

The OrganicA Project: Preliminary “Top-Grafting” Results in a Transitional Organic Apple Orchard

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Abstract

Organic apple production in the eastern United States is significantly influenced by cultivar susceptibility to apple diseases because of the weather conditions during the growing season. In New England, there has been a recent shift away from ‘McIntosh’, the historically predominant cultivar which is very susceptible to apple scab, to ‘newer’ cultivars because of consumer preference for unique cultivars and a shift in market focus from wholesale to more profitable retail, niche markets. These cultivars may offer new opportunities for enhancing organic apple production in the region. As part of the OrganicA Project, an 18 year-old orchard at the University of Vermont Horticulture Research Center in South Burlington was top-grafted in April 2006, with five cultivars that growers identified as having high consumer appeal and which would strengthen local and regional niche-markets: ‘Zestar!’, ‘Ginger Gold’, ‘Honeycrisp’, ‘Liberty’, and ‘Macoun’. A goal of this long-term research project is to determine sustainability and profitability of this organic production system. Initial assessment of scion survival and incidence of flowering on scions in June revealed that of the five cultivars grafted in the orchard, ‘Zestar!’ had significantly less scion survival and greater incidence of flowering.

Objective

Objective 1. Incorporate and evaluate “new” apple cultivars and research-generated knowledge of apple ecosystem dynamics into organic production systems to determine sustainability and profitability.

Sub-objectives: (a) Determine any differences in initial survival of grafted scion among five cultivars; (b) Determine if original cultivar ‘stock’ affects initial survival of grafted scion.

Experimental Design

The existing orchard that was top-grafted consisted of ‘McIntosh’ and ‘Liberty’ trees on M.26 rootstock planted in 1988. Since these cultivars may affect growth of the new ‘top-grafted’ cultivars, a randomized complete block experimental design was used to block any effect on new scion growth. Trees were top-grafted in April 2006, to five cultivars: ‘Zestar!’, ‘Ginger Gold’, ‘Honeycrisp’, ‘Liberty’, and ‘Macoun’. A total of 19 two-tree replicates per cultivar were top-grafted across the entire orchard. The number of scions grafted was dependent on rootstock diameter, where <6 inches received two scions and >6 inches received four. A brief graphic description of the grafting process is given in *Grafting Technique*.

Grafting Technique



In early spring the original trees were cut down to a height of approximately three feet and leaving one nurse limb.

A short piece of 1-year vegetative scionwood was trimmed down to four buds and inserted into clefts made into the stump.

The finished grafts were sealed completely with wax to ensure that they remained moist to allow for good callus growth.

2006 Results

Scion graft growth for each tree in Orchard 2 was assessed using the naked eye. At each tree, the number of scions grafted, the number of scions that exhibited any green tissue on any of the buds, and the number of scion grafts that had any developing blossoms were recorded on June 2, 2006. There was no statistically significant block effect (i.e. original scion effect) on grafted scion survival. Another assessment of scion survival was completed on February 12, 2006 where all trees with at least one living scion were counted.



Scion growth showing one living and one dead scion.

Pinching off flower buds.

	Number of trees grafted	Total % Scions with Live Tissue June 2006	Total % Scions with Flowering Tissue June 2006	Total % of Trees with ≥ 1 Living Scion February 2007
Ginger Gold	38	99 a	14 ab	97 a
Honeycrisp	38	97 a	0 b	97 a
Liberty	38	100 a	0 b	100 a
Macoun	38	99 a	1 b	100 a
Zestar!	38	60 b	34 a	82 a

Means within a column with the same letter are not significantly different according to Tukey’s Studentized Range (HSD) Test ($P \leq 0.05$)