Small Steps to a Big Future for Massachusetts Cider Apples

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In Massachusetts, our love affair with cider has a long and illustrious -- if sometimes notorious -- history that predates even John Chapman (AKA Johnny Appleseed). In recent decades, there has been a growing nationwide passion for the fermented beverage enjoyed by our forebears. Unfortunately, there is a dearth in production of desirable apples for traditional hard cider. (Referred to as just cider from here on, as it *should* be). This has led to a market flooded with a bevy of apple-based adult cider beverages possessing less than traditional qualities. There are some orchards in the Northeast that have been making positive headway in increasing traditional cider apple plantings. There remains, however, a chronic shortage of traditional cider apples (Fabien-Ouellet & Conner, 2017). This project aims to provide Massachusetts growers with information specific to Massachusetts cider apple varieties that contribute to a quality top-shelf cider.

Not all apple varieties are created equally. Some apples are far better suited for fresh eating and baking. The supermarket is filled with varieties we all know and love: McIntosh, Honeycrisp, Fuji, and Gala. These varieties do not possess the characteristics necessary to create the hallmark quality of a traditional cider we expect from Massachusetts cider makers. Many varieties prized for the fruit's cider qualities are European, with storied heritage, finicky growth habits and pest susceptibility. But, with craft cideries attempting to distinguish themselves from mass-produced sweet-tasting ciders often made from apple juice concentrate, there is an opportunity for local growers to find a new and exciting niche for their apples (Raboin, 2017).

Table 1. Eleven cultivars grafted onto older trees at the UMass Cold Spring Orchard in Belchertown, MA. Descriptions are general. Characteristics of each variety will be evaluated for MA production conditions.

Cultivar	Flavor Profile
Alkmene (aka Early Windsor)	Sweet-sharp
Ashmead's Kernel	Sweet-sharp
Court Pendu Plat	Sweet-tart
Egremont Russett	Sweet-sharp
Ellis Bitter	Bittersweet
Foxwhelp	Bittersharp
Kingston Black	Bittersharp
Medaille D'Or	Bittersweet
Michelin	Bittersweet
Redfield	Bittersweet
St. Edmund's Russet	Sweet

Materials & Methods

Dormant scion wood was collected in Hawley, MA on April 6 and from Dummerston, VT on April 13, 2018 (Figure 1). For each cider variety, four to six budwood sticks approximately 1/4 inch in diameter and 12 to 16 inches long were selected. Care was taken to select wood with no obvious signs of disease or other damage. As each variety was collected, it was bundled using flagging tape labeled with cultivar name. The base of each bundle was then wrapped in moist paper towel and covered with plastic wrap to prevent desiccation and stored in

Table 2. Apple qualities considered when selecting which varieties to blend for fermentation.

Apple classifications[a]	Tannin[b]	Acid
Sweets	Low (<2 %w/v)	Low (<4.5 %w/v)
Sharps	Low	High (>4.5 %w/v)
Bittersweet	High (>2 %w/v)	Low
Bittersharp	High	High

[a] Merwin (2015).
[b] Weight by volume (w/v) is commonly expressed in g/L of tannins or total acidity.

Figure 1. Peter Mitchell of Headwater Cider and Jon Clements tie off and label bud wood for later grafting (Good thing there was cider on hand, it was as cold as it looks that day!).

an uninsulated cellar to keep the wood cold enough to prevent bud break.

Existing trees at the UMass Cold Spring Orchard planted as a variety trial on M.9 rootstock in 2012 were selected for top working to the cider scions (Figure 2). These trees, on M.9 rootstock, were planted 3 feet apart and grown to a tall-spindle with 4-wire support. Just prior to grafting, the leader was cut-off just above several lower "nurse" limbs.

On May 4, 11, and 18, 2018, scion wood was grafted onto the topped trees using a bark-inlay. Three trees were grafted with each variety (the experimental unit) across 4 replications in a randomized (in)complete block design. (To be honest, the grafting was continued onto Rep 4 in an adjacent row of free standing trees on M.26 and G.210 rootstocks.) Grafting was done before, during, and after bloom, when the bark was readily "slipping." This is when the vascular system is actively growing and allows the bark to be gently moved away from the hardwood without damage. Each scion was cut down to two to three buds, the end whittled (with a utility knife!) to an angle on each side so that the vascular system of the new cultivar could be aligned with that of the interstem when slipped between the bark and hardwood. Grafts were wrapped with black electrical or masking tape (wicked technical, I know, but, it works!) and covered with Doc Farwell's grafting seal. And then we waited…

Results

Successes and challenges. By-and-large, the grafts took well and grew vigorously during the 2018 growing season (Figure 3). Overall graft success was 77%. Time of grafting seemed significant, as graft take was 100% in the first two reps, which were grafted on May 4. Success rates declined as grafting date became later. Desic-

Figure 2. Jon Clements instructs undergraduates Cam Olanyk and Lyndsey Ware on the art and science of grafting at the UMass Cold Spring Orchard in Belchertown, MA, May 4.

Figure 3. First round graft, scion budding out (circled) with nurse limbs surrounding graft, June 14.

Figure 4. Previously healthy graft lost to a windstorm. Tying up scion for support is a critical step in the success of the grafting process, July 24.

cation of the bud wood also played a role in decreased rate of success. That hot and musty, uninsulated cellar was not the best storage place as spring got underway in earnest. Later, there was a windstorm, never a friend of the orchardist. High winds swept through before all new scion growth could be attached to support wires causing some loss (Figure 4). It is interesting to note that once the grafts started growing, two leaders were selected and grown nearly vertical to what could be best described as a "bi-leader fruiting wall" where the leaders are spaced approximately 18 inches apart (Figure 5).

Pests. The biggest surprise in this arena was how few we actually saw. Potato leafhopper showed up in MA mid-June and immediately went to work causing damage to younger trees, and our grafts. Gypsy moth caterpillars also made a brief appearance. These were both readily managed to prevent loss, even if the foliage looked a little worse for wear from their feeding. Otherwise insect and disease issues were at a minimum, as you might expect from trees with no fruit.

Next Up

Next spring, we will collect more budwood to replace what was lost in 2018 to fill out all four replications in this planting. With any luck, by the end of 2019, we will have a complete block to observe bloom time, pest incidence and severity, growth habit and fruit quality characteristics. Already observed was lots of blind wood on these grafts, so a branching experiment on this 1-year old wood is already planned for Spring 2019. Stay tuned for more adventures in cider apple production!

Figure 5. Once scion had established and sent out new growth, the two most upright and healthy shoots were selected as leaders, the others removed.

Literature Cited

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