

ARE YOU READY TO START A CSA?

Adding Fruit Crops to Your CSA

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Fruit crops can be a significant addition to a CSA. Locally grown fruit marketed directly to consumers can be allowed to ripen more fully and attain higher quality prior to harvest than that which is shipped in and allowed to sit on the shelves for extended periods of time before being sold. Even with this distinct advantage, the decision to begin growing fruit crops should only be made after serious consideration of production and marketing challenges. The following material explores some of the points that should be carefully considered to determine how feasible fruit crops might be for inclusion in your CSA.

ARE FRUIT CROPS RIGHT FOR ME?

When deciding if fruit crops are right for you, consider the following points:

GETTING STARTED IN FRUIT PRODUCTION

- Lag time between planting and first crop.
 - No return on investment.
 - Determines productive potential of planting over its entire life.
- Trees/vines/bushes live for many years.
 - What you do each year affects what happens the next year.
 - Fruit buds are initiated in the growing season of the previous year.
- Multiple pests.
- Perishable commodities.

FRUIT CROP PRODUCTION

Positives:

- Can be done on smaller acreages.
- Can utilize hilly land.
- Potentially high returns per acre.

Negatives:

- High risk.
- High inputs of:
 - Labor.
 - Management.
 - Capital.
- Relatively little mechanization.
- Several years before a return on investment.
- Perishable crops.

WHAT SHOULD I GROW?

Once you decide that fruit crops are right for you, the next step is to determine which fruit or fruits to grow. Growing a crop not currently being produced in your area could be regarded as an opportunity in that there would be no local competition for marketing the crop. However, there may be a good reason the crop you are considering is not being grown in your area. See table 1.

While many different fruit and nut crops can be grown in Tennessee, not all of them are well-suited for production in all parts of the state. The wide range of soils and climatic conditions throughout the state are primary factors influencing successful production areas.

Consider what is already being grown in your area. Does the absence of a given crop indicate that weather conditions do not favor its production, or does it mean that consumer demand is not sufficient to warrant its production? The cost of setting up production, limited availability of equipment and supplies, or the demand for competing crops also may be factors.

TABLE 1. CONSIDERATIONS WHEN CHOOSING FRUIT CROPS:

- Market demands
- Site limitations
 - Winter damage
 - Spring frosts
 - Pest pressure
 - Water availability
 - Quantity
 - Quality
- Species
 - Cold hardiness
 - Chilling requirement
- Varieties
 - Bloom time
 - Pest resistance
- Rootstocks
 - Size control
 - Precocity
 - Pest resistance

WHEN DO I WANT MY CSA TO BE OPEN?

Harvest periods and the types of crops you choose will determine when your marketing window will be open. The following tables will help you create a production schedule. For more in-depth information, see *How Do I Manage My Harvest?*

TABLE 2. Harvest Periods

CROP	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV
Strawberries		██████████				██	
Raspberries		██████████		██████████	██████████		
Blackberries		██████████	██████████		██	██	
Stone Fruits		██████████	██████████	██████████			
Grapes (bunch)			██████████	██████████			
Grapes (Muscadine)					██████████	██████████	
Pears				██████████	██████████		
Apples			██████████	██████████	██████████	██████████	
Pecans						██████████	██████████

TABLE 3. Length of Harvest/Variety

SMALL FRUIT

- Strawberries (matted row):** 3-4 weeks
- Strawberries (plasticulture):** 4-5 weeks
- Raspberries (primocane):** 6-10 weeks
- Blackberries (floricane):** 2-4 weeks
- Blueberries (rabbiteye):** 4-5 weeks
- Blueberries (highbush):** 3-4 weeks
- Grapes (bunch, fresh fruit):** 2 weeks
- Grapes (wine):** single harvest
- Grapes (Muscadine):** 3 weeks

TREE FRUIT AND PECANS

- Peaches:** 2 weeks
- Pears:** 2 weeks
- Apples (summer varieties):** 2-3 weeks
- Apples (fall varieties):** 1-2 weeks
- Pecans:** 2-4 weeks

MANAGERIAL AND LABOR NEEDS

MANAGERIAL

Fruit crop production is a unique, intense type of agriculture requiring high levels of managerial skills. Consider the following points:

- Who will be the manager? Will it be you or an employee?
- How capable is that person and how much time will he or she have to devote to the task?
- What is the interest level of the manager? Is this just a job or is it something in which the manager has a real passion?
- Will there be a backup person in case the manager is unable to do the job?

LABOR

As previously mentioned, fruit crop production is an intense form of agriculture. In addition, it has a relatively low level of mechanization compared to other types of crop production; therefore, labor is an important area of consideration. For some operations such as fruit thinning and harvest, the window for completing the task can be fairly narrow. When considering labor needs, ask yourself the following:

- How much labor is available to perform the necessary tasks associated with fruit production?
- How skilled are the laborers? Once trained, are they capable of being left on their own and doing a good job or will they need close, constant supervision?
- How reliable are they? Will they be there when needed?
- Will they be there all season and in future years, or will new workers need training each season?

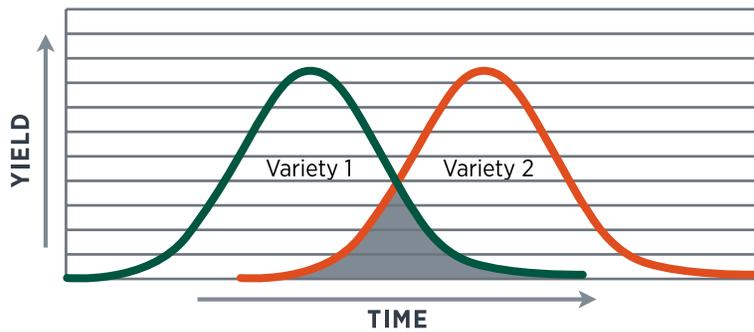
HOW DO I MANAGE MY HARVEST?

PLANTING MULTIPLE VARIETIES

Plant multiple varieties of a given fruit to extend the period in which it is available at your farm. A good marketing strategy is to plant varieties of a certain fruit that overlap slightly in harvest time so you have a continuous supply of that fruit. If you graphed the harvest of a certain type and variety of fruit, the resulting curve on the graph would be bell-shaped (see fig. 1) with light yields early, increasing to a high point midway and then tapering down. Select a second variety that

will provide harvestable fruit before the first variety is over. Table 3 provides an estimate of how long each variety will be harvestable.

FIGURE 1. Overlapping Harvest Times



MAXIMIZING QUALITY AND SHELF LIFE

Most fruit crops reach their highest quality when they are allowed to ripen fully on the tree, vine or bush. The riper fruits are, the more delicate they become, which is one reason you will be able to offer your customers produce that cannot be rivaled by distant producers. When growing and marketing fresh fruit, it is important to realize that the crops must be handled carefully and stored under conditions that will extend shelf life.

Harvested fruits have only a limited time before they deteriorate beyond the point where they are able to be sold. The type of fruit, variety, fruit quality and postharvest conditions will affect the length of shelf life. See tables 4 and 5.

Fruit to be placed in storage should not be washed first. Washing will removed the waxy cuticle on the fruit, making it

more prone to moisture loss and rot development. In addition, placing warm fruit into cold wash water can result in some of the water — and any contaminants in the water — being drawn into the fruit. Washing, if necessary, should be done once fruit is removed from storage and is being prepared for sale. Small fruit should never be washed by the grower, but rather by the consumer right before eating.

STORAGE CONDITIONS AND DURATION

The quicker harvested fruits can be placed in a cool environment, the better. With apples, for every 18 degrees F the temperature of the fruit is lowered, the shelf life of the fruit is increased two to three times. The actual temperature of storage may vary depending on the length of time the fruit is to be held. If a crop is only being stored for a short amount of time, it can be stored at a higher temperature.

High humidity in storage will lessen moisture loss from the fruit. Good air circulation is essential to lessen disease development in storage and to avoid the pockets of ethylene gas that some fruits give off.

Ethylene is a naturally occurring ripening material, and its accumulation in storage can dramatically decrease shelf life in certain fruit and vegetable crops. Fruits and vegetables should be stored separately as fruits may pick up the taste of certain vegetables. In addition, the ethylene given off by the fruits can accelerate the deterioration of vegetables.

For apples, one option for storage is to keep them on the tree for an extended period of time. ReTain is a stop-drop material sprayed on apples prior to anticipated harvest. It will temporarily halt the ripening of the apple, including the development of the abscission layer on the stem. ReTain can hold apples on the tree for several weeks past their normal harvest time. This will allow more time to harvest and market the crop, and may also result in more intense color development and soluble solids levels in the fruit.

TABLE 4. Storage of Small Fruit

PRECOOL WITHIN 1-2 HOURS OF HARVEST

CROP	SHELF LIFE	TEMPERATURE (DEGREES F)	RELATIVE HUMIDITY (%)
Strawberries	7-10 days	32	90-95
Blueberries	2-4 weeks	32	90-95
Blackberries and Raspberries	2-5 days	32	90-95
Grapes (bunch)	5-10 days	30-32	90-95
Grapes (Muscadine)	14 days	33-36	90-95

TABLE 5. Storage of Tree Fruit and Pecans

Peaches (tree ripened)	60 F for two days (At approximately 40 F, peaches develop a bitter taste).
Apples	30-34 F at 90-95% relative humidity with good air circulation. Summer varieties have a shorter shelf life than fall varieties.
Pears (European)	30 F at 85-90% relative humidity. Pick when mature but not ripe.
Pears (Asian)	1-3 months at 30F and 90% humidity.
Pecans	2 months at room temperature, 9 months at 40 F, 2 years when frozen.



FIGURE 2. SmartFresh Ginger Gold Trial - 2010, 30 days at room temperature. (Photo by Mike Parker, NC State University)

SmartFresh is another product that will extend the storage time of certain crops and is being most widely used in apples. When applied to apples within 24 hours after harvest, SmartFresh will temporarily stop ripening, allowing the apples to be held for longer intervals prior to consumption with no loss in quality.

OTHER CONSIDERATIONS

ORGANIC VS. CONVENTIONAL PRODUCTION

Organic fruit production can be a challenge in Tennessee, where a multitude of insects and diseases that attack fruit crops exist. The availability and effectiveness of organically approved pesticides for fruit crops is very limited. To increase chances of success in organic fruit production, all aspects of production beginning with type of fruit, variety, site selection and development, pruning, training, floor management, and a host of other cultural practices must be utilized.

VALUE-ADDED PRODUCTS

Having ciders, juices, dried fruit, jams and jellies and other value-added products available can add a lot to your CSA. Be sure to investigate the requirements for pasteurization and facility needs prior to investing in a food processing operation. Also, consider the extra demand on your time and that of your employees to develop and operate this aspect of the CSA.

NOTES ON INDIVIDUAL FRUIT AND NUT CROPS: WHAT TO PLANT AND WHAT TO AVOID

TREE FRUIT

Apples: are the most consistent tree fruit crop for Tennessee. They are more cold-hardy during winter and bloom later than other fruit crops in spring.

Ripening time for different varieties extends from July into November. The demand for apples increases dramatically as fall approaches so growers are focusing more on later-ripening varieties. While there still is a place for semi-dwarf apple trees, the trend is toward full dwarfing rootstocks and high-density plantings.

Major apple diseases include apple scab, cedar apple rust, fireblight and powdery mildew (spring diseases) and bitter rot, black rot, white rot, sooty blotch and flyspeck (summer diseases). San Jose scale, codling moth, plum curculio and stinkbugs are the most common insect problems. The potential for issues with brown marmorated stinkbug is being closely watched. A regional cultural guide and pest control manual is updated annually and is accessible through the UT Extension website.

Peaches: are the most common stone fruit grown in Tennessee, and they sell very well in all markets. Suggested varieties are those having a chilling requirement of 850 hours or more, with emphasis on varieties needing in excess of 1,000 hours of chilling as they are more consistent in production in Tennessee.

No dwarf or semi-dwarfing rootstocks are recommended for commercial peach production. Halford and Lovell are preferred rootstocks, and Guardian also is used frequently. A new rootstock, MP-29, is gradually becoming available. Its major attribute is resistance to Armillaria root rot, which is a major problem in southern peach crop areas with the exception of Tennessee. MP-29 appears to reduce tree size appreciably, especially when compared to Guardian.

The harvest season for peaches extends from about the first of June into September; however, the period from early July through August is when the most popular peach varieties ripen. Earlier peaches are often clingstone and are not in high demand among consumers. Yellow flesh, freestone peaches are the most popular, although the market for white flesh freestone peaches is increasing.

Brown rot is the No. 1 disease in peaches. Other diseases of concern include scab and bacterial spot. Insects of concern are scale, trunk borers, lesser peachtree borers, plum curculio and stink bug. A regional pest control guide for peaches and other stone fruits is published annually and is available online through the UT Extension website.

Plums: are not widely grown in Tennessee, although they are a popular item at markets. Plums often bloom earlier than peaches, making frosts a point of concern. The same pests that concern peach growers are an issue with plums. An additional disease called black knot is frequently found on plums and cherries and can be controlled through pruning and fungicide applications.

Nectarines: are not widely grown in Tennessee. A limited number of varieties exist. Brown rot and fruit cracking are major issues with nectarines.

Pears: production is not widespread in Tennessee. Pear trees are slow to come into bearing, do not yield as heavily as apples, and do not have as many rootstock options as apples. There are, however, some dwarf and semi-dwarf rootstocks available for pears. Fireblight is a major concern in pears, as it can be in apples. Certain varieties, such as Bartlett and Anjou, are highly susceptible to fireblight and should not be planted. Both European type and Asian pears may be grown in Tennessee.

Cherries: are not a good crop for Tennessee. Tart cherries do better than sweet cherries; however, issues still exist. The insect and disease problems seen in peaches are threats for cherries as well. Some sweet cherry varieties need a second variety for cross-pollination while others do not. Some dwarfing and semi-dwarfing rootstocks are available for sweet cherries. Winter injury, spring frosts and canker diseases are problems with sweet cherries.

Pecans: can be grown successfully in most parts of Tennessee, although there are differences in varieties recommended for different areas of the state. Weevil is the major insect pest. Leaf phylloxera, nut casebearer and aphids are also concerns. Diseases include scab (choose resistant varieties) and powdery mildew.

SMALL FRUIT

Information on pest control for small fruit crops can be found online at the Southern Region Small Fruits Consortium website (smallfruits.org).

Strawberries: This crop can be grown in all parts of Tennessee. Since strawberries are the first fruit crop to ripen in the year, they are very popular. Frost control is a concern for strawberries, and growers definitely should take an aggressive approach to control. The availability of “clean” planting stock is an important issue since anthracnose coming in on plants can be a serious threat to new plantings.

Blueberries: Northern highbush, southern highbush and rabbiteye blueberries can be grown successfully in Tennessee. Rabbiteye blueberries are easier to grow than northern and southern highbush. However, since highbush harvest starts up to a month earlier than rabbiteye, many growers elect to grow both highbush and rabbiteye varieties.

Cross-pollination with a second variety that blooms at the same time is essential for many rabbiteye varieties. Even with highbush varieties, having good cross-pollination usually results in larger crops and bigger berries. Highbush varieties will not cross-pollinate with rabbiteye varieties.

Spotted wing drosophila is emerging as a major concern for blueberries, and its presence will require an ambitious control program focusing on timely sprays, clean harvest and sanitation. Problems in blueberry production can most often be traced back to improper soil pH, low soil organic matter, lack of mulching and water issues.

Blackberries: Currently, florican-bearing blackberry varieties are recommended. While some primocane-fruiting varieties exist, they do not perform satisfactorily in a hot climate. There may, however, be opportunities for them in the upper elevations in East Tennessee. Both thorned and thornless blackberry varieties are available, although the thornless types are the most popular. Trellising is recommended for cane support.

Spotted wing drosophila has become a serious issue for blackberries. A good spray program plus thorough harvest and sanitation are essential for its control.

Raspberries: Most areas of Tennessee are too hot for raspberries to perform well. Black, purple, yellow and red-fruited varieties exist. Some varieties of red and yellow raspberries are primocane fruiting, and some others fruit on floricanes in the second summer of cane life. Primocane-fruiting red raspberries appear to do the best in Tennessee. As with blackberries, the spotted wing drosophila is of major concern. Red raspberry appears to be its favorite fruit.

Grapes: Bunch grapes (American, French-American hybrid and *Vitis vinifera*) and muscadine grapes are grown throughout most parts of Tennessee. Of these, muscadine grapes tend to be the easiest to grow from a pest management standpoint. Cold damage is the major concern with muscadines; therefore, this crop is not recommended for the higher elevations and colder areas of the state.

American bunch varieties are easier to grow and crop more heavily than hybrids or *viniferas*. *Viniferas* are the most sensitive of the bunch grapes to cold weather and diseases. They also yield the least of all types of grapes, but they are in high demand by wineries.

Muscadines and American varieties are multi-use grapes, and are used for fresh consumption, jellies, juice and wines. Hybrids and *viniferas* are primarily used for wines. Seedless table grapes also can be grown in Tennessee; however, the varieties should be those that have been developed in the East and not the varieties most common in the western states.

Disease problems in grapes include black rot (the most serious disease of grapes in eastern North America), powdery mildew (the No. 1 grape disease worldwide), downy mildew, anthracnose, Botrytis, ripe rot, sour rot and macrophoma rot. Insect concerns include grape root borer, phylloxera (aerial and root phylloxera exist, but resistant rootstocks are recommended for *viniferas* and some hybrids for root phylloxera control), grape berry moth, Japanese beetle and June bug. Spotted wing drosophila is a potential threat and bears watching.

FRUIT CROPS TO AVOID

Apricots, plumcots, aprium and pluots: The varieties currently available have too short of a chilling requirement to be consistently successful in Tennessee.

Figs: Without some type of winter protection, cold injury will be a frequent problem.

Kiwi (including hardy kiwi): The potential for cold injury makes kiwi a risky crop.

Persimmon: Oriental persimmon is not as cold tolerant as American persimmon and should not be planted on a large-scale basis without some small trials to show it is feasible. American persimmons may not have a wide enough appeal to consumers to merit their production.

HELPFUL TABLES/DIAGRAMS

Small Fruit Yield Potential (Approximation)

CROP	YIELD/100 FEET OF ROW	YIELD/ACRE
Strawberries — Matted Row	50-70 lbs.	6,000-8,000 lbs.
Strawberries — Plasticulture	115-140 lbs.	10,000-14,000 lbs.
Raspberries (primocane-bearing)	50-100 lbs.	2,000-4,000 lbs.
Blackberries (floricane-bearing)	220-275 lbs.	8,000-10,000 lbs.
	YIELD/VINE	YIELD/ACRE
Grapes (bunch, American)	20-30 lbs.	5-7 tons
Grapes (bunch, hybrids)	15-20 lbs.	4-5 tons
Grapes (bunch, <i>V. vinifera</i>)	6-10 lbs.	2-3 tons
Grapes (Muscadine)	60-80 lbs.	7-9 tons
Blueberries	15-20 lbs.	1,450 gal.

Tree Fruit and Nut Yield Potential

CROP	SPACING / # TREES PER ACRE	YIELD/TREE	YIELD/ACRE
Stone Fruits (peaches)	16' x 24' / 113 trees/acre	3-4 bu	339-452 bu
Apples (dwarf trees)	4' x 12' / 907 trees/acre	1-1.25 bu	1,000-1,200 bu
Apples (semi-dwarf)	8' x 16' / 340 trees/acre	2-3 bu	680-1,020 bu
Pears	14' x 22' / 141 trees/acre	3 bu	423 bu
Pecans	30' x 40' / 36 trees/acre	27-33 lbs.	1,000-1,200 lbs.

Crop Expectations – Small Fruit

CROP	TIME TO FIRST CROP	TIME TO FULL CROP	LIFE EXPECTANCY
Strawberries (Matted Row)	15 months	15 months	3-5 years
Strawberries (Plasticulture)	9 months	9 months	1 season
Caneberries (primocane)	5-6 months	3 years	8-10 years
Caneberries (floricane)	15 months	3 years	8-10 years
Blueberries	3 years	5-7 years	25-plus years
Grapes (bunch)	4 years	5 years	20-plus years
Grapes (Muscadine)	3 years	5-6 years	25-plus years

Crop Expectations – Tree Fruit and Pecans

CROP	TIME TO FIRST CROP	TIME TO FULL CROP	LIFE EXPECTANCY
Peaches	3 years	5-6 years	17-20 years
Apples (dwarf)	2 years	4-5 years	15-20 years
Apples (semi-dwarf)	3-4 years	5-7 years	20 years
Pears	4-5 years	7-9 years	20 years
Pecans	8-10 years	15-plus years	40-plus years

Ease of Pest Control

Before Spotted wing Drosophila:

- Blueberries
 - Rabbiteye
 - Highbush
- Muscadines
- Blackberries
- Strawberries (plasticulture)
- Raspberries
- Grapes
 - American bunch
 - French-American hybrid
 - *V. vinifera*
- Stone fruits
- Apples



Currently:

- Muscadines
- Strawberries (spring crop)
- Bunch grapes
 - American
 - French-American hybrids
 - *V. vinifera*
- Blueberries
- Blackberries
- Raspberries
- Stone fruits
- Apples



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