

Title: Horticultural Options When Starting an Organic Apple Orchard

Name: M. Elena Garcia
Institution: University of Arkansas
Address:
Department of Horticulture
University of Arkansas
316 Plant Science Bldg
Fayetteville, AR, 72701
E-mail: megarcia@uark.edu
Phone: 479-575-2790
Fax: 479-575-8619

Although there is strong interest in organic apple production in New England, there are very few certified organic orchards. This is primarily because of insect, horticultural, and disease challenges associated with the predominant cultivar grown in the New England region (i.e., 'McIntosh'). Recent shifts in consumer preference for 'newer' cultivars have led to planting of different apple cultivars which have different disease susceptibility. In addition, research has identified potential alternatives to insect and horticultural obstacles to organic apple production in the region.

In spring 2006, two organic research apple orchards were established at the UVM Horticultural Research Center as part of a multi-disciplinary, multi-state long-term research project: OrganicA Project (<http://www.uvm.edu/~organica/>). These plantings represent two methods by which growers would change cultivars on their farm: (1) by planting a new orchard (Orchard 1) where young trees ordered from a nursery are planted; and (2) by using a technique called "top-grafting" or "top-working" whereby twigs containing several vegetative buds of the new cultivar (scion) are grafted onto the trunk of an existing, older tree changing the cultivar of the tree (Orchard 2) (Garcia, 2001). The cultivars selected were those cultivars that growers identified as having high consumer appeal and that would strengthen local and regional niche-markets: 'Zestar!', 'Ginger Gold', 'Honeycrisp', 'Liberty', and 'Macoun'.

There are several advantages of top-grafting trees over planting new trees in the same site including: not leaving the land fallow for at least one year to avoid replant disease [a complex of fungi, bacteria, and nematodes in addition to abiotic factors that results in poor tree growth of young, newly planted trees (Pscheidt, 2004)] and eliminating costs associated with bulldozing trees, tree stump removal, pre-plant land preparation, buying and planting new trees. Another advantage of top-grafting is that a top-grafted tree will have a full crop sooner than a newly planted tree and will generally produce a full crop by the fourth year from grafting (enough time to transition into organic production). The newly planted trees generally will not produce a full crop until the fifth or sixth year after planting. Costs for top-grafting include wages for a professional grafter, buying the scion wood, tools, and grafting supplies. Although top-grafting is a common practice among orchardists, and in the past few years many orchards have changed cultivars by top-grafting to new cultivars such as 'Gala', no economic analysis of the advantages, disadvantages, or cost benefits of top-grafting exists. One objective the OrganicA Project is to incorporate and evaluate "new" apple cultivars and research-generated knowledge of apple

ecosystem dynamics into organic production systems to determine their sustainability and profitability. The information presented here represents alternative horticultural methods and techniques utilized during the process establishing an organic apple orchard.

Orchard Establishment

There are many horticultural challenges when starting an organic orchard or converting an existing conventional orchard into an organic system. Soil management and weed control are areas that can pose serious challenges because of the limitations associated with perennial systems. A permanent vegetative ground cover needs to be established before planting. Perennial grass crops have been recognized as a means of improving soil health because they enhance the level of microbial biomass and activity as well as soil structure and organic matter contents (Tisdall and Oades, 1982; Sparling, 1995; Herrick and Wander, 1997). Practices in agricultural systems that improve soil health have also been shown to reduce plant pests (Liebman and Davis, 2000; Darby, 2003), wind and water erosion (Reganold et al., 1987) and improve water infiltration and soil nutrient release and absorption (Herrick and Wander et al., 1997).

Orchard 1 (new planting): The plot where this orchard was established was a former apple orchard where the trees were pulled out in early 2003 and the land left fallow. The organic orchard was planted in spring of 2006 in a randomized complete block design with 10 blocks (based on variations in trunk caliper size of trees received from nursery) and three-tree replications of each of five cultivars per block ('Zestar!', 'Ginger Gold', 'Honeycrisp', 'Liberty', and 'Macoun') on Budagovsky 9 (B.9) rootstock. Trees were purchased from a nursery as two-year-old trees. Tree training for this orchard is as a vertical axe. Pre-planting soil preparations and amendment additions were based on soil analysis results. Agricultural lime ash was added to adjust the pH. Buckwheat was sowed as a cover crop and was allowed to go to seed before mowing in early July. A second crop grown from the first crop's seed was flail mowed and the residue disc harrowed in August 2004. The plot was then seeded to a mix of oats and Arlington red clover. This cover crop program was repeated in 2005. In late August, a permanent cover of a mix of creeping fescue (30%), dwarf perennial ryegrass (30%), Kentucky bluegrass (30%), and white clover (10%) was established. Before planting in spring 2006, a strip of finished compost two m wide by 10 cm deep was spread. The trees were planted into this strip. A weed badger cultivating tool has been used to maintain a clean weed-free strip one m wide underneath the trees within the tree row.

Orchard 2 (top-grafted): An existing orchard planted in 1988 was top-grafted. The orchard contained the cultivars 'McIntosh' and 'Liberty' on M.26. Since the former cultivars may affect growth of the new 'top-grafted' cultivars, a randomized complete block design, blocking any possible former cultivar effect on new growth was used. The same five cultivars planted in Orchard 1 were top-grafted onto the trees in this orchard. There are six two-tree reps of each cultivar per block. The top-grafting operation was conducted in the spring of 2006. These trees are trained with a central leader. The existing herbicide strip (approx. 1.5m wide) was converted to perennial cover in 2005. The row middles remain with the existing permanent cover (orchard grass mix and other native species).

Pest management incorporates integrated pest management practices and only OMRI approved organic pesticides have been used as necessary.

Available OrganicA Project web resources:

<http://www.uvm.edu/~organica/>

The pages of this site are intended to provide information to New England apple growers who are interested in organic apple production and who want to examine the opportunities of organic production given the shift in cultivars and the new research-generated information that is available.

<http://www.uvm.edu/~organica/OrganicOrchardInformation/Horticulture/horticulture.html>

Site within OrganicA web page for horticulture information on organic apple production.

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This research has been funded by a USDA Integrated Organic Program Grant