

# UK COOPERATIVE EXTENSION SERVICE

UNIVERSITY OF KENTUCKY — COLLEGE OF AGRICULTURE

## Apples

### Introduction

Over the past 40 years Kentucky growers have produced apples using free-standing trees in low to medium density plantings. Today's high density orchards have closely planted trees on dwarfing rootstocks



requiring permanent support structures. Earlier production, quicker returns on the investment, and improved fruit quality are just a few of the many benefits of the new high-density systems.

Growers, however, who do not have a source of water for trickle irrigation should not consider high density plantings. Additionally, because high density systems require a significantly greater level of grower expertise and cultural management, semi-dwarf plantings may be more suitable for producers who are new and inexperienced.

### Marketing and Market Outlook

Kentucky's fresh apple market is almost exclusively retail, with very few growers selling on the wholesale market. For wholesale apple production to be profitable in Kentucky, the grower would need to receive approximately \$0.25 per pound. Since the national average for grower prices has exceeded \$0.25 per pound only twice from 1990 to

2005, extensive wholesaling is not recommended for Kentucky growers

There is a strong demand for locally grown, full-flavored, quality apples, especially varieties not available in supermarkets. Direct marketing and value-added processing (cider) are the primary reasons that Kentucky apple orchards remain profitable. Farmers markets, U-pick, and roadside stands are all good outlets for selling apples. Restaurants are interested in local apples, and value-added apple products (fried apple pies, preserves, etc.) are very popular with Kentucky consumers.

### Production Considerations

#### *Site selection, planting and maintenance*

Select an orchard site that is considerably higher than surrounding areas and has excellent air drainage. Apples perform best on deep, friable, fertile soils with good internal drainage. Avoid heavy, poorly drained soils, as well as those with impervious hardpans close to the surface. Irrigation is essential for high density plantings so the orchard should be located near a ready source of water.

Apple planting stock may need to be ordered as much as 24 months in advance of planting in order to obtain commercial quantities (275 to 350 trees per acre) of the desired cultivars and rootstocks. While more costly per tree than conventional unbranched whips, planting well-branched or feathered trees can be well worth the investment by bringing the orchard into full production one year earlier. Trees are best planted in fall or early spring in rows running north and south. Pruning and training methods



employed in high density plantings are considerably different from those in conventional orchards. The goal in high density orchards is to promote early fruiting and to discourage excessive vegetative growth. Efforts are initially focused on training limbs, rather than pruning. A permanent tree support system is essential and should be in place as soon after planting as possible.

#### *Pest management*

There are a wide variety of insects and diseases to control on apples. The Integrated Pest Management (IPM) approach helps growers determine exactly when pesticide applications are needed. Using IPM in Kentucky can reduce the number of pesticide applications by about one third when compared with a calendar-based program. IPM involves collecting detailed data regarding the crop, pests and weather conditions in order to make sound pest management decisions. Weather data can be collected with either manual or automated instruments.

#### *Harvest and storage*

The optimum maturity level for harvest will depend on the cultivar, intended market and whether the fruit will be stored. Color, starch level, sugar content and firmness are important harvest indicators. Cold storage will be needed to extend the marketing season.

#### *Labor requirements*

A medium density system will require nearly 300 hours of operator labor per acre per year. Trees take four to six years to reach full bearing. A high density system can require over 2,005 hours per acre over four years.

An experienced apple picker can harvest about 12½ bushels of apples per hour. At a yield of 450 bushels per acre, this will require about 36 hours of harvest labor. On-farm packing and grading will require additional labor (15 to 25 hours), depending on packaging used. Packing labor can be minimized by field sorting and having customers select their own apples from retail bins.

## **Economic Considerations**

The cost of establishing a high density orchard is greater than that of a lower density orchard. Establishing an orchard of 300 supported trees per acre can range from \$7,500 to \$10,000 per acre. Initial investments include land preparation, purchase of trees, tree establishment, installation of an irrigation system and construction of a tree support system. A good sprayer for insect and disease control will also be needed. In addition, field monitoring instruments can range in price from \$100 to \$6,000, depending on the level of sophistication.

Annual pre-harvest production costs for each production system can range from \$1,400 to \$1,500 per acre. Harvest costs will vary depending on the wage rate paid to labor and the availability of harvest equipment, but can generally be estimated at around \$1.60 per bushel. At a retail price of \$10 to \$30 per bushel, the central leader (medium density) and high density systems can return about \$1,750 to \$8,300 per acre to land, labor, and management in a full production year.

## **More Information**

- Apple Integrated Crop Management Manual (University of Kentucky)  
<http://www.uky.edu/Ag/IPM/appleipm/appleipm/ap-man.php>
- Apple Integrated Pest Management Web site (University of Kentucky)  
<http://www.uky.edu/Ag/IPM/appleipm/appleipm/index.php>
- Apple Marketing Fact Sheet (University of Kentucky, 2005)  
<http://www.uky.edu/Ag/NewCrops/apples2005.pdf>
- Commercial Tree Fruit Spray Guide, ID-92 (University of Kentucky, *et al*, 2006)  
[http://www.hort.purdue.edu/fruitveg/ID168\\_2006.pdf](http://www.hort.purdue.edu/fruitveg/ID168_2006.pdf)
- Midwest Tree Fruit Pest Management Handbook, ID-93 (University of Kentucky, *et al*, 1993)  
<http://www.ca.uky.edu/agc/pubs/id/id93/id93.htm>

- Total Quality Assurance: Apple Production: Best Management Practices, ID-137 (University of Kentucky, 2001)  
<http://www.ca.uky.edu/agc/pubs/id/id137/id137.htm>
- Apple Production Budget (Ohio State, 2000)  
<http://aede.osu.edu/Programs/FarmManagement/Budgets/Fruit/index.htm>
- Considerations in Organic Apple Production (ATTRA, 2004)  
<http://attra.ncat.org/attra-pub/summaries/omapple.html>
- Establishing the High Density Supported Apple Orchard (Ontario Ministry of Agriculture, Food and Rural Affairs, 1998)
  - Part 1 – Site Selection and Preparation  
<http://www.omafra.gov.on.ca/english/crops/facts/hdapch1.htm>
  - Part 2 – Choosing Trees for Planting  
<http://www.omafra.gov.on.ca/english/crops/facts/hdappch2.htm>
  - Part 3 – Choosing a Tree Training System  
<http://www.omafra.gov.on.ca/english/crops/facts/hdappch3.htm>
  - Part 4 – Planting the High Density Orchard  
<http://www.omafra.gov.on.ca/english/crops/facts/hdappch4.htm>
  - Part 5 – Training High Density Apple Trees  
<http://www.omafra.gov.on.ca/english/crops/facts/hdappch5.htm>
  - Part 6 – Tips for Successful Establishment  
<http://www.omafra.gov.on.ca/english/crops/facts/hdappch6.htm>
- Ohio Apple Production: National Market Perspective, B-1188 (Ohio State, 1989)  
<http://ohioline.osu.edu/rb1188/index.html>
- Organic and Low-Spray Apple Production (ATTRA, 1999)  
<http://attra.ncat.org/attra-pub/apple.html>
- Pennsylvania Tree Fruit Production Guide (Pennsylvania State University, 2006-2007)  
<http://tfpg.cas.psu.edu/default.htm>