plants periodically for foliage-feeding insects as well as disease. Timely applications of approved fungicides and insecticides are helpful if insects and diseases become serious problems.

Container grown plants are completely dependent on the grower for correct amounts of water and nutrients. A garden plant can be neglected for several weeks and "Mother Nature's" water and nutrients will carry the plant through but do not neglect the container plant for even a day or the plant will be dead and dried up by harvest time. Another aspect of this problem is that the gardener becomes more attached to a container plant since he sees and cares for it daily.

COMPOST PILE VALUABLE

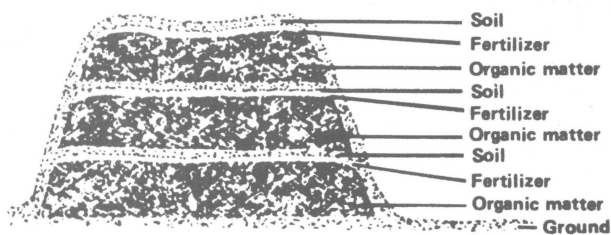
Falling leaves during autumn make lawns rather unsightly, so what can one do with leaves and plant material to improve growing conditions for the next season? Have you ever heard of composting?

Compost is a mixture of decomposing and rotting debris which can be used to add fertilizing elements to the soil. It is a process which returns plant and animal matter back to the soil and completes the life cycle. This cycle begins when the seeds are planted. As the small plant seed grows, it takes nutrients from the soil to make cells and metabolites. The larger the plant gets, the more materials are required. When that plant dies, it decomposes and the "borrowed elements" return to the soil. Thus, the cycle is completed.

The advantage of using organically released fertilizer elements is mainly one of economics.

They are free! Gardeners should realize that organically released fertilizer elements do not differ in any way from those fertilizer elements obtainable from other sources. The organic combinations of elements must be reduced to some soluble inorganic forms by plants again. These inorganic forms also are found in commercial fertilizers. With this information, one can readily recognize the fallacy in the claim that vegetables and other food products fertilized with inorganic chemical fertilizers are somehow harmful to human health as compared with those in which the same elements are supplied from composted or other organic materials. The main advantage, other than an economical fertilization technique, is that compost added to the soil improves tilth, fertility and ability to hold moisture. These factors encourage optimum plant growth and maximum yields if proper cultural practices are followed.

Basic items suitable for composting include leaves, grass clippings, animal manures, old plants and kitchen garbage. Do not use meat scraps and fats which attract undesirable creatures and generate odor. Offensive odors also develop if the compost pile becomes soggy or anaerobic (lack of sufficient oxygen). This not only reduces odor but also hastens the decaying process.



A compost pile

If a compost pile is properly made and maintained, an excellent composted material will be ready for use by late spring or early summer of next year. Try the "sandwich" composting effect. Choose a site on level ground if possible and near a water source since moisture is required. Pile an 8- to 10-inch layer of rough brush or twigs on the bottom of the site. This helps especially if you choose not to turn the compost. (Unturned compost takes about 6 to 8 months to decompose.) On top of the twigs, pile 8 to 10 inches of plant material. Add a light sprinkling of high-nitrogen fertilizer or a "natural" fertilizer such as manure, bone meal or cottonseed meal to this plant material. On top of this plant material, add about an inch of soil and dampen down this first layer. Repeat these layers (omitting the twigs) until the pile is as high as you desire. Try to keep the pile stand-

ing; some people build supporting structures rather than trust a free-standing pile.

Remember to turn and moisten the pile about every week to provide proper aeration and temperature. When the pile begins to "work," it will be hot internally. The compost is ready when it smells earthy and has a brown, rich humus look and feel. When compost is added yearly, the soil becomes fluffy, easy to work, fertile and holds soil moisture better. Don't throw those valuable resources in the trash. Use those leaves to make your garden grow.

EMERGENCY PROCEDURE

In November, or hopefully early December, the weatherman will give the bad news — a Blue Norther which will freeze all tender vegetation is on the way. If you followed the planting schedules, your fall garden should have been producing luscious vegetables for over a month.

However, gardeners should prepare to weather the storm! Texas weather is peculiar. Northers blow through for several days; then the weather often clears and warms. The next cold weather may not occur for several weeks. If you can protect tender vegetation during the cold snap, you can continue harvesting summer vegetables in winter months.

Only tender, frost-susceptible vegetables need protection. These were listed in the planning section. Hopefully, these were planted together as recommended. Frost-tolerant vegetables can withstand considerable cold.

If tomatoes are supported by cages secured to prevent blow down by high winds, they can be used as miniature greenhouses. Each cage can be covered with a plastic garbage bag and a light bulb placed in each covered cage. The burning bulb releases enough heat to prevent plant damage from temperatures as low as 25° F. or colder. Remember to anchor these cages because if they blow down on a cold night, all efforts are in vain.

Anchored cages also may act as supports for a larger, covered structure. For instance, if a row of caged tomatoes borders each side of two rows of beans or squash, a greenhouse-type structure can be made by draping a large sheet of polyethylene plastic from the base of one row of cages to the base of the opposite row of cages. Anchor loose ends of plastic with soil or rocks.

As little foliage as possible should come in contact with the plastic since the contacted foliage will freeze. After danger of frost is past, only one side of the makeshift greenhouse is rolled back. The other remains secured with soil for a quick cover on the next frost alert.

Maybe you don't want to go to all of this trouble. In that case, be prepared to harvest all frost-susceptible vegetables before the first killing frost. Tomatoes may be harvested green and allowed to ripen over a period of time if stored in a warm, dry location. Many gardeners wrap individual tomatoes in newspaper to prevent damage to good fruit from those which rot during storage. Remove rotten tomatoes from storage as soon as possible.

PROBLEMS IN A FALL GARDEN

Since most fall gardens are established in August, hot, dry weather can be expected. Dry weather causes fast drying soils and stressed plants. Proper watering and plant establishment techniques have been discussed earlier; however, use mulch to prevent this situation and the unrealistic water bills in September.

Mulching is a valuable cultural practice, especially in the fall. It increases yields, conserves moisture, prevents weed growth, regulates soil temperature and lessens losses caused by ground rot on many vegetable crops. Use nearly anything for mulch, although organic mulches are preferred. These may include straw, leaves, grass cuttings or compost.

Apply the mulch when planting or transplanting fall vegetable crops. Complete all soil amendments and cultivate before mulching furrow and rows. These tasks are more difficult with a heavy mulch present.

South Central Texas gardeners have an abundance of live oak leaves which are one of the best mulching materials available. Decomposing leaves release organic acids which help counter the tremendous alkalinity of soils in this area.

Another problem associated with fall temperatures is blossom-end-rot. Blossom-end-rot is a "physiological" disorder of tomato fruit. Conditions favoring this problem cause water stress of the plant. Soils which are too wet or too dry, or drying winds cause water loss from the foliage. Whenever these conditions occur, plants lose more water to the atmosphere through their foliage than they absorb through their roots. This water loss from the plant and the fruit results in a slight desiccation of the blossom-end or the bottom of tomato fruit. These cells die, causing a blackened area.

Visual symptoms associated with blossom-end-rot often result from a condition which may have occurred several days or even weeks before. Therefore, when homeowners begin worrying about blossom-end-rot, the cause may have oc-

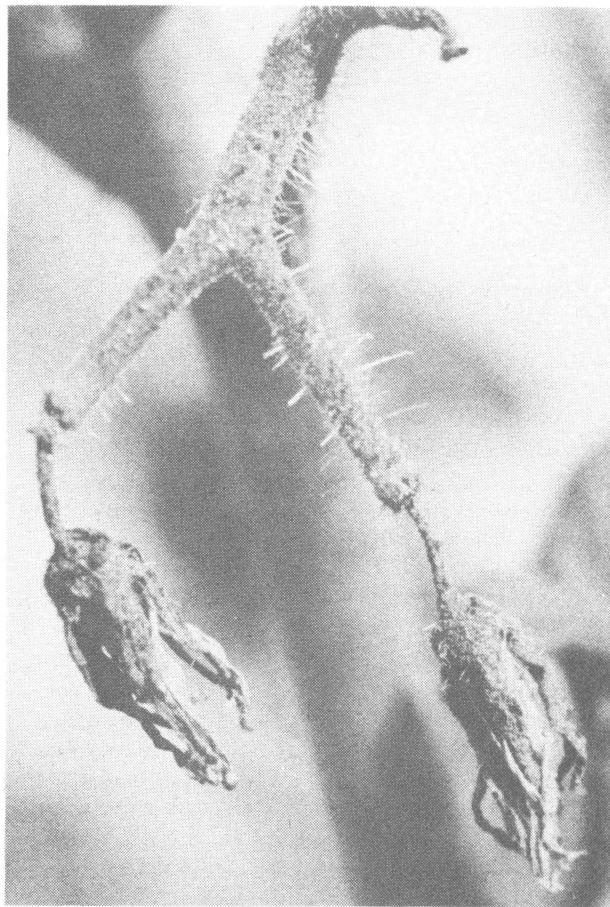
curred weeks before the conditions become obvious.

What can be done about blossom-end-rot? Anything which maintains uniform soil moisture helps. A garden located in well-drained soil helps prevent this disease associated with soggy or overwet soil. A good mulching program also reduces water loss from the soil and makes it more available to the plant during dry periods. A uniform and consistent watering program is vitally important also.

Should affected fruits be removed from the plant? The consensus among Texas horticulturists is to remove the fruit allowing for first-quality fruit to develop rather than letting the affected fruit mature. Locate the garden in a well-drained area, use a good mulching program, maintain sufficient and adequate soil moisture for good growth and be prepared to apply foliar applications of calcium chloride if needed.

Getting fruit to stay or set on the plant is sometimes a serious problem for fall gardeners. Again, hot weather is the culprit.

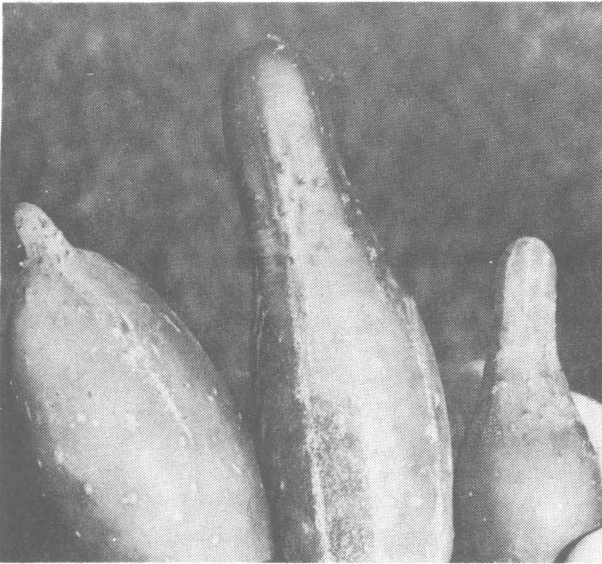
The concept of fall gardening is to plant during hot weather and produce during cool fall condi-



High day and nighttime temperatures can cause tomato blooms to fail to set fruit.

GARDEN PROBLEM GUIDE

Symptoms	Possible cause	Possible cures
Dying young plants	Fertilizer burn	Mix fertilizer thoroughly with soil.
Stunted plants pale to yellow	Disease (damping-off) Low soil fertility	Use treated seed. Soil test for fertilizer recommendations.
	Poor soil drainage Shallow or compacted soil Insects or diseases	Add organic matter. Work soil deeper. Identify and use control measures.
Stunted plants Purplish color Holes in leaves	Nematodes Low temperature Lack of phosphorous Insects	Use approved chemicals. Plant at recommended time. Add phosphorous fertilizer. Identify and use control measures.
	Hail Disease	Be thankful it was not worse. Identify, spray or dust; use resistant varieties.
Spots, molds, darkened areas on leaves and stems	Chemical burn	Use recommended chemical at recommended rate and time. Keep fertilizer off plants.
Wilting plants	Fertilizer burn Dry soil Excessive soil moisture Disease	Irrigate if possible. Avoid over watering. Use resistant varieties if possible.
	Too much shade Plants too thick Too much nitrogen	Move garden to sunny area. Seed at recommended rate. Avoid excessive fertilization.
Failure to set fruit	Improper temperatures Too much nitrogen Insects	Follow recommended planting time. Avoid excessive fertilization. Identify and use control measures.
	Heavy pruning in hot weather	Do not prune; use cages.
Dry brown to black rot on blossom end of tomato	Low soil calcium Extremely dry soil	Add gypsum. Irrigate and mulch.
Misshapen tomatoes (catfacing)	Cool weather during blooming	Plant at recommended time.
Abnormal leaves and growth	2,4-D weed killer	Do not use sprayer that has previously applied 2,4-D. Do not allow spray to drift to garden.
	Virus disease	Remove infected plants to prevent spreading. Control insects that transmit.



Misshapen cucumbers caused by poor pollination.

tions. This system is much more favorable than the spring concept of planting in cold conditions and harvesting in hot weather. Fall gardening has the added advantage of a longer harvest of higher-quality vegetables during October, November and December.

Yet, hot weather in September causes problems when many fast-maturing vegetable varieties, recommended for fall planting, are blooming. Tomatoes drop blooms if temperatures are above 90° F. during the day or 72° F. at night. Blossom-setting hormones will not "stick" blooms during hot weather.

Cucumbers also may react strangely during hot days. Hot weather causes poor fruit pollination. Poor pollination of cucumbers results in small, misshapen fruit which should be removed. An unusually long, hot summer may cause bitterness in the first-harvested fruit from eggplants and cucumbers, also.

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HORT 4