



Grapes

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Introduction

Grapes (*Vitis* spp.) are suitable for either large-scale or small-scale commercial production. Typically three types of grapes are grown in Kentucky: Native American, hybrid, and European grapes. The climate in Kentucky is the limiting factor to grape production. Although American and hybrid cultivars are better suited for production in Kentucky, European (vinifera) cultivars are more desirable and potentially have the highest economic gain for grape growers and wine makers. However, vinifera cultivars are more susceptible to winter injury and diseases resulting in a lower yield, reduced fruit quality, and often vine death. Growing grapes in Kentucky can be highly successful and rewarding if the cultivars are matched to a specific site and proper production techniques are implemented.

Marketing and Market Outlook

It is critical that growers determine their marketing strategy before planting, since this is an essential consideration in selecting appropriate cultivars. Growers interested in commercial production should become associated with the Kentucky Wineries Association, which is the leading grape and wine association in Kentucky.

A marketing system for Kentucky's table grapes does not exist. The volume of grapes that can be marketed in Kentucky through fresh market outlets is limited and currently concentrated at the farmers market and fine dining levels. There may also be some potential for producers wishing to explore and expand markets in more populated sections of the state, especially in the Louisville and Northern Kentucky areas.



Wine grapes do offer the opportunity to market larger volumes. Several wineries operating in the state are interested in purchasing certain cultivars of high-

quality, Kentucky-grown grapes. Demand does differ by variety and close communication on variety selection with wineries is a critical part of long-term planning. More wineries are utilizing production contracts, and UK has conducted specific research into this issue. Growers should also estimate their breakeven price per ton and compare their cost of production to recent prices paid by wineries.

Marketing and policy guidelines are dynamic for wine grapes and wineries. Careful attention should be paid to local and state laws governing the production and sale of wine. While wine grape production certainly can be profitable, there remains substantial policy uncertainty. That said, many new wineries are emerging onto the market in and around Kentucky, creating



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additional market opportunities for quality wine grapes.

Production considerations

Plant and cultivar selection

There are many grape cultivars from which to choose. Each type of grape has its own characteristic and each cultivar within these types has its own advantages and disadvantages. While all species of grapes can be used to make wine, the quality of the finished product is influenced by cultivar, fruit quality, and vine management practices. Cultivar selection will be based on site suitability, target market, and salability of both the harvest yield and final product. Well-adapted cultivars that are cold tolerant and have increased disease and pest resistance for their locale are essential components of selection.

Purchase true-to-name nursery stock that is certified virus-free.

Site selection and planting

Sites for grapes should have full sun exposure, good air circulation, and well-drained soil. The best sites are above the level of adjoining land, so that cold air drains away from the planting. Gently rolling hillsides with well-stabilized soil are fine; however, cultural operations are easier on level or gently sloping sites. Vines are normally planted in the spring after the risk of freezing temperatures has passed.

Trellis construction

Grapevines require a trellis for vine support and the production of a high quality crop. The trellis system should be chosen prior to planting and in place by the start of the second growing season. However, installing the trellis prior to planting is advantageous. The training system should be strong, long-lived, and appropriate for grape cultivar and vineyard site. This is a major vineyard investment that should last 20 years or more.

Maintenance

Grapevines require regular maintenance

including training, pruning, and canopy management. Weed control under trellises, maintaining row middles, and post-planting fertilization will also be required.

Training vines begins early in the season as new shoots emerge in the spring. Choosing one or two shoots that will serve as the vine trunk and removing all other shoots is important to develop strong healthy trunks. Specific training methods will depend on the type of trellis system chosen for a specific cultivar. It may take two years to fully train a vine to the trellis system to ensure a well-established trunk and fruiting arms (cordons). After the vines have been fully trained to their trellis system, training should not be needed on mature vines unless there is a need to replace a trunk or cordon.

Canopy management includes dormant pruning, shoot thinning, shoot positioning, shoot hedging, cluster thinning, and if needed, leaf-pulling. The purpose of canopy management is to increase sunlight exposure to the grapevine canopy, provide better spray coverage, and to balance vegetative and fruiting growth that will maximize grape production each year. Balanced vines will improve fruit quality, cold hardiness, and longevity of the vineyard.

Vineyards require two types of pruning, dormant pruning and in-season shoot thinning. There are two types of dormant pruning, spur-pruned (permanent cordon) and cane-pruned (a single cane renewed every year). Both types of dormant pruning take place in the early spring after severe weather is past. Dormant pruning is an essential management practice that determines the amount of crop that will be held in a given season. Shoot thinning takes place when the green shoots are about 2-3 inches. On spur-pruned vines, leaving four to eight shoots/foot of fruiting wood is desirable to maintain appropriate shoot density. On cane-pruned vines, shoot thinning is generally not needed.

Pest management

Black rot is one of the most important diseases

of grapes in Kentucky. Other common diseases include anthracnose, botrytis gray mold, crown gall, downy mildew, phomopsis cane and leaf spot, and powdery mildew. Fungicide applications, along with good cultural practices, are critical for the management of these diseases. Insect pests such as grape flea beetle, grape berry moth, grape cane gall maker, green June beetle, Japanese beetle, leafhopper, spotted wing drosophila, brown marmorated stink bug, and phylloxera can all attack grapes. Regular scouting is necessary to monitor diseases and insect populations. Grapes usually require 12 to 15 pesticide sprays per season.

Weeds are managed with herbicides and/or mechanical cultivation. Most grape varieties are easily damaged by the vapor or drift of either 2,4-D or Dicamba. For information on weed, insect, and disease management refer to University of Kentucky Cooperative Extension publication ID-94.

Birds can cause serious crop losses during some years, often depending on the availability of other wild food sources and water. Netting is the best method of control; however, sonic bird repellents have been proved to help in some circumstances.

Harvest and storage

Harvest is dependent upon grape maturity in a given year and is determined by Brix, pH, and tartaric acid (TA) levels, as well as taste. Proper, calibrated equipment is needed to obtain accurate Brix, pH, and TA levels in the grape sample. Ideally, whole clusters would be sampled; however, it is common to take a 200-500 berry sample to test. Due to yearly seasonal changes in Kentucky, harvest dates for a specific cultivar may vary year-to-year. Often, the exact harvest date will be dictated by seasonal rains near full grape maturity.

Grapes should be harvested as early as possible to avoid deterioration during the heat of the day. Storage of and delivery of wine grapes is usually agreed upon between the grower and the

winemaker. Table grapes are often immediately packed into 1-, 2-, or 4-quart containers or vented plastic bags for market sales.

Labor requirements

Labor needs per acre during the first and second years include planting (30 hours), training (30 hours), and maintenance (24 hours). A fruiting vineyard will require vine and trellis maintenance (80 hours) along with spraying and mowing operations (48 hours). Harvest will require approximately 48 hours per acre. The above numbers are generalized numbers. It is advantageous to have one full-time vineyard manager to scout for diseases, provide canopy management, and spray the vineyard. Grapevines need daily attention.

Economic considerations

Producers should carefully examine their own costs and production situation before beginning production. Kentucky's climate and developing grape market can lend considerable risk for producers who do not pay the utmost attention to marketing and management. Initial investments include land preparation, purchase of planting material, and trellis installation. The following estimates are based on University of Kentucky 2016 grape production budgets. Refer to Grape Cost and Return Estimates: Summary and Assumptions for the variables taken into consideration when formulating these budget figures.

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Establishment costs for table grapes are estimated at more than \$9,000 per acre over a four- to five-year period. These establishment costs are recouped through year six. Most vines should produce a fair crop the third year and reach full bearing potential in four years.

Since returns vary depending on actual yields and market prices, the following per acre returns to land and management estimates are based on three different economic scenarios. Conservative estimates represent the University of Kentucky's

statewide average cost and return estimates.

Pessimistic \$(78)*	Conservative \$3,172	Optimistic \$5,209
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Wine grapes will be economically feasible only in areas of the state where climatic risk for production is minimized and market prices approaching \$1,000 per ton are assured. Returns per acre vary considerably depending on the varieties grown and the price paid per ton. A mature planting of European-American hybrids with a yield of 6 tons per acre and gross returns of \$5,700, could return \$1,807 per acre to land and management.

**Parentheses indicate a negative number, i.e. a net loss*

Selected Resources

- Grape Cost and Return Estimates: Summary and Assumptions, CCD-BG-6 (University of Kentucky, 2016) <http://www.uky.edu/ccd/sites/www.uky.edu/ccd/files/grapecostreturns2016.pdf>
- Grape Production Budgets – French-American Hybrid and American Wine Grape Varieties, CCD-BG-8 (University of Kentucky, 2016) <http://www.uky.edu/ccd/sites/www.uky.edu/ccd/files/european2016.pdf>
- Grape Production Budgets – Table Grape Varieties, CCD-BG-7 (University of Kentucky, 2016) <http://www.uky.edu/ccd/sites/www.uky.edu/ccd/files/tablegrapes2016.pdf>
- Grape Production Budgets – Vinifera Wine Grape Varieties, CCD-BG-9 (University of Kentucky, 2016) <http://www.uky.edu/ccd/sites/www.uky.edu/ccd/files/vinifera2016.pdf>
- Crop Estimation in Vineyards, H0-86 (University of Kentucky, 2007) <http://www2.ca.uky.edu/agcomm/pubs/ho/ho86/ho86.pdf>
- Growing Grapes in Kentucky, ID-126 (University of Kentucky, 1997) <http://www.ca.uky.edu/agc/pubs/id/id126/id126.htm>

- Midwest Fruit Pest Management Guide, ID-232 (University of Kentucky et al., 2017) https://ag.purdue.edu/hla/Hort/Pages/sfg_sprayguide.aspx
- 2017 Midwest Small Fruit Pest Management Handbook, B-861 (University of Kentucky et al., 2004) http://plantpathology.ca.uky.edu/files/mw_sm_fruit_pest_mngmt.pdf
- Commercial Grape Production in Kansas, MF-2370 (Kansas State University, 2004) <http://www.ksre.ksu.edu/bookstore/pubs/mf2370.pdf>
- Midwest Grape Production Guide, B-919-05 (Ohio State University) http://plantpathology.ca.uky.edu/files/mw_grape_productn_b919.pdf
- Organic Grape Production (ATTRA, 2006) <http://www.attra.org/attra-pub/grapes.html>
- Production Guide for Organic Grapes (Cornell University, 2016) <https://ecommons.cornell.edu/handle/1813/42888>
- Southern Region Small Fruit Consortium (Clemson University, North Carolina State University, Virginia Tech, University of Arkansas, University of Georgia, University of Tennessee) <http://www.smallfruits.org/>
- Winery and Vineyard Feasibility Workbooks (Ag Marketing Resource Center, 2010) http://www.agmrc.org/commodities_products/fruits/wine/winery_and_vineyard_feasibility_workbooks.cfm

Podcast

- Table Grape Production and Marketing in Kentucky (University of Kentucky, 2014) <http://www.uky.edu/ccd/sites/www.uky.edu/ccd/files/tablegrapes.mp3>

Webinars

- Grape Contracting (University of Kentucky, 2013) <http://video.ca.uky.edu/search/?q=grape+contracting&x=0&y=0>

Suggested Citation:

Kaiser, C. & M. Ernst (2017). *Grapes*. CCD-CP-7. Lexington, KY: Center for Crop Diversification, University of Kentucky College of Agriculture, Food and Environment. Available: <http://www.uky.edu/ccd/production/crop-resources/fruit/grapes>

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June 2017

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