Peach Production in Texas

Jim Kamas, George Ray McEachern, Larry Stein, and Nancy Roe
Extension Horticulturists
Texas A&M University

September 15, 1998

Introduction

Peaches are the leading deciduous fruit crop grown in Texas and it is estimated that there are more than one million trees planted statewide. Average annual production exceeds one million bushels. The demand for high-quality, locally produced peaches remains good, and the future appears bright for the industry. The potential for growing fresh peaches is enhanced by the proximity of major growing areas to metropolitan centers, enabling growers to market high-quality, tree-ripened fruit at premium prices. Late spring frost continues to be the single greatest factor limiting orchard profitability and growers should plan on losing one in six to seven crops even in the best of orchard locations. At times, frost has resulted in crop loss for two or three years in a row and has caused growers in some locations to leave the business due to loss of revenue and enthusiasm. In planning a new orchard, prospective growers should take this risk into account and plan orchard size accordingly. If peach production is to be considered as a part-time enterprise, two to five acres of orchard may be appropriate while a full-time one person enterprise may range closer to a 20 - 25 acre planting.

Site Selection & Initial Considerations

Important considerations in seeking an orchard site include soil drainage and type, water quality, air drainage, previous site history and market access. Peaches are very susceptible to waterlogged soils, so good to excellent internal soil drainage is essential to long-term tree survival. The ideal is a sandy loam topsoil at least 18 to 24 inches deep underlain with a red-colored, well-drained clay subsoil. A subsoil that is dull colored, blue, gray, or mottled usually has poor drainage characteristics and is not satisfactory. The subsoil, as well as the topsoil, must be relatively fertile and have satisfactory nutrient and water holding capacities, but it must be especially permeable to movement of water, air, and roots. Take soil samples from a prospective orchard site for analysis of pH, inherent fertility, and salinity problems. If the pH is below 6.0, lime may be required before the planting beds are established. High salinity levels in either soil or water may indicate that a particular site should be avoided. Clean, salt-free water is essential for commercial peach production. If the irrigation well either has an SAR above 7.0 or total salts above 1,000 ppm, it should not be used. Soil samples in conjunction with annual or semi-annual leaf analysis will provide the greatest guidance in nutrient deficiencies and can help define annual fertilization programs.

Choosing an orchard site with high elevation in relation to the surrounding area is the single greatest factor in reducing risk of crop loss due to spring frost. Easy movement of cold air out of the orchard is essential to minimize the serious damage from spring frosts during bloom or early fruit development and air drainage barriers should be avoided. On frosty mornings, temperatures may fluctuate as much as ten degrees from hilltop to low lying areas and can mean the difference in a full crop as compared to a complete crop loss. In addition, proper selection of cultivars adapted to a specific location in the state is important in maximizing annual cropping potential.

Peach trees perform best on sites not previously planted to fruit orchards. Old orchard sites should not be replanted for at least three years because of soilborne disease problems. Immediately planting a site that has been cleared of standing timber, especially post oaks is not recommended because of the risk of soilborne pathogens such as post oak root rot (*Armillaria mellea*).

It is important to know how the crop will be marketed in order to accurately select peach varieties and orchard size. Some of the best orchard locations are in relatively remote areas where pick your own or retail sales may not be practical. Wholesale marketing usually results in somewhat lower prices, but is an important alternative when larger orchards are planted. Peaches are extremely perishable and there is little flexibility to explore alternative markets once harvest begins.

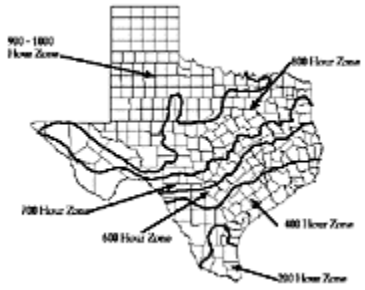
VARIETIES

Select varieties with long term proven production for a given area of Texas. Planting unproven or unadapted varieties frequently results in disaster and disappointment.

Peaches have a chilling requirement of a certain number of hours of winter temperatures between 32° to 45° F to break dormancy and induce normal bloom and vegetative growth. If varieties are chosen that have a chilling requirement that is too low, there is a greater probability that they will bloom early and be more subject to frost. If the chilling requirement is too high, they may be very slow to break dormancy and abort fruit. Plant varieties which have the correct chilling requirement for your area.

Varieties recommended for Texas are listed at the end of this publication in Table 1. Figure 1 indicates where individual varieties are recommended in the state. Commercial varieties must be vigorous, consistently bear satisfactory yields, and have acceptable disease resistance. Fruit characteristics need to meet certain minimum quality standards measured by size, shape, firmness, color, and flavor.

Fig. 1. Approximate Average Winter Chilling in Texas
Click on image to see full screen view



As the season progresses, fruit quality improves. However, early peaches are sold for a premium price because of a lack of competition from other production areas. By using several varieties with the proper ripening sequence, the grower can have fruit over a 6 - 10 week season. Late season varieties are higher quality, but demand more sprays, have significant out of state competition and may be less profitable.

Rootstock Selection

The growth, productivity, and longevity of a peach tree are influenced greatly by the selection of an appropriate rootstock. Because peaches perform best on sandy soils where nematodes may be a problem, nematode resistant rootstocks such as Nemagard or Guardian are recommended in sites with coarse soils. Commercial growers on heavier, more alkaline soils where nematodes are not an obstacle have found Lovell rootstock to have fewer problems with micronutrient deficiencies such as iron and zinc. Contract budding with a commercial nursery may be necessary to obtain the desired varieties on the correct rootstock.

ORCHARD ESTABLISHMENT

After clearing the orchard site of trees and underbrush, remove roots, disk and smooth the area. If the site has been recently cleared of timber, consider a rotation of annual cover crops and plan on delaying planting one to two years after clearing to reduce the probability of *Armillaria*.

If a site has been in native or improved grasses, starting site preparation the year before planting will greatly reduce weed control problems once the orchard is planted. Discing once or twice during the early season should reduce annual weed populations and the application of a non selective herbicide such as Roundup® in September will help reduce problems with perennial weeds such as bermudagrass and Johnsongrass.

Planting trees on terraces for maximum soil drainage will generally extend tree life. While this practice is essential on shallow, poorly drained soils, tree performance is better even on the best of soils. Construct the terraces, or beds, so the tops are 12 to 18 inches higher than the row middles.

Spacing
Selecting an appropriate orchard configuration will ensure easy equipment passage and reduce shading over the life of the orchard. Most growers have found that rows spaced 22 to 24 feet apart is sufficient. Research on tree size shows that the maximum tree canopy is obtained with 18 foot spacing within the row. Space non-irrigated or cultivated orchards 24 X 24 feet to allow for equipment passage and larger soil volume for the tree to draw from in times of drought. High density peach spacing has been tested in Texas and in most cases, is not recommended.

For optimal success in the planting operation, use the following steps:

1. Purchase healthy, vigorous nursery stock on appropriate rootstocks from a reputable nursery. June-budded trees ranging from 2 - 4 feet in height are the principle stock used in commercial planting. Nursery stock 30 - 36 inches tall are usually considered ideal. Contact a nursery 10 - 12 months before you plan to plant in order to assure availability.

2. Plant trees while dormant from December through early March. In our climate, early planting gives good root establishment before bud break.

3. When the nursery stock arrives, keep roots from freezing or drying out by heeling the trees in soil. This is done by opening a trench, laying the trees at a 45° angle, covering the roots with soil and watering in the heeling bed. Trim and soak the roots in water one hour before planting.

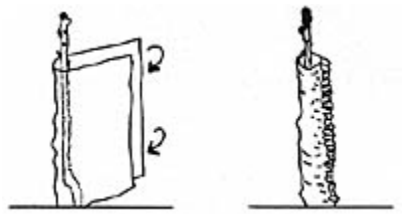
4. Make planting holes only large enough to accommodate the root system. Prune off damaged roots, cut back long ones.

5. Plant the tree at the same depth as in the nursery.

6. Firm soil around the newly planted tree and water well to help settle the soil and to eliminate air pockets around roots. Add water as needed.

7. Cut back nursery tree to a height of 24 to 36 inches. Remove lateral branches flush with the trunk.

8. Place a growth tube or aluminum foil on the lower 18 inches of the trunk leaving six inches of the trunk exposed as illustrated in Fig. 2.

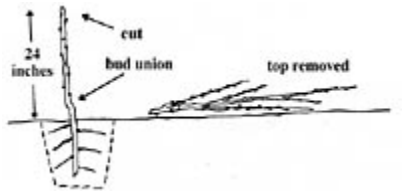


Click on image to see full screen view

Figure 2. Protecting the trunk with a growth tube or aluminum foil helps reduce sunscald, inhibits low buds from forcing for scaffold limb formation and will aid in weed control procedures the year of establishment.

Tree Training

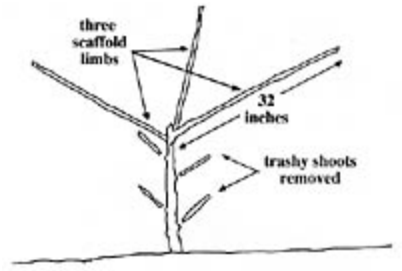
After planting, nursery stock is pruned to a single trunk and headed back to a height of about 24 inches. All branches are removed (Fig. 3).



Click on image to see full screen view

Figure 3. Head back the nursery stock to a height of approximately 24 inches.

Within a few weeks after growth begins in the spring, select the strongest three to five shoots arising from the top 6 inches on the main stem. They should be evenly spaced along the trunk with at least one directed into the prevailing wind. Remove all other shoots along the trunks or limbs. These few branches will grow vigorously for about 4 more weeks and then begin to lignify, or harden and turn brown, near the trunk. At this time, select the major scaffold limbs. It is recommended that only three, evenly spaced scaffold limbs be retained, but some growers will develop four scaffold limbs per tree. Allow the major limbs and non-competing side shoots to grow (Fig. 4).



Click on image to see full screen view

Figure 4. Young tree with three scaffold limbs.

The following dormant season, remove all branches except for the three or four scaffold limbs. The scaffolds should be pruned back to approximately 24 inches to encourage lateral bud break needed to develop sub-scaffold limbs. With good care, the growth that is produced in the second growing season should produce a first crop the following year.

First Year Care

One of the most critical phases of first year peach tree care is weed control. Left unchecked, weeds can cause the loss of the first year's growth. Most grasses and weeds are more aggressive than newly set peach trees in removing both water and nutrients from the soil. Often these small trees can be seen sitting in lush green grass with the tell tale red spots of nitrogen deficiency on

their leaves.

Whether mechanical or chemical, weed control will greatly increase tree growth during the first year. Mechanical control has the advantage that no chemical toxicity will occur and can be performed by unskilled labor when available. Its disadvantages are that frequent cultivations are required for adequate control and root damage can be extensive if cultivation is too deep. Implements should be adjusted so that they cut no more than three inches into the soil to avoid extensive root damage.

Chemical weed control has become the method of choice for most growers because it is more reliable, does a better job of controlling perennial weeds, is more economical and usually does not have to be repeated as often.

Do not use Roundup around first year trees unless the trunk has been wrapped with aluminum foil as described earlier. This is because green bark on the young trees can absorb the herbicide and cause extensive tree damage. As trees progress past the first season, the trunk bark becomes much more resistant to uptake of herbicides.

Pruning

The main goals of pruning are to maintain tree form to an open center which facilitates light penetration and air circulation, and to partially control crop size by selectively thinning out fruiting wood. Peach trees bear fruit only on one year old wood. Dormant pruning is an invigorating action which results in a healthy canopy to produce the current season's crop and allow for ample production potential for the following year. Another pruning objective is to lower the fruiting zone to a height which can be hand-harvested from the ground. Topping trees at 7 -8 feet usually accomplishes this objective because the weight of the crop will bring limbs down where the fruit can be easily reached. Additional objectives of pruning are to remove dead or diseased shoots, rootstock suckers, and vegetative water sprouts from the center of the tree. When thinning out fruiting wood, remove old gray-colored, slow growing shoots which are not fruitful and leave one-year-old, red, 18 - 24 inch bearing shoots.

Four Steps to Prune a Mature Peach Tree

1. Remove all hanger shoots, rootstock suckers, and water sprouts in the lower three feet of the tree. This removal of lower growth clears a path for herbicide applications and allows for air circulation.

2. Remove all shoots above seven feet in height other than red 18 - 24 inch fruiting shoots. Cuts need to be at selected points where the scaffold and sub-scaffold limbs extend upward at a 45 - 50-degree angle. Cuts which leave limbs sideways at a 90-degree angle should be avoided.
3. Remove all vigorous shoots which grow toward the inside of the tree.
4. Remove all old gray wood in the three to seven foot production zone.

Always remove bull shoots in the middle of the trees any time they develop. Summer pruning immediately after harvest can help reduce bull shoots in the top of the tree.

Peach pruning normally removes 40 percent of the tree each winter. This reduces the number of fruit on the tree and stimulates strong growth of fruiting wood each year. Proper pruning is one of the keys to a long peach tree life.

Pruning paint is not needed. Wear gloves, long sleeves, eye protection, and a cap which covers the ears to prevent injury.

Late-spring frost is the single greatest factor in Texas peach production, and pruning early in the year removes much of the flower bud crop that constitutes "insurance" against crop loss. The peach tree will bloom soon after pruning when chilling is satisfied and warm weather follows. Growers with only a few trees can wait until "pink bud" to prune while larger growers traditionally prune as late in the spring as they can while still allowing for enough time to complete the task. Mature peach trees often take 20 to 30 minutes to prune properly.

Fertilization

To keep trees healthy and productive, nutrient levels should be maintained in the optimal range. The only way of accurately doing this is to monitor nutrient levels in both the soil and foliage. Soil tests determine the initial nutrient needs and can help a grower maintain soil pH in the desired range. Although applying lime will easily raise soil pH levels, it is extremely difficult to lower pH levels in calcareous soils.

Leaf analysis enables a grower to determine if the tree has obtained needed nutrients from the soil. Where elements are low, correct by appropriate means. Collect leaf samples between July 15 and August 15. Samples should consist of fully matured leaves taken from new growth well exposed to sunlight. Take samples from the mid-shoot area and collect two or three leaves per tree. Randomly select trees across a block and include fifty to sixty leaves per sample. Trees that represent a problem area should be sampled separately from "normal" trees to help identify a limiting element. Instructions for collecting and submitting samples are available at your County Extension Office.

Fertilization of fruit trees should be dictated by the pH of the soil in the absence of a soil test. A soil test should be run every 3 - 5 years. The ideal soil pH for peach production is between 6 and 7. Major problems with micronutrient deficiencies, especially iron and zinc, usually develop when the pH goes above 7.8.

Maximum growth of young trees is obtained with small, frequent fertilizations. Newly-planted fruit trees can be fertilized the first year if they make 8 to 10 inches of growth by May. If the trees have 8 to 10 inches of growth in May, then the tree can be given one cup of nitrogen fertilizer (ammonium sulfate or nitrate). Spread fertilizer at least 18 inches away from the tree.

The second year the trees should be fertilized four times: March, April, May and June. If your soil pH is below 7.8, the first application can be a 3 - 1 -2 ratio fertilizer; if above 7.8, use only nitrogen. Apply one cup of fertilizer at the first of each month. If the trees fail to make growth from month to month, do not continue to fertilize. Only fertilize if the trees are actively growing. The third year, the trees should be fertilized four times again, using 2 cups of a fertilizer at the first of each prescribed month.

Once trees are in full production, usually in the fourth growing season, base phosphorus and potassium fertilization on soil and or leaf tissue test recommendations. For mature peach trees, apply 50 to 60 pounds of actual nitrogen (N) per acre in the spring before growth begins. Ammonium nitrate is 33% nitrogen while ammonium sulfate is 21% actual nitrogen, so figure pounds of fertilizer on that basis. In late August or early September if trees look fairly good and are not actively growing, apply an additional 15 pounds per acre. For trees with insufficient growth and poor color, apply 30 pounds per acre. Do not apply additional fertilizer to excessively vigorous trees at that time.

Irrigation
In the past, most commercial peach orchards have been grown dryland with very wide spacings and only limited supplemental irrigation. Irrigation, if used, was generally done just before harvest to increase fruit size. With the advent of drip or trickle irrigation, irrigation concepts have changed dramatically. Today, it is not recommended that any peach orchard be planted on a site without suitable water, both in quality and quantity, for irrigation. Have the water analyzed for total soluble salts (EC), sodium absorption ratio (SAR), bicarbonate and carbonate content, and pH before orchard establishment.

The following irrigation schedule works fairly well for young peach trees using drip irrigation. However, it should be adjusted for soil type and weather conditions.

GALLONS OF WATER PER WEEK PER TREE						
.	**April**	**May**	**June**	**July**	**Aug.**	**Sept.**
Year 1	7	7	14	28	28	21*
Year 2	14	14	28	56	56	28*
*Applying supplemental irrigation in September and October may be unnecessary if seasonal rainfall arrives.						

For the remainder of the life of the orchard, base the amount of irrigation on Class A Pan Evaporation data. Design irrigation systems to apply up to 50 gallons of water per tree per day.

Fruit Thinning
Peaches will begin bearing a commercial crop in the third or fourth year. Most peach varieties set far more fruit than can be grown to large size with good quality. Thinning is used to control the number of fruit per tree in order to increase fruit size and quality as well as to insure adequate vegetative growth in the trees. Prices of large fruit are usually at least twice those of small fruit and large fruit are more economical to harvest.

The earlier fruit is thinned from a tree, the greater the size response of the remaining fruit. Early ripening varieties are ideally thinned during bloom, but the risk of frost generally dictates that growers thin them shortly after fruit set. As a rule of thumb, fruit should be thinned within 4 to 6 weeks after bloom and should be thinned in order of ripening. Fruit should be thinned to six to eight inches apart along the fruiting branches which generally leaves about 600 fruit per mature tree.

Hand thinning and mechanical thinning are the only two fully proven methods currently available to the peach grower. Hand thinning is the most precise and expensive but enables growers to more carefully select the desired fruit position. Hand thinning costs range up to $150 per acre. Mechanical thinning by machine shakers has been used for several years and with careful machine operation it is quite successful. The major drawbacks are a tendency to damage trees if used improperly and the necessity of waiting for the fruit to get large enough to be shaken off. This limits the usefulness of machine thinning on early ripening varieties. Work continues on the use of mechanical thinners utilizing ropes that are suspended over the tree and rotated through the canopy to thin opening blooms.

Weed Control
Weed control is one of the more important operations in peach growing. Irrigation and fertilization cannot overcome the ill effects of severe weed competition. This is especially true with first and second year trees.

Historically, weeds were controlled by discing and hand hoeing, but this method is usually not recommended because of the loss of irreplacable topsoil due to erosion and the inability to move equipment through the orchard in wet weather.

The most efficient floor management system for most orchards consists of a mowed, native sod middle with a weed-free strip under the trees. Weeds in the strip are controlled chemically. Gradually widen the weed free strip from 3 to 4 feet in the first year orchard to 10 to 12 feet in a mature orchard.

Chemical weed control, manages weeds more effectively for longer periods and at reduced cost when properly used. Chemicals used in weed control can damage trees if used improperly. Read and carefully follow all label instructions when applying herbicides.

Insect and Diseases
Numerous insects and diseases damage peach trees and fruits in Texas. Major pests include San Jose scale, greater and lesser peach tree borers, plum curculio, peach twig borer, and catfacing insects. In some cases, insect populations may be monitored for presence and injurious levels of infestation through trapping. Serious diseases are scab, brown rot, bacterial spot, post-oak root rot, and cotton root rot. Fewer insect and disease problems occur in Far West Texas, but they are sufficient to warrant control measures. Commercial and homeowner spray schedules are available at local County Extension Offices.

Harvesting and Handling
Texas-grown peaches are consumed primarily within the state and are hand harvested. Consumers demand dessert-type peaches that are ready to eat when purchased. This means that growers need to harvest fruits at a mature stage. This makes it important to exercise care in harvesting and handling. Harvest fruits when firm-ripe and well-colored with a red blush over yellow background. When harvested at this stage, fruits ripen properly and have excellent eating quality.

Several types of containers are used for picking and hauling fruit, including half-bushel baskets, drop-bottom picking bags, wooden boxes, and plastic containers. The latter containers are about half-bushel size and are especially adapted for handling more mature fruit. They may be stacked several feet high on trailers without damaging fruit. Pads on the bottom of these containers help reduce fruit damage. Bruising is also lessened because the same container is used for picking and hauling operations. Larger operations are successful using pallet boxes with an 18-bushel capacity for hauling fruit to packing houses.

Methods of handling harvested fruits vary among growers. Many growers own or have access to packing house facilities for washing, defuzzing, grading, packing, and storing fruits. Hydro-cooling to remove field heat is a valuable practice when fruits must be held in cold storage for extended periods or transported long distances. Many producers need a cold-storage facility. Refrigeration of harvested fruits at 320 to 350 F holds them in good condition for about 2 weeks and reduces rots, thereby permitting accumulation of surplus fruits. This helps create an orderly marketing system.

Marketing

Market emphasis is on consumer demand for high quality, tree-ripened peaches ready to eat when purchased. Today's peach market demands large fruit, preferably 2-1/4 inches in diameter or larger, free of insect and disease blemishes, and attractive, with good shape, color and maturity.

Texas produces less fruit than is consumed within its borders. The presence of major metropolitan areas permits growers to take advantage of these prime markets without hauling fruit for long distances. Although competition from other states is keen, locally-grown fruit bring premium prices.

Most peaches grown in the state are marketed by the individual grower. Growers utilize a number of market outlets, including sales to local supermarkets, packing shed operators, roadside stands, brokers and wholesalers, as well as direct sales from orchards. Many growers market a large portion of their crop retail because of greater profits. Half bushel cardboard boxes are the standard container used for wholesale marketing, but many growers utilize peck, half-peck or smaller containers for retail sales.

Cost and Returns

Production costs and returns depend on the nature and size of the operation. Orchards begin bearing commercial crops by the third season and usually remain profitable through 12 to 15 years of age. Reasonable average gross returns during this period are $2,000 per acre when fruit is wholesaled. Net income varies by season and attention to cultural management and marketing. Net returns are higher for growers marketing a large portion of their crop retail

Table 1. Characteristics of major peach varieties of Texas.

*Varieties are listed in chilling catagories for convenience only. Select varieties with chilling requirements appropriate for specific areas.

Variety	Fruit Size	Stone Freeness	Chilling Requirement	Average Ripe Date
Varieties for Low Chill Regions				
EarliGrande	Small-med	Semi-cling	200	4/15-4/20
FlordaCrest	Small-med	Semi-cling	350	4/18-4/24
Flordaprince	Small	Cling	100	4/19-4/29
ValleGrande	Medium	Semi-free	200	4/20-4/25
TropicBeauty	Medium	Semi-free	150	4/25-4/30
TropicSweet	Medium	Free	175	4/25-5/01
Flordaglo	Medium	Semi-free	150	4/29-5/7
TropicSnow	Medium	Semi-free	150	5/14-5/25
FlordaGrande	Large	Semi-Cling	100	5/16-5/27
Varieties for Medium Chill Regions				
Springold	Small	Cling	750	5/15-5/20

FlordaKing	Large	Cling	450	5/15-5/20
Bicentennial	Small	Cling	700	5/20-5/30
Texstar	Med-large	Free	650	5/20-6/01
Juneprince	Med-large	Semi-free	650	5/20-6/01
Junegold	Large	Cling	650	5/22-6/03
Goldprince	Med-large	Free	650	5/23-6/05
Tex Royal	Large	Free	600	6/02-6/12
Sentinel	Large	Semi-free	850	6/03-6/14
Gala	Large	Semi-free	700	6/04-6/15
Rio Grande	Large	Free	450	6/10-6/20
Flavorcrest	Large	Free	750	6/10-6/20
Harvester	Med-large	Semi-free	750	6/15-6/25
La Feliciana	Large	Free	550	6/20-7/04
Hawthorne	Large	Free	700	6/27-7/7
Fireprince	Large	Free	800	6/30-7/09
Dixiland	Large	Free	750	7/14-7/30
Varieties for High Chill Regions				
Springold	Small	Cling	750	5/15-5/20
Bicentennial	Small	Cling	700	5/20-5/30
Sentinel	Large	Semi-free	850	6/03-6/14
Surecrop	Medium	Cling	1,000	6/10-6/15
Harvester	Med-large	Semi-free	750	6/15-6/25
Majestic	Large	Free	800	6/25-7/01
Ranger	Large	Free	950	6/27-7/03
Milam	Large	Free	750	7/01-7/10
Redglobe	Large	Free	850	7/01-7/10
Loring	Large	Free	750	7/06-7/11
Denman	Medium	Free	750	7/08-7/16
Redskin	Large	Free	750	7/13-7/20
Dixiland	Large	Free	750	7/15-7/25
Flameprince	Large	Free	850	7/25-8/05

| Extension Information Resources Index | Vegetables | Fruit and Nuts | Gardening | Composting |
| Propagation | Landscaping | Nursery | Horticultural Programs | Harvesting and Postharvest |