Increasing Branching of Cider Apple Trees

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Personal observation has suggested some cider apple variety trees are particularly prone to producing blind wood. Blind wood is a result of last season's shoot growth failing to produce bud, or branch, breaks during the current growing season. These lengths of unproductive wood remain for the duration of the shoot's life (until it is pruned out or whatever). Several methods can be used on dormant 1-year old wood to prevent blind wood and promote branching. These include notching and use of plant growth regulators (specifically 6-benzyladenine, 6-BA). To promote branching on potential blind wood, ten cider apple varieties were treated with notching or 6-BA and compared to an untreated control in 2019 at the UMass Cold Spring Orchard in Belchertown, MA. Results show that a 6-BA application is particularly effective at increasing branching on 1-year old wood, however, results depend somewhat on cider apple variety.

Materials & Methods

In 2018, a previously planted apple variety evaluation block on M.9 rootstock at the UMass Cold Spring Research Orchard (CSO) in Belchertown, MA was top-work grafted to ten cider apple varieties using bark inlays. (See "Small Steps to a Big Future for Massachusetts Cider Apples" in the Spring 2019 issue of Fruit Notes for more details, http://umassfruitnotes.com/v84n2/a2.pdf). The cider apple varieties are: Foxwhelp, Ashmead's Kernel, Kingston Black, Ellis Bitter, Michelin, Redfield, Egremont Russet, St. Edmund's Russet, Medaille D'Or, and Cort Pendu Plat. The experimental design is a randomized block with four replications and three trees of each cider apple variety per experimental unit. Graft success was very good, and during the 2018 growing season two leaders were

Figure 1. Maxcel® in white paint applied to 1-year old Redfield cider apple variety on April 13, 2019 at UMass Orchard, Belchertown, MA.

Table 1. Mean number of branches produced by variety across three branching treatments.

Variety	Number of branches
Michelin	19.4 a
Egremont Russet	15.1 ab
Ellis Bitter	11.1 bc
Medaille D'Or	9.4 c
Cort Pendu Plat	8.9 c
Redfield	8.7 c
Kingston Black	8.3 c
Foxwhelp	7.9 c
Ashmead's Kernel	7.5 c
St. Edmund's Russet	6.4 c

Means not followed by the same letter are significantly different (Tukey's HSD $P = 0.05$).

selected such that each graft was grown into a double leader (bi-axis) tree. Leader/shoot growth was also very good, the leaders reaching heights ranging from two to four feet, but generally lacking any kind of branch breaks, i.e., they were mostly "whips."

In 2019, three branching treatments were applied to the leaders on 1-year-old wood: an untreated Control (UTC), notching (NOTCH), or Maxcel® (6-BA, Valent Biosciences LLC). Maxcel was applied using a mixture of 4 oz. 6-BA in 16 oz. white paint (app. 6,000 ppm). This is within the label rate range indicated to promote branching on dormant young wood. Within the experimental unit, leaders of each variety that were close to equal vigor were selected for each of the treatments. The 6-BA treatment was applied before bud break on 13-April (Figure 1) while the notching treatment was done just before bloom in early May. 6-BA in paint was applied to the leader in a two-to-three-foot stretch where branching was desired (but not to the top of the leader). Notching was done using a double-blade anvil-style pruner such that a notch was made just above the bud and also at the same time opposite the bud, and just notching the bark with a little twist. Not every bud was notched, but 6-8 notches were made to approximately the same length of wood as the 6-BA in paint treatment was applied. In mid-June the leaders were evaluated by counting the number of branches longer than 2.5 inches in the area where 6-BA and notching treatments were applied.

Figure 2. Typical branching achieved when 6-BA in white paint is applied before bud break to blind wood on most cider apple varieties.

Results & Discussion

For cider apple variety, across the three branching treatments, there was a significant difference between varieties in number of branches produced (Table 1). Michelin and Egremont produced the most branches, followed by Ellis Bitter, and then Medaille D'Or, Cort Pendu Plat, Redfield, Kingston Black, Foxwhelp, Ashmead's Kernel, and St. Edmund's Russet.

For branching treatment, across all ten varieties, the 6-BA treatment was very effective at producing

Table 2. Mean number of branches produced by treatment across three cider apple varieties.

Branching treatment	Number of branches
6-BA	14.9 a
NOTCH	8.9 b
UTC	7 b

Means not followed by the same letter are significantly different (Tukey's HSD $P = 0.05$).

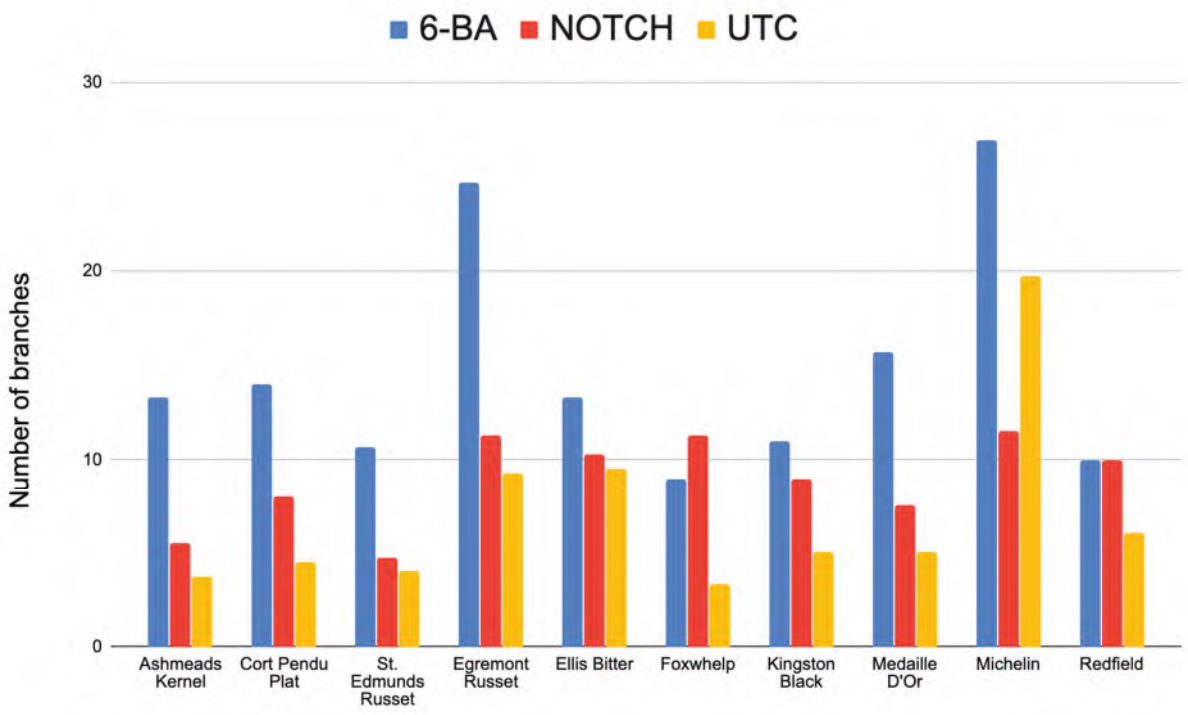

Figure 3. Number of branches produced by treatment depends on variety.

branches. (Table 2). The NOTCH treatment did not differ from the UTC.

A significant interaction of variety and treatment was also interesting (Figure 3). In other words, branching treatments were more or less successful, depending on which variety the treatments were applied. For example, only 6-BA (vs. NOTCH) was very effective at creating branches compared to the UTC when applied to Michelin. But on Foxwhelp, both NOTCH and 6-BA treatments increased branching over the UTC. And with Ellis Bitter, NOTCH and 6-BA application were rather ineffective at increasing branching. The other varieties varied in their response to the branching treatments. Still, as a trend, 6-BA was effective at producing branches across most varieties and is a recommended practice to improve branching on 1-year-old wood of most cider apple varieties where blind wood is expected to be a problem (Figure 2). Notching may also help make branches during bud break when the 6-BA treatment was not applied. Note that these treatments are likely most effective on top-worked trees or on 2nd-leaf trees (on 1-year old wood) with an established root system (vs. trees just planted this year) that have some "push" to them.

On a final note, it is assumed that increasing branching will subsequently result in a less "top-heavy" tree and greater flowering and fruiting. Remains to be seen, but we will follow flowering and fruiting during the 2020 growing season to see if these branching treatments make a difference.