



So You Want to Grow Grapes in Tennessee

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Tennessee has a long history of grape production. Most recently, passage of the Farm Winery Act in 1978 stimulated an upsurge of interest in grape production. If you are considering growing grapes, the following information may be useful to you.

1. Have you ever grown grapes before?

Successful grape production requires a substantial commitment of time and money. It is a marriage of science and art, with a good bit of labor thrown in. While our knowledge of how to grow a crop of grapes continues to expand, we always need to remember that some crucial factors over which we have little control, such as the weather, can offset even our best efforts.

2. What is your intended market?

- Own use
- Commercial
 - table
 - wine
 - both

Most grape production in Tennessee is for wine. A few vineyards sell a portion of their crop for fresh consumption. Either way, it is essential to thoroughly investigate the market to help you decide what to plant. If you want to sell fruit to a winery, one of the first things you should do is visit several wineries. This will help you determine their needs and, therefore, what types of grapes and varieties you might plant. Even if you plan to develop your own

winery, the time you spend visiting others will be a good investment.

3. What to grow

- American
 - seeded
 - seedless
- French-American hybrid
- Vitis vinifera*
- muscadine

Of the five main types of grapes grown in the United States, American and French-American hybrid varieties are the best adapted to Tennessee growing

conditions. American grapes are versatile. They may be used for fresh consumption (table grapes) or processed into wine, juice, jellies or some baked products. Seedless grapes are used mostly for fresh consumption, with very little demand for them in wines. Yields of seedless varieties do not match those of seeded varieties. They are also more susceptible to certain diseases than the seeded American varieties.

French-American hybrids are crosses between American bunch and *V. vinifera* grapes. Their primary use is for wine.

Vitis vinifera varieties are used for wine. Winter injury and disease problems seriously curtail their growth in Tennessee.

Muscadines are used for fresh consumption, wine, juice and jelly. Vines and fruits are not very susceptible to most insects and diseases. The primary drawback to muscadine culture in Tennessee is a lack of sufficient cold hardiness. Injury to the aboveground portion of the plant is quite likely to occur at



temperatures of 10 degrees F or lower. Death of these tissues will occur at 0 F.

Not only is it essential to discuss the type(s) of grape(s) to grow, but the varieties of each as well. Within each type of grape, there are many varieties. Considerable differences exist among these varieties with regard to disease susceptibility, cold hardiness and fruit characteristics. Extension PB 746, ***Tree Fruit, Tree Nut and Small Fruit Cultivar Recommendations for Tennessee***, available at your county Extension office, lists varieties that have performed satisfactorily in Tennessee or areas with similar growing conditions.

4. Type of plant (rooted cutting vs. grafted vine)

For American, French-American hybrid and muscadine grapes, purchasing good-quality rooted cuttings is suggested for most situations. Such vines are less expensive than grafted vines and have the advantage of remaining “true-to-

type” if cut back to ground level and allowed to resprout, which may be necessary in the event of cold injury or when trunks are being renewed. In a replant situation (where vines have recently been removed and new vines are being set in the same site), survival, growth and fruiting may be better with grafted versus own-rooted cuttings.

For *V. vinifera* varieties, grafted plants are generally suggested. Certain rootstocks provide resistance to grape root phylloxera, an insect that attacks the roots of *V. vinifera* varieties. Desirable growth characteristics may be enhanced by these rootstocks. The primary disadvantages of grafted vines, in addition to price, include the presence of the graft union, which serves as a possible point for crown gall development, and the loss of the variety if the vine is killed to ground level. New sprouts that develop following dieback of the portion of the vine above the graft would have characteristics of the rootstock and not the desired variety. To lessen chances of this occurring, soil is frequently

mounded around the base of the vines in the fall to protect the lower trunk and the graft union. This mound must be removed the following spring. Mounding can be done mechanically. However, it is an expensive practice that has the potential of doing damage to the trunks if not done correctly.

5. Start small

Setting a vineyard is a fairly expensive operation requiring a substantial investment in money, management and labor. Care of the site prior to planting and of the vineyard for the first few years of its life will determine the vineyard's potential throughout its life. For the new grape grower, it is fairly common to be overwhelmed by the time and effort needed to set and develop a vineyard. Every planting is a new learning experience – especially the first one. It is for these reasons that you should start out with a small planting. Lessons learned with it will prove invaluable in subsequent plantings. How small is small? Here we have to go back to point number 2, What is your intended market? If you intend to sell fruit to a commercial winery, you need to discuss with the winery operator what he or she would consider the minimum quantity of juice of a given variety in which the winery would be interested. Wineries generally are not very interested in purchasing only enough fruit to yield a partial tank of juice. The following figures will help you get an approximate idea of how many vines to plant:

**Expected yield
(per plant or per acre):
10 to 15 pounds per vine
3 to 5 tons per acre**



Yields will vary considerably depending on the variety, training system, soils, water, fertilizer rates, losses to pests and several other factors. However, the figures presented above are reasonable.

**Gallons of juice per ton of fruit:
130 to 150 gallons**

This figure will vary with the type of grape and with the individual winery. Expect muscadines to yield closer to the 130-gallon figure and other types of grapes to yield closer to the 150-gallon figure or higher.

6. Time until the first crop

Site preparation for a vineyard should begin at least six months to a year in advance of planting.

Expect to receive the first commercial crop of grapes four years after planting. Under good conditions, it may be possible to reach this point in three years. However, under less favorable conditions, it may take longer than four years. Full production in the vineyard should be recognized about one year following the first commercial crop.

7. Establishment costs

Plants:

Plant costs may vary depending on the nursery, quantity of vines to be purchased, variety, grafted vs. non-grafted vines, patent charges and grade or size of vines. Therefore, the prices listed are not absolute, but should be sufficient to give you a good basis for planning purposes.

1-year, #1 vines

**American varieties
\$0.95 to \$1.50 each**

**French-American varieties
\$1.35 to \$1.90 each**

**Seedless varieties
\$2.30 to \$2.60 each**

***Vitis vinifera* varieties
(grafted)
\$3.50 to \$5.50 each**

**Muscadines
\$1.40 to \$5.00 each**

Expect prices to be substantially higher if your total order is less than 50 plants. Price discounts may be given as the

number of vines ordered exceeds certain levels.

Trellises: (costs will vary depending on source and quantity) The trellis should be designed to support the vines and the crop, permit good light penetration throughout the canopy and facilitate ease of management of the planting. A good trellis is expensive to construct. However, a weak trellis, while being less expensive initially, may turn out to be much more expensive if it fails during the growing season or requires additional upkeep.

Cost of materials for a single wire trellis, such as would be used with the bilateral cordon system, has been estimated at \$3,500 per acre (2001 prices). Labor costs would be extra.



Item	Specifications	Unit Cost
end posts	10 ft. in length x 5 to 6 in. diameter	\$14.80
line posts	Wood, 8 ft. in length x 5 to 6 in. diameter	9.95
	Steel, 8 ft. length	3.10
wire	# 11 crimped, high-tensile with class III galvanized coating, 250 ft. roll	7.95
fence staples	1 inch, \$0.69 per pound	0.03
anchors	mobile home type	6.00
deadend	wire tightener	2.40
splice	repair wire (splice)	3.76
cross arms	4 ft. length for Geneva Double Curtain System	7.00

Example 1:

Plant spacing 8 ft. inrow x 10 ft. between rows.

Row length - 240 ft. (end post to end post)

Training system - **bilateral cordon**

(240 ft. inrow length x 180 ft. (18 rows 10 ft. apart) = 0.99 acre)

# items/row	Item	unit cost	row cost	acre cost
2	end posts	\$14.80	\$29.60	\$532.80
14	line posts (wood)	9.95	139.30	2507.40
	(1/2 steel @\$3.10, 1/2 wood@ \$9.95)	9.95	91.35	1644.30
1 roll	wire	7.95	7.95	143.10
2	anchors	6.00	12.00	216.00
2	deadends	2.40	4.80	86.40
14	Staples	0.03	0.42	7.56
			<u>\$194.07</u>	<u>\$3493.26</u>
	(Substituting steel line posts for 1/2 the wood line posts)		146.12	2630.16

Example 2:

Vine spacing 8 ft. in row x 12 ft. between rows

Row length 240 ft. (end post to end post)

Training system - Geneva Double Curtain

(240 ft. inrow length x 180 ft. (15 rows 12 ft. apart) = 0.99 acre)

# items/row	item	unit cost	row cost	acre cost
2	end posts	\$14.80	\$29.60	\$444.00
14	line posts (wood)	9.95	139.30	2089.50
	(1/2 steel @\$3.10, 1/2 wood@ \$9.95)	9.95	91.35	1370.25
2	anchors	6.00	12.00	180.00
2	deadends	2.40	4.80	72.00
14	staples	0.03	0.42	6.30
16	4' crossarms	7.00	112.00	1680.00
3	rolls wire	7.95	23.85	357.75
		<u>\$48.13</u>	<u>\$413.32</u>	<u>\$6199.80</u>
	(Substituting steel line posts for 1/2 the wood line posts)		365.37	5480.55

While substituting steel line posts for wood may be a way to significantly lower trellis costs, switching entirely to steel posts is not advisable. The primary function of a line post is to hold trellis wires at set distances aboveground. Steel posts will perform this task about as well as wood. However, line posts must also resist lateral stresses on the trellis encountered when there is a curve in the trellis or when wind

pushes against the trellis.

Indications are that wood posts of the proper size set at the correct depth perform better. Finally, good, treated wood posts may outlast steel posts, thus giving the trellis a longer lifespan. For these reasons, replacing more than one-half of the wood line posts with steel posts is not recommended.

The publication, *Cost of Producing Grapes for Wine and*

Juice Processing in Arkansas,

1995, lists the cost of labor involved in installing a single wire bilateral cordon trellis as \$93.50 per acre and \$7.89 annual costs for maintaining the trellis. The per-acre cost of labor for installing a 3-wire bilateral cordon trellis is listed as being \$108.50 with an annual maintenance cost of \$9.90. These figures need to be adjusted to reflect current wage levels.

8. Costs/year (non-bearing)

Planting costs include site preparation, price of vines (see #7) and the actual cost of planting the vines. If the trellis is not due to be constructed before or shortly after planting, the cost of a stake on which to train the developing trunk should be included in planting costs.

During the period from when vines are set until the first crop year, the following production practices need to be addressed:

pruning – Vines should be pruned back to a single shoot, which should then be cut back to two buds before growth starts the year of planting.

training – Loosely tie one developing shoot to the stake or to the trellis to promote the development of a straight trunk on the vine. Excess shoots should be clipped off or pinched back to promote the maximum growth in the remaining shoot. The straighter the trunk, the more productive and hardy the vine will be. In addition, vines with straight trunks are less apt to be hit by equipment than vines with trunks that bow out into the between-row area.

fertilization – Fertilize vines about one month following planting. In subsequent years, vines should be fertilized in late winter. Depending on the amount of growth received, additional light fertilizer applications during early summer may be beneficial for nonbearing vines. Regular soil testing is a valuable tool for developing good fertilization practices. Tissue analysis is another valuable tool for use in formulating optimum fertilizer rates.

weed and grass control – Weeds and grasses compete more successfully for water and nutrients than young vines. Therefore, it is advisable to maintain a clean area extending at least 2 to 3 feet out from the base of the vine. With young vines, few herbicides are labeled or safe to use. Be sure to refer to label recommendations for the proper herbicides, rates and timing. Mechanical cultivation may be used. However, take care to avoid damaging the trunks of vines or cultivating too deeply (in excess of 2 inches) and damaging the root system. String trimmers should never be used around vines as they can seriously damage trunks.

pest control – While most pests cause problems with the developing crop, some pests can damage the vine itself. Japanese beetles can damage leaves, resulting in reduced growth. Mildew can become a problem in nonbearing vines. Control may be based on prevention, as is the case with mildew, or eradication. Refer to pest control information available at your county Extension office.

9. Costs/year for bearing vines (excluding harvest costs)

Commercial growers estimate annual production costs at about \$1500 per acre. Included in this figure are pruning, fertilizing, pest control (including weeds and grasses), canopy management practices (such as cluster thinning, shoot positioning and leaf removal), trellis repair and mowing. Actual costs will vary from year to year and from grower to grower. Some variation can be attributed to the type of grape and to the design of trellis used. These production expenses will not vary much among years in a bearing vineyard.

10. Vineyard site selection (where to grow)

For the commercial producer, site selection is probably the most important of the thousands of decisions that will have to be made throughout the life of the vineyard. Almost everything that happens in the vineyard will be at least somewhat influenced by the site.

Accessibility is an important consideration for the producer who wants to market on the farm. Is the site close and convenient for the customers? Is it visible? Are the roads leading to it paved and wide enough to permit safe passage? If you will be transporting your crop to market, distance is still an important factor, as are road conditions.

Several site characteristics should be considered from a production standpoint. Elevated areas (in comparison to the immediate surroundings) tend to be less prone to frost and disease pressures. The incidence of winter injury to trunks and the chances for disease buildup may be less on vines situated on a northeastern slope than others. While grapevines will grow and fruit well on very steep land, such a site may be dangerous to work. Considerable time will have to be spent with equipment in the vineyard (removal of prunings, fertilizer applications, spraying, mowing and harvest). If the site is too steep to permit safe operation of equipment, it should be avoided.

Grapevines grow and fruit best on soils with good internal and surface drainage characteristics. The more area, both vertically and laterally, that the roots can occupy, the more consistently productive the vine will be. Do not plant in soils offering less than 30 inches of rooting depth. Excessively wet soils, especially during the growing

season, will stress vines and lead to their decline or death. Unless irrigation is to be used, drought-prone soils should be avoided. Highly fertile soils are not good vineyard soils. The lush vine growth on such soils will provide excessive shade, which will result in poor fruit quality and reduced yields while promoting high disease pressure. Fertilizers can be added to soils that are low to moderate in fertility to give the desired response. Information about soils and soil testing can be obtained at your county Extension office.

11. Quality, quality, quality

You have no doubt heard the phrase, "Garbage in, garbage out," in reference to computers. Well, the same is true for grapes and wines. You cannot make good wine out of poor-quality grapes. Enologists (winemakers) claim that upwards of 90 percent of wine quality is made in the vineyard. It is the challenge for the winemaker to maintain the quality and the characteristics of the grapes throughout the winemaking process.

Grape growers and winemakers are dependent on each other for their success. It is not reasonable to expect wineries to purchase fruit that is not at the correct stage of maturity or with high levels of damage due to diseases or insects. Likewise, wineries need to be realistic in their demands. It is a mistake to delay harvest until fruit reaches a Brix (sugar) level that may be above what is normally attained for that variety. Unnecessary delays in harvest may result in heavy losses due to shatter (berry drop, birds, insects and/or diseases) without any increase in fruit quality. In some situations, fruit

quality characteristics for wine may actually decline.

12. Timetable for vineyard development:

Preplant practices

Much of the work in establishing a vineyard takes place prior to planting the vines. In addition to deciding where to plant, what to plant and what market to pursue, several things can be done to prepare the site for planting and to promote good growth and survival of the vines.

Soil testing should be done at least six to 12 months prior to planting. Information and materials for soil testing may be obtained at your county Extension office. Lime

and/or nutrients found to be needed should be applied well before planting.

Noxious weeds should be controlled prior to planting. Herbicides that are not labeled for use in vineyards, but with no persistent residues that would harm young vines, may be used at this time. In fields having a desirable sod cover, tillage or the use of an appropriate herbicide may be used to prepare a vegetation-free strip in which the vines will be planted.

Where necessary, the vineyard site may be seeded to a desirable sod in advance of planting. The grass between rows will provide support for equipment travel and serve as a deceleration and



diffusion strip for runoff water, thus lessening the threat of erosion.

Order vines several months before planting time. To assure receipt of certain varieties/ rootstocks, it may be necessary to order a year or more in advance.

Planting

The best time to plant new vines is in late winter to early spring. In Tennessee, we occasionally experience radical temperature changes in late fall to early winter. New vines could be injured or killed if set prior to such an event. Also, it is difficult to get dormant vines from many nurseries prior to this time. It is important to have vines planted before warm weather begins. Plants that are set late may not survive and grow off well the first summer, especially if adequate rainfall is lacking.

Since the vines to be set will be relatively small, it is not necessary to dig a big hole to accommodate the root system. It is important, however, to dig a large enough hole to allow the roots to be spread out. Having all the roots confined to a small area or severe root pruning will weaken the plant and reduce survival rates.

If the trellis has not been constructed at the time of planting, a stick, such as a tomato stake or tobacco stick, should be driven into the ground next to the base of the vine. When the new shoot(s) start to grow, they can be loosely secured to the stick to develop a straight trunk.

New vines should be pruned before growth starts. Remove all shoots except one and prune it back to two buds. You need one bud for the trunk. The second bud is a back-up if the first bud should be injured or destroyed.

Post-plant (nonbearing)

If the trellis was not constructed before or at the time the vines were set, it should be built before the first dormant pruning, unless vines have not made enough growth to be trained to the trellis.

Early in the life of the vineyard, your primary objective should be to get the vines trained to the trellis. Pruning should focus on trunk development the first and possibly the second years. Once the trunk has been developed, canes or cordons can be selected.

Although the vineyard is not bearing fruit at this time, it is still necessary to protect it from certain pests that can destroy enough leaf area to reduce vine growth. Grasses and weeds should also be controlled, as the competition for water and nutrients can result in greatly diminished vine growth.

Grape vines should be fertilized each year, including the year of planting. Nonbearing vines should be fertilized before growth starts in spring. Weak vines might need a supplemental fertilizer application in late spring to early summer.

13. Annual production calendar:

pruning – later winter to early spring

vineyard floor management – late winter to early spring

fertilization – one month prior to the start of growth

pest control – dormant stage until harvest, possibly with one or two postharvest sprays

cluster thinning – as soon as fruit set is evident

leaf removal – about four weeks prior to anticipated harvest

harvest – late July through September, depending on varieties; October harvest for muscadines

vineyard sanitation – after harvest remove dead vines, repair trellises, eliminate problem weeds.

14. Harvesting:

When to harvest will depend on the use of the fruit. Table grapes and juice grapes should be harvested when they are fully ripe. Grapes to be used for jelly may be harvested prior to full ripeness to lessen problems of crystals in the jelly.



Grapes to be used for wines should be harvested when the sugar level (degrees Brix), juice pH and total acidity reach the desired point for the type of wine to be made. As grapes ripen, sugar levels in the fruit will increase, total acidity of the juice will decrease and juice pH will increase. Crop sampling is essential to determine the optimum time to harvest. Close contact with the winery as harvest approaches is essential.

Grapes may be harvested by hand or mechanically. Mechanical harvesters are expensive and are, therefore, not in widespread use with small growers. Hand harvesting involves cutting the entire fruit cluster (except for muscadine where individual berries are harvested). The fruit is then put in lugs for transportation to the winery .

Ideally, grapes should be harvested early in the day and transported to the winery before the “field heat” gets too high. Unless refrigeration is available, it is a serious mistake to hold harvested fruit for more than one day before delivery to the winery, as it will deteriorate seriously in quality.

15. Nurseries:

O rder grapevines from reputable nurseries. It is not necessary to restrict orders to nurseries located in or near Tennessee. If the varieties to be ordered are those adapted to the state and if the nursery does its job well (including shipping the vines), vines from nurseries located in other parts of the country will be fine.

Ordering “bargain” vines is a bad idea. Beginning a vineyard with less than the best quality plants available is false economy. Weak vines may have high mortality rates,

may grow slowly or may be infected with diseases that will compromise vine performance. In addition, the chances of getting the wrong varieties may be greater if ordering from unknown nurseries. Nurseries that have been in business several years and that have built good reputations will stand behind their vines.

16. Expected returns:

- no crop for the 1st and 2nd years following planting
- light crop the 3rd year
- first commercial crop the 4th year
- full crop the 5th and succeeding years

Yields will depend on the type and variety of grapes grown, the training system and trellis used, pruning levels and other cultural practices, such as fertilization and cluster thinning. A yield of five tons per acre is a reasonable average for all types of grapes except for *V. vinifera* varieties. With these, limited experience would suggest yields in the range of 1500 pounds per acre or less.

17. Equipment needs for a commercial vineyard:

tractor – size will be dictated by the type and size of air blast sprayer purchased.

trailer – for many jobs associated with planting and caring for a vineyard, a trailer that can be pulled behind the tractor will be virtually indispensable.

sprayer – an air blast sprayer is highly recommended by the time the vineyard starts to produce a crop. Prior to that time, the same sprayer may be used for both weed control sprays and sprays for the vines, if it is thoroughly cleaned following herbicide applications.

weed sprayer – purchase a sprayer that can be accurately calibrated and handle both liquid and wettable powder herbicides.

post hole auger – for planting vines and for constructing the trellis, an auger with a 6-inch and a 12-inch diameter bit is suggested.

pruners – these will be needed at planting time to do necessary root and top pruning.



cultivation equipment – a plow, disk and a harrow will be needed to prepare the site for planting grass, unless the field already has a good sod cover. It may be possible to hire a local farmer to prepare the site.

mower – either a rotary mower or a flail mower will do a good job cutting grass. A flail mower can also be used to chop prunings, because it chops them much finer than a rotary mower.

lugs – the number of lugs you need will depend on the number of vines of a given variety or varieties that will need to be harvested at one time. One standard grape lug will hold about 25 to 30 pounds of grapes.

truck – a small truck is valuable for numerous chores around the farm. Depending on your need for a bigger truck, you may choose to lease a truck at harvest time to transport fruit to the winery .

You may choose to have additional equipment. However, this list contains the minimum number of items needed in a commercial vineyard operation.

18. Labor needs:

Most operations in a vineyard require a lot of hand labor. Pruning, thinning, cluster thinning, leaf removal and harvest are generally done by hand in all except the larger vineyards. Due to the short period of time during which a crop should be picked, harvest is one of the most intense times and requires more supplemental labor than other vineyard operations.

19. A vineyard isn't forever:

With good cultural practices and cooperation from Mother Nature, a vineyard should live and be productive for many years. Grape root borers can limit the productive life of the planting if allowed to go unchecked. Severe cold temperatures during winter can damage or kill aboveground parts of the vine, especially in cold-sensitive grapes such as vinifera and muscadine. Trunk damage due to cold or mechanical injury can weaken the vine and cause a loss in productivity. To avoid decline due to trunk injury, developing multiple trunks and replacing trunks at set intervals, or sooner if needed, will extend the productive life of the vine.

Even if the vineyard stays healthy and productive, there may come a time when a shift in consumer demand necessitates removing vines and setting new ones of different varieties. While removing all or part of a productive vineyard is hard to accept, maintaining varieties for which there is no longer a good market is a poor economic decision. Due to the introduction of superior varieties, pest-resistant varieties or a loss of market, new plants are essential for growers wishing to stay in business.

Accurate records of problems in a vineyard, yields and returns from a vineyard are valuable in determining when vineyard replacement should be considered.

20. Success depends on both the growers and the wineries:

The success of the wine grape grower depends on the success of the wineries. The success of the wineries depends on

the success of the grape growers. Wineries depend on growers for timely deliveries of good-quality fruit of the needed type and variety.

Grape growers depend on the wineries as a market for their crops at a reasonable price. In Tennessee, farm wineries cannot survive without a source of in-state fruit. Likewise, Tennessee growers cannot survive without the in-state market for their fruit that the wineries provide. Wineries cannot be expected to purchase fruit in excess quantities, of poor quality or of a variety that they cannot use or at an excessively high price. Likewise, growers should not be expected to supply fruit at low prices or to be penalized for the inability to attain unrealistic quality parameters. Knowledge of the challenges that each group faces will help to make better relationships for everyone.

21. Long-term relations with wineries:

Don't wait until just prior to harvest to start talking with wineries. Keep in touch with the wineries that you sell to throughout the year. If you should experience loss of a part of your crop due to winter damage or frost or if it looks like you will have a full crop, let the winery staff know so they can make any necessary adjustments in their long-range planning. Winery needs are dependent on sales. If the winery anticipates an increase in the need for a certain type or variety of grape or a change in varieties needed, the sooner you know about this, the more quickly you can make any changes in your operation to respond to this need.

Past performance will affect future sales. If you agree to sell fruit to a winery, deliver quality, deliver the amount agreed upon and

deliver the fruit when it is ready and is needed by the winery. Wineries like to deal with dependable growers for delivering good fruit. The more they know about your vineyard and all the effort you put into it, the more apt they are to want a long-term relationship with you as a grower.

22. Other fruits for wine:

While grapes constitute the main fruit used by Tennessee wineries, several others are used as well. Blackberries, raspberries, blueberries, apples and peaches are all used. These crops can be grown in Tennessee and may represent a way to diversify your production activities to spread the risk of crop failure or to increase your market appeal. Talk with winery operators regarding their need for fruits other than grapes.

23. Major pest problems:

Although good-quality grape crops are being grown in all parts of Tennessee, there are several pests that can cause severe problems in either the fruit or the vines. Grape root borers can weaken vines and cause their demise. Black rot is the most important grape disease in the eastern United States.

Recommendations for control of these and other pests of grapes may be found in Extension PB1175, **Commercial Small Fruit Spray Schedules**. This publication is updated annually and is available without charge at your county Extension office.

24. Taking the first step:

Before doing anything about starting your own vineyard, try to find out as much as you can about growing and marketing grapes. If producing wine grapes is

your goal, visit several wineries and find out as much as possible about their needs and expectations. If possible, visit grape growers in your area. Contact your county Extension office for any publications and information they may have concerning grape production. Extension agents can provide valuable information concerning soils and production. Join associations that focus on grapes and wines. In Tennessee, the Tennessee Viticultural and Oenological Society (TVOS) is made up of persons interested in grapes and wines on all levels. The Tennessee Farm Winegrowers Association is made up of commercial growers and wineries. A lot of valuable information is presented and contacts can be made via their meetings and the TVOS newsletter.

25. References (the more you know, the better you grow)

A lot of information concerning grape production exists. While it certainly isn't possible to read everything that has ever been written about grape production or talk to everyone who has knowledge of this subject, it surely is worth your time to learn as much about grape production and marketing as possible in advance of making a major commitment in time and money. Keep in mind that grapes are grown throughout the world in many areas and that growing conditions vary considerably among these areas. Therefore, not all production information is adaptable to all areas. The following references may offer a good "starting point" to acquaint yourself with some aspects of grape production.

Tennessee Extension resources:
PB746, **Recommended Tree Fruit, Tree Nut and Small Fruit Cultivars for Tennessee**, available at your county Extension office.

PB1475, **Grape Growing in Tennessee**, by David W. Lockwood. This publication is available at your county Extension office.

Other sources:

Miscellaneous Bulletin 111, **Cultural Practices for Commercial Vineyards**, by T. D. Jordan, R. M. Pool, T. J. Zabadal, and J. P. Tomkins.

Order from:

Distribution Center
7 Research Park
Cornell University
Ithaca, NY 14850

Compendium of Grape Diseases.

Order from:

The American
Phytopathological Society
3340 Pilot Knob Rd.
St. Paul, MN 55121

The Mid-Atlantic Winegrape Grower's Guide, by Tony K. Wolf and E. Barclay Poling.

Order from:

Publications Office
Department of Agricultural
Communications
North Carolina State University
Campus Box 7603
Raleigh, North Carolina
27695- 7603

Sunlight Into Wine, by Richard Smart and Mike Robinson.

Order from

Australian Industrial Publishers
Pty Ltd. 2 Wilford Ave.
Underdale SA 5032 Australia

PB1689-1M-12/01
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