

# AGRICULTURAL ALTERNATIVES

agalternatives.aers.psu.edu

## Wine Grape Production

Grapes have been cultivated in Pennsylvania since the 1600s, and the first commercial vineyard in America was located here in the late eighteenth century. Grapes are produced in many areas throughout the Commonwealth and lend themselves well to small-scale and part-time farming operations. Due to the nature of grape production, considerable production can be obtained on a limited amount of land. Depending on the variety produced, marketing can be either wholesale (for juice, wine, or the fresh market) or retail (primarily fresh table grapes). This marketing diversity can easily fit into current production practices. Because of the high cost of establishing a vineyard, you should carefully research all aspects of this enterprise, including market demand, before investing in wine grape production.

According to the 2002 *Pennsylvania Orchard and Vineyard Survey*, Pennsylvania has 250 commercial vineyards comprised of 11,000 acres of grapes, which produce an average of 5.8 tons per acre for a total production of over 63,600 tons of grapes. The industry generates an almost \$15 million income for commercial vineyards. Vineyards with more than 20 acres make up 92 percent of the production in Pennsylvania. Concord grapes for juice account for 77 percent of total grape production, while table grapes account for only 2 percent. Although Erie County accounts for 72 percent of grape production in Pennsylvania, wine grapes are grown on a small scale throughout the state.

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There are 1,800 acres of wine grapes in cultivation, making up 12 percent of the total production. Native American varieties constitute the vast majority of wine grape production (primarily Concord, but also includes significant acreages of Catawba, Niagara, and other varieties). French-American hybrids (the most commonly grown varieties being Chambourcin, Vidal Blanc, Seyval Blanc, and Vignoles) account for 3 percent of the total production. Many of the newer vineyards are being planted with *Vitis vinifera* varieties including Chardonnay and Cabernet Sauvignon, which are classic examples of European wine grapes. These grapes are used to make fine wines that are produced by nearly 115 wineries now licensed in the Commonwealth. According to 2003 data, wine-making is the fastest-growing segment of the grape industry in Pennsylvania with an estimated total economic impact of \$200 million annually.

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## Marketing

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The market you choose to serve will have a large impact on which grapes are the best varieties for you to grow. Current markets for native varieties, such as Concord, Catawba, and Niagara, are not as lucrative as markets for French-American and *V. vinifera* hybrids. The price per ton for French-American and *V. vinifera* hybrids can be five to ten times higher than for native varieties. For native varieties, the goal is to produce as many tons per acre as possible due to their lower selling price. For hybrid and *V. vinifera* varieties used primarily for wine production, quality—not quantity—is the main production goal. Make sure you understand the quality requirements of the winemaker to which you are selling before selecting varieties for your vineyard. Quality grapes are of paramount importance to the winemaker because they have a direct impact on the quality of the wine. French-American and *V. vinifera* hybrids are more difficult to produce and represent additional risks to the grower. The impact of losses to birds, disease, and frost should be considered when developing your marketing plan. For more information on marketing, please consult the *Agricultural Alternatives: Fruit and Vegetable Marketing for Small-scale and Part-time Growers*.

If you are producing grapes for the juice market, whether for a local winemaker or for wholesale, your market should be established well before production begins. Depending on your location, juice marketing may also require hauling the crop considerable distances because most bulk wine and juice producers and brokers are located in either Erie County, Pennsylvania, or western New York. The expense of hauling your grapes to market is a major consideration and should be included when evaluating the profitability of wine grape production. However, with many areas now having small wineries, hauling expenses may not be a potential limiting factor.

If you are selling juice, you will need to purchase a press and have adequate facilities and equipment for pressing, storing, and transporting the juice. However, local wineries and home winemakers may be a ready market for fruit or juice produced at your operation. For operations smaller than 5 acres, this should also be considered in the marketing plan.

The growth of small wineries throughout Pennsylvania has been encouraged to promote tourism and recreational development by the Limited Winery Act that was first passed in 1968. This law is enforced by the Pennsylvania Liquor Control Board (PLCB) and gives preferential treatment to wineries producing 200,000 gallons or less of wine per year. The law allows wineries to sell wine directly to the public at the winery and up to five PLCB-approved retail locations and obtain licenses to participate in off-premises wine and food expositions. One aspect of this law that provides a marketing niche for wine grape growers is the requirement that limited

wineries primarily use Pennsylvania grapes. The limited winery can apply for a license from the PLCB that allows them to use up to 25 percent “permitted fruit” (imported fruit or juice derived from fruit produced within 350 miles of the winery), but this means there will always be a strong demand for Pennsylvania wine grapes. For more information on limited wineries and their licensing requirements, visit the PLCB Web site (<http://www.lcb.state.pa.us/>).

## Site Selection

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Site selection is possibly the most important component when planning a vineyard. Site selection will have an impact the health of the vines, the amount of production, the quality of the fruit, and the quality of the end product if you are growing for juice or wine.

For a vineyard location, a deep, well-drained soil on a south- or east-facing slope is desired. A soil depth of 30 to 70 inches is needed to promote optimal root growth. Deep root penetration is necessary for a healthy root system and vine. Shallow soils tend to be poorly drained, and grapes do not thrive when their roots are continuously wet. Wet roots promote fungal diseases that attack the root system and drastically shorten the life of the vines. South- or east-facing slopes promote faster drying of the vines and longer hours of sunlight to ripen the fruit in the fall. Digging one to two pits 3 or more feet deep with a shovel or backhoe will help you determine your soil structure.

An ideal site has a gentle 3 to 10 percent slope, although steeper slopes may be used. If your site is prone to excessive winds, wind breaks should be planted at the time the vineyard is established. Proper air drainage will also promote drying of the vines in the morning and after rainfall. Vines that remain damp for extended periods are susceptible to fungal diseases that will require additional fungicide applications. Good air drainage will also reduce the chance of frost damage to the crop during late spring and early fall cold snaps. If you are a new resident to the area where you will establish your vineyard, consult local growers about the history of late and early frosts, prevailing winds, and precipitation microclimates in your area.

**Table 1. Relative cold-hardiness of grapevines grown in Pennsylvania.**

VERY HARDY	HARDY	MEDIUM	TENDER	VERY TENDER
Concord	Auroe	Alden	Chardonnay	Gewurztraminer
DeChaunac	Canadice	Chancellor	Souffolk Red	Sauvignon Blanc
Marechal Foch	Catawba	Chambourcin	Interlaken	Pinot Gris
	Delaware	Chelois	White Riesling	
	Fredonia	Chardonnay	Pinot Noir	
	New York Muscat	Himrod	Cabernet Sauvignon	
	Niagara	Lakemont	Cabernet Franc	
	Vignoles	Seyval		
		Steuben		
		Vidal		

SOURCE: Michigan State University

## Land Preparation and Preplanting

A soil test is recommended one year prior to planting the vineyard. This will establish a baseline for future soil tests taken after the vineyard has been established for several years and will help determine if organic matter has built up on the vineyard floor. You will need to remove weeds and trees that have grown in your chosen site.

Depending on the type of grapes you plan to grow, the pH of the soil can range from 5.5 to 7.0. The species *V. labrusca*, which is primarily grown in colder and eastern climates of the United States, requires a soil that is more acidic and can grow in soils that have a pH of 5.5 or slightly below. *V. vinifera* requires a soil that is more alkaline and can grow in soils with a pH of 7.0 or slightly higher. Either species can adapt to the climate in which you live depending on the variety of grape you choose. For general purposes, the pH should range between 6.0 and 7.0. You should test the soil for all macro- and micronutrients associated with grape production. Soil test kits may be obtained from your local extension office.

You can remove perennial weeds by mowing, using herbicides, or a combination of both, or by clean-tilling the land and planting a cover crop on the vineyard floor. Although under ideal conditions it is best if the vineyard floor is clean-tilled on a regular basis, in most situations a cover crop is necessary to reduce soil erosion. You should also install any drainage tile you may need prior to planting the vineyard. All drainage tiles should be installed beside the planned rows so they do not interfere with installing the trellis system after planting.

A nematode survey should also be conducted. Nematodes can damage the root system of the vine, resulting in poor or uneven growth in the vineyard. Any nematode treatments required must be completed prior to planting. Nematode survey kits can be obtained from your local extension office.

## Ordering Vines

The beginning grower should order vines from a reputable nursery one year before planting. Grapes are sold as rooted cuttings (“own-rooted” plants) or as grafted plants. Whichever vines you choose, they are both usually sold as bare-rooted dormant plants. Bare-rooted plants come with an established root system but have no soil on these roots.

If you are using grafted plants, a balance between the rootstock and variety (scion) is critical to vineyard longevity and optimal production. This balance occurs when the vines are well matched to the soil type and structure. You should have the necessary preplanting tasks completed and be ready to plant in the spring as soon as the soil can be worked.

*V. vinifera* requires grafting to combat their susceptibility to the root louse Phylloxera. These root lice are present in many soils in the United States. Grafting the variety onto a resistant rootstock such as *V. riparia* (which is commonly used in the eastern United States due to the heavy soils) will solve this problem. Cultivar and rootstock selection should be based on the climate in your area, the intended use of the grapes, and the site you have selected.

**Table 2. Site criteria for planting grapes.**

CLASSIFICATION OF SITE	FREQUENCY OF TEMPERATURES OF -5°F <sup>a</sup>	FREQUENCY OF TEMPERATURES OF -10°F	LONG-TERM MINIMUM (°F)	SUITABLE GRAPE CULTIVARS
Excellent	Three times or less over 10 years	A maximum of once every 10 years	-10	All cultivars listed in Table 1
Good	Four times in 10 years	A maximum of once every 10 years	-15	All cultivars; however, tender and very tender ones will be injured in some years
Acceptable	Every year	A maximum of four times every 10 years	-15	Cultivars of medium or greater hardiness

NOTE

a. If winter temperatures reach -10°F five or more times in 10 years, and/or winter temperatures drop to -15°F three or more times in 10 years, this site is not suitable for grape production.

## Layout and Planting

Ideally, rows should be oriented so prevailing winds blow parallel to them to allow the vines to dry more quickly after a rain. Vines that dry quickly are less susceptible to fungal diseases. Although optimal row orientation for wine grapes in the Mid-Atlantic region is north to south (this allows for maximum sun exposure throughout the day), row orientation is usually a compromise between topography and climate. Row length is often determined by land features, but it can vary from a few feet up to 500 feet depending on the strength of the trellis system. Keep in mind that shorter rows will increase the overall expense of the trellis system because more end posts and anchors will be needed. Rows should be as long and straight as possible to facilitate the operation of machinery.

Once the row pattern and direction are established, subsoiling or ripping the rows is recommended. This will speed the planting process regardless of whether you plant vines with a shovel, auger, or an orchard tree planter. Vines should be planted as deep as possible (depending on the location of the graft union) to protect the roots from freezing in cold winters. The vines should be planted in holes large enough to accommodate the existing root system, ensuring that the roots point downward to avoid “J” rooting.

If you are planting “own-rooted” plants, there will be no graft union to contend with, but for grafted vines, the graft union should be placed 2 inches above the soil level. This will help ensure the vines do not send out shoots from above the graft union, called “scion rooting.” Since rootstock shoots are not the desired variety, you will need to control these to keep them from growing.

Grapes are commonly planted in rows 8 feet apart, but they can be as close as 4 feet between the rows, and the vines can be planted as close as 3 feet apart in the row.

High-density plantings are possible, but they come with higher establishment costs and require more intensive management. For example, a planting on a spacing of 8 feet by 9 feet will require 605 vines per acre, while a planting of 8 feet by 6 feet will require 908 vines per acre. The topography and farm machinery you have or plan to purchase are very important in determining row spacing. The variety and rootstock combinations you choose will also have an impact on spacing because vigorous combinations require more space to grow.

After planting, apply mulch around the vines to inhibit weed growth and increase organic matter in the soil. Mulch also helps to stabilize soil moisture. Provide plenty of water to newly planted vines to help the roots grow and ensure early establishment. Some fertilizer may also be necessary, so be sure to check your soil test and follow any recommendations.

## Trellis Construction

Once the vines are planted, the trellis system should be constructed followed by the installation of a drip irrigation system if one is planned. For more information on irrigation, consult *Agricultural Alternatives: Irrigation for Fruit and Vegetable Production* and *Agricultural Alternatives: Drip Irrigation for Vegetable Production*.

Each grape cultivar has its own growth pattern. The varieties you select will have a major impact on the type of production method or training system used. Native varieties (Concord, Catawba, and Niagara, for example) tend to grow in a willowy or downward pattern. European and many hybrid grapes (Catawba and Cayuga White) tend to grow in an upright pattern. The growth pattern has a major effect on the design of the trellis system.

There are several variations of trellis design. You can use a single stake at each vine, but training is more difficult with this method. There are also one-, two-, and three-wire trellis systems, with the two-wire system being the most popular. A lyre or movable wire system called vertical shoot position (VSP), which looks much like the three-wire system, is recommended for *V. vinifera* cultivars. The Geneva double curtain or “T” trellis may be used for more vigorous cultivars. The system you choose should be matched to the cultivar and be built from materials that can support the weight of the vines and withstand weather for many years.

The one-wire trellis consists of one wire approximately 52 to 54 inches from the ground. The two-wire trellis consists of two wires with the lower wire 40 to 46 inches from the ground and the top wire 12 to 14 inches above the first wire. The three-wire trellis consists of the first wire 30 to 36 inches above the ground with the second and third wires being 12 inches apart. The movable wire trellis allows for the top wire to be moved upward to support new growth and aid in sunlight and airflow distribution. The “T” trellis consists of the first wire at 52 inches above the ground with two wires 48 inches apart at 69 to 72 inches above the ground.

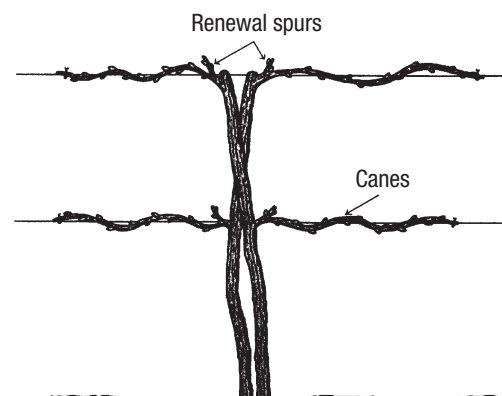
The end posts used for the trellis should be treated wooden posts approximately 6 to 8 inches in diameter set at a 75-degree angle from the ground for support. The posts in the row should be either steel posts or treated wooden posts that are a minimum of 3 inches in diameter. These posts should be 8 feet long to ensure the correct height of the top wire and should match your training system. The fruiting wire should be a minimum of 12.5-gauge high-tensile wire. Wires other than fruiting wires may be 9-gauge or more high-tensile wire. You will also need earth anchors at the end of the wire to provide tension for the wire. Other tools, equipment (wire tensioners and splicers, augers, or post drivers), and staples will be needed to construct the trellis. Check with your local building products supplier, farm supply store, or specialty vineyard supplier for more information.

## Pruning and Training

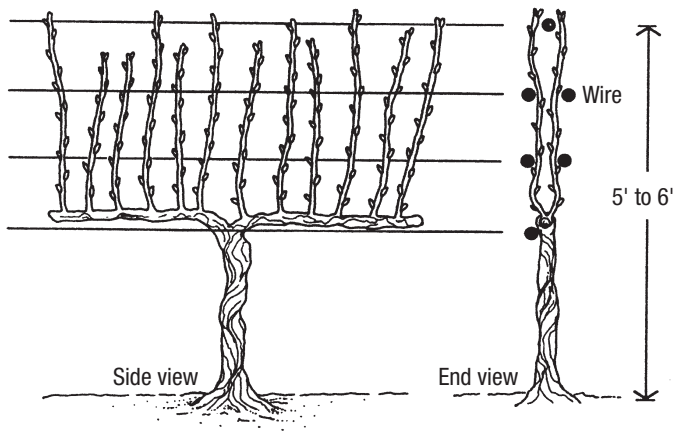
Grape vines should be pruned back to a single cane with two to three nodes/buds per cane/vine after planting. Once shoot growth begins and the danger of frost is over, remove all but the two strongest or largest shoots. This will establish a double trunk, which will provide more options for future production.

The first two seasons of your vineyard will be establishment years. Through the first 3 to 4 years of the vineyard, the graft union should be covered with soil during winter and uncovered in spring to lessen the chance of freeze damage. You should remove any flower buds that form to promote the growth of the vine and root system rather than fruit. Tying the newly planted vine to a wooden or metal stake will help ensure straight trunks for your vine. This is important because a well-rooted and well-established vine will produce quality grapes for 30 years or more. Straight trunks will also make future work in the vineyard easier when using mowers, sprayers, and harvest equipment. When the vine grows to the height of the first wire on your trellis (usually occurring during the first year), you should tie the vines to the wire for support.

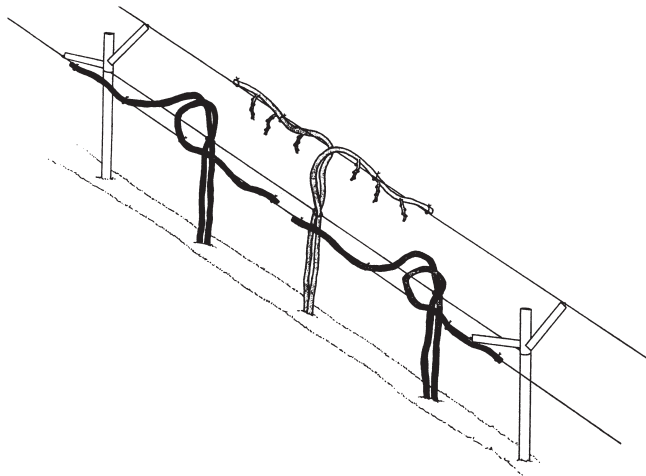
During the second year, the vine should reach the second wire of the trellis and the vines should also be tied to this wire. You are now ready to begin training the vines. The canes should be tied loosely to the horizontal wire and run parallel to the ground. These are called “cordons” and will be the frame of the vine for years to come. Establishing the cordons horizontally will help promote an even distribution of vigor and nutrients from the soil. Beginning with the third season you can begin to leave flowers and fruit to ensure you harvest a crop.



**Example of a four-can Kniffin training system on a two-wire trellis. (Courtesy of Michigan State University.)**



**Example of a vertical shoot positioning training system on a four-wire trellis. (Courtesy of Oregon State University and Michigan State University.)**



**Example of a Geneva double curtain training system on a "Y" trellis. (Courtesy of Oregon State University and Michigan State University.)**

Pruning is usually completed in February or March before the buds open (usually in April in southeastern Pennsylvania). Pruning is essential to control the size and shape of the vine. One to two layers of leaves on the canopy are considered best for bud and flower development. When pruning, you should leave three to four buds per foot of cordon. This will ensure enough buds and new growth to produce as many grapes as the vine will support. Mature vines will produce much more wood than they can support or is needed. More harm will be done by under-pruning than by over-pruning. Typically, 90 percent of the new growth is removed during the pruning process.

Because of the amount of new growth a vine produces each year, you can change training systems if you are unhappy with the existing one. This will usually decrease production for a year or two, but it is possible for the vines to adapt to changing conditions. A divided canopy system, for example, may help create a more balanced vine. For more details and information on pruning and training, consult *Fruit Production for the Home Gardener: A Comprehensive Guide*.

## Fertilization

Fertilization of grape vines should be done only if deficiencies are indicated on your soil test or leaf tests. Either commercial fertilizers or compost can be broadcast over the vineyard. There is some evidence that good compost may be better for the vine than commercial fertilizers. Compost should be used sparingly to reduce overfertilization of the vine. A layer of compost about one inch deep under the vine should be sufficient for the first two years.

## Pest Concerns

You will need to monitor several insects and diseases that may affect your vineyard. Whether you use synthetic pesticides or organic control practices, insects and diseases have the potential to severely affect the quantity and quality of your production. Several of the major grape insects include:

- Grape Berry Moth—feeds internally in the grape berries
- Grape Phylloxera—feeds on root system
- Grape Root Borers—larvae feed on roots
- Grapevine Girdlers—feeds on young and mature vines
- Japanese Beetles—feeds on foliage and possibly fruit

Disease control is greatly assisted by proper air drainage and pruning techniques, but other control measures may be needed. Several of the major grape diseases include:

- Black Rot—can infect fruit and possibly the vine
- Botrytis Bunch Rot—infests leaves and fruit
- Downy and Powdery Mildew—infests leaves and fruit
- Phomopsis—infests leaves, shoots, and fruit

For more information about control of grape insects and diseases, consult the *Fruit Production for the Home Gardener* or the most recent version of the *New York and Pennsylvania Pest Management Recommendations for Grapes*.

If potential wildlife damage is a concern in your vineyard, grow tubes may be necessary to protect the young vines, and other measures will be necessary to protect the crop. Birds are particularly troublesome pests because

they will begin feeding as soon as the grapes begin to ripen. There are several methods of bird control including balloons, electronic calls, and noise makers. Some of the most effective bird controls are noise makers, including LP gas cannons and pyrotechnics. Extreme care should be used with these devices. Other animals that will feed on grapes and vines include deer and raccoons. Deer can be controlled by constructing a fence around the vineyard. In Pennsylvania, the Pennsylvania Game Commission may be of assistance with purchasing and designing a fence.

## Harvest and Storage

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Depending on the climate in your area, wine grape harvest generally begins in mid-September and continues through mid-October, starting with white varieties and ending with red varieties. Grapes should be harvested at the highest quality to increase the quality of the end product. Grapes should not be harvested for one to two days following a rain to ensure that the clusters have dried. If a frost occurs, grapes should be harvested as quickly as possible before the quality declines due to the grapes drying.

Grapes need to be handled very gently to reduce the possibility of crushing the fruit in the containers. Grapes that have been crushed in transport will yield less juice for the winery. Another consideration when harvesting is foreign materials in the container. Leaves, vines, and other materials that often find their way into the container will create difficulty for the winemaker and could possibly lower the value of your crop.

Grapes may be harvested either by hand or mechanically. For the small-scale producer, harvesting by hand will be the primary method unless another producer in your area with a mechanical harvester is willing to custom-harvest your crop. If you are harvesting by hand, there are several things you will need before beginning the grape harvest. These items include:

- Harvest shears
- Containers for the harvested grapes (5-gallon buckets or plastic lugs and, if needed, large plastic or metal bins)
- First aid kit
- Bee sting kit or pen

Usually grapes are harvested into plastic buckets or lugs and then put into plastic or wood bins that hold up to 1,000 pounds of grapes. The grapes may be transported to the winery or market using either method and will depend on the size of the crop and type of equipment you have. An average person can harvest between 300 and 500 pounds of grapes per day, so plan your labor needs accordingly.

For optimum wine quality, grapes should be harvested when the sugar content reaches 18 to 22 percent at a pH of 3.0 to 3.5. Sugar content is measured with a device called a refractometer (available through vineyard supply companies). Harvesting the grapes based on sugar content will mean that the harvest may be extended because only the ripe clusters will be harvested each day.

Do not store unrefrigerated grapes for more than 12 hours as this will result in decreased quality and flavor. Refrigerated grapes should be stored at 35 to 40 degrees, but for no more than two to three days. Any extended storage will decrease the quality and flavor and possibly the value of the crop.

## Regulations

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All agricultural producers in Pennsylvania, including small-scale and part-time farms, operate under Pennsylvania's Clean Streams Law. A specific part of this law is the Nutrient Management Act. Portions of the Nutrient Management Act (Act 38) may pertain to you depending on the mix of enterprises you have on your farm (in particular, animal operations). Because all farms are a potential source of surface and groundwater pollution, you should contact your local Soil and Water Conservation District to determine which regulations may pertain to your operation. You should also check your local zoning regulations to make sure that your intended business activities are permitted in your location.

## Risk Management

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There are several risk management strategies you may want to employ for your farm. You should insure your buildings and equipment, and you may also want to insure your crops as well. Insuring your farm may be accomplished by consulting your insurance agent or broker. You can also insure individual crops (like grapes) through traditional crop insurance policies, and your whole-farm income through a program called AGR-Lite. To obtain AGR-Lite insurance you will need your last five years of Internal Revenue Service (IRS) Schedule F forms. Both types of policies are federally subsidized and are available from private crop insurance agents. Contact a crop insurance agent to see which type of coverage makes the best sense for you.

For more information on agricultural business insurance, see *Agricultural Alternatives: Agricultural Business Insurance*. More information on crop insurance can be found on the Pennsylvania Crop Insurance Education Web site (<http://cropins.aers.psu.edu/>).

## Sample Budget

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Included in this publication is a sample wine grape production budget. This budget utilizes custom hire for most of the field work, which could be more economical for small-acreage growers. Producers who own equipment should substitute actual equipment costs for custom-hire costs. The budget summarizes the receipts, costs, and net returns of a wine grape enterprise. This sample budget should help ensure that all costs and receipts are included in your calculations.

Costs and returns are often difficult to estimate in budget preparation because they are numerous and variable. Therefore, you should think of this budget as an approximation and make appropriate adjustments in the “Your Estimate” column to reflect your specific production and resource situation. More information on the use of crop budgets can be found in *Agricultural Alternatives: Enterprise Budget Analysis*.

### Initial Resource Requirements

- Land: 1 acre
- Labor—full production: 100–120 hours
- Harvest labor: \$660.00
- Capital investment: \$14,425.00
- Equipment needed
  - Tractor (40–50 horsepower)
  - Airblast sprayer: 50–200 gal
  - Herbicide sprayer: 50–200 gal
  - Tools for trellis construction
  - Hand shears for harvest
  - First-aid supplies and bee sting kit
  - Harvest containers



## For More Information

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Cox, J. *From Vines to Wines. The Complete Guide to Growing Grapes and Making Your Own Wine.* North Adams, Mass.: Storey Books, 1999.

Crassweller, R. M., et al. *Fruit Production for the Home Gardener: A Comprehensive Guide.* University Park: The Pennsylvania State University, 2006.

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Greaser, G. M., and J. K. Harper. *Agricultural Alternatives: Enterprise Budget Analysis.* University Park: The Pennsylvania State University, 1994.

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Wagner, P. M. *A Wine-Grower's Guide.* New York: Alfred A Knopf, Inc., 1969.

Weaver, R. J. *Grape Growing.* New York: John Wiley & Sons Inc., 1976.

Weigle, T. H., and A. J. Muza. *2006 New York and Pennsylvania Pest Management Guidelines for Grapes.* Ithaca: Cornell University, 2006.

Vine, R. P., E. M. Harkness, T. Browning, and C. Wagner. *Winemaking from Grape Growing to Marketplace.* New York: International Thomson Publishing, 1997.

## Web Sites

ATTRA—National Sustainable Agriculture Information Service  
<http://www.attra.org/attra-pub/grape.html>

Penn State Wine Grape Network  
[http://winegrape.cas.psu.edu/growing\\_grapes/](http://winegrape.cas.psu.edu/growing_grapes/)

Pennsylvania Liquor Control Board  
<http://www.lcb.state.pa.us/>

Professional Friends of Wine  
<http://www.winepros.org/wine101/viniculture.htm>

## Periodicals

*Practical Winery & Vineyard Magazine*  
<http://www.practicalwinery.com/>

*Vineyard & Winery Management Magazine*  
<http://www.vwm-online.com/>

*Wine East Magazine*  
<http://www.wineeast.com/>

*Wines & Vines Magazine*  
<http://www.winesandvines.com/>

## Sample Budget for Wine Grapes—First and Second Years

Summary of costs and returns per acre of production

Variable Costs	Land Preparation	Your Estimate	Establishment Costs	Your Estimate	Preproduction (Year 2)	Your Estimate
Land Preparation						
Custom Trenching	\$96.80					
Soil Sample	\$9.00					
Lime	\$60.00					
Compost and Application					\$33.79	
Plowing	\$15.70					
Disking	\$14.30					
Harrow (2x)	\$23.00					
Sub Soil Rows	\$25.00					
Plant Grass Seed	\$9.20					
Drainage	\$1,365.00					
Grass Seed	\$16.00					
Vines			\$3,184.00		\$64.00	
Stakes at Vines			\$79.60			
Herbicides			\$31.98		\$31.98	
Pesticides			\$51.00		\$78.00	
Rodenticide			\$10.20		\$10.20	
Labor:						
Pruning					\$164.00	
Training			\$44.00		\$44.00	
Vineyard Layout			\$99.88			
Planting/Replanting Costs			\$51.00		\$21.50	
Operator Labor			\$47.97		\$42.58	
Trellis Construction			\$2,836.00			
Irrigation Installation			\$800.00			
Irrigation Operation			\$75.00		\$75.00	
Fuel			\$26.29		\$23.14	
Repairs and Maintenance			\$9.05		\$9.97	
Interest on Operating Capital	\$65.36		\$293.84		\$23.93	
<i>Total Variable Costs</i>	<i>\$1,699.36</i>		<i>\$7,639.81</i>		<i>\$622.09</i>	
Fixed Costs						
Tractors and Equipment			\$25.81		\$28.45	
Land Charge	\$150.00		\$150.00		\$150.00	
<i>Total Fixed Costs</i>	<i>\$150.00</i>		<i>\$175.81</i>		<i>\$178.45</i>	
<b>Total Costs</b>	<b>\$1,849.36</b>		<b>\$7,815.62</b>		<b>\$800.54</b>	

All land preparation costs are completed by custom hire.

## Sample Budget for Wine Grapes—Third Year and Mature Planting

Summary of costs and returns per acre of production

Variable Costs	Preproduction (Year 3)	Your Estimate	Production (Mature Planting)	Your Estimate
Compost	\$22.00			
Compost Application	\$11.79			
Replanting Vines (2%)	\$63.68		\$63.68	
Herbicides	\$31.98		\$123.53	
Fungicides/Insecticides	\$362.00		\$430.67	
Rodenticide	\$10.20		\$10.20	
Labor:				
Pruning/Brush Removal	\$331.00		\$399.50	
Hilling	\$107.95		\$54.00	
Trellis Maintenance	\$82.00		\$85.00	
Flower/Cluster Removal	\$79.00		\$99.88	
Training	\$103.00		\$44.20	
Operator Labor	\$55.78		\$126.74	
Harvest Labor*			\$660.00	
Irrigation Operation	\$90.00		\$90.00	
Fuel	\$30.84		\$70.74	
Repairs and Maintenance	\$13.99		\$31.52	
Bird Control			\$4.00	
Harvest Supplies			\$50.00	
Hauling**			\$94.50	
Interest on Operating Capital	\$55.81		\$65.35	
<i>Total Variable Costs</i>	<i>\$1,451.02</i>		<i>\$2,503.51</i>	
Fixed Costs				
Tractors and Equipment	\$40.02		\$93.44	
Reuseable Harvest Containers			\$150.00	
Land Charge	\$150.00		\$150.00	
<i>Total Fixed Costs</i>	<i>\$190.02</i>		<i>\$393.44</i>	
<b>Total Costs</b>	<b>\$1,641.04</b>		<b>\$2,896.95</b>	

\*Based on a yield of 3.5 ton per acre

\*\*Hauling expense is based on using a half-ton pickup and a 30-mile roundtrip.

**Annual returns above variable production costs for various combinations of yield and prices for native American grapes. Values are adjusted for harvesting and hauling expenses.**

Price Received (\$/ton)	Tons per Acre					
	3.5	4	4.5	5	5.5	6
\$300	(\$1,450)	(\$1,407)	(\$1,365)	(\$1,323)	(\$1,281)	(\$1,239)
\$400	(\$1,100)	(\$1,007)	(\$915)	(\$823)	(\$731)	(\$639)
\$500	(\$750)	(\$607)	(\$465)	(\$324)	(\$182)	(\$39)
\$600	(\$400)	(\$207)	(\$15)	\$177	\$369	\$561
\$700	(\$50)	\$193	\$435	\$677	\$919	\$1,161
\$800	\$300	\$593	\$885	\$1,177	\$1,469	\$1,761

**Annual returns above variable production costs for various combinations of yield and prices for French-American hybrids. Values are adjusted for harvesting and hauling expenses.**

Price Received (\$/ton)	Tons per Acre					
	2.5	3	3.5	4	4.5	5
\$600	(\$784)	(\$592)	(\$400)	(\$207)	(\$15)	\$177
\$700	(\$534)	(\$292)	(\$50)	\$193	\$435	\$677
\$800	(\$284)	\$8	\$300	\$593	\$885	\$1,177
\$900	(\$34)	\$308	\$650	\$993	\$1,335	\$1,677
\$1,000	\$216	\$608	\$1,000	\$1,393	\$1,785	\$2,177
\$1,100	\$466	\$908	\$1,350	\$1,793	\$2,235	\$2,677
\$1,200	\$716	\$1,208	\$1,700	\$2,193	\$2,685	\$3,177

**Annual returns above variable production costs for various combinations of yield and prices for Vinifera grapes. Values are adjusted for harvesting and hauling expenses.**

Price Received (\$/ton)	Tons per Acre			
	2.5	3	3.5	4
\$1,000	\$216	\$608	\$1,000	\$1,393
\$1,100	\$466	\$908	\$1,350	\$1,793
\$1,200	\$716	\$1,208	\$1,700	\$2,193
\$1,300	\$966	\$1,508	\$2,050	\$2,593
\$1,400	\$1,216	\$1,808	\$2,400	\$2,993
\$1,500	\$1,466	\$2,108	\$2,750	\$3,393
\$1,600	\$1,716	\$2,408	\$3,100	\$3,793
\$1,700	\$1,966	\$2,708	\$3,450	\$4,193
\$1,800	\$2,216	\$3,008	\$3,800	\$4,593
\$1,900	\$2,466	\$3,308	\$4,150	\$4,993
\$2,000	\$2,716	\$3,608	\$4,500	\$5,393

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