Machine harvesting for specialized processed and fresh markets

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This study is being conducted at the NWREC in a 0.25 acre conventional planting of ‘Mini Blues’ and ‘Legacy’ established in 2015. The planting is designed for machine harvest. The objectives of the study are:

1. Develop best management practices for establishment and management of ‘Mini Blues’ for a 100% machine harvested market
2. Determine best pruning method for management of ‘Mini Blues’
3. Develop best management practices, including pruning and training, for ‘Legacy’ for high yield, efficient hand harvest and efficient machine harvest of later, smaller-sized fruit
4. Assess impact of machine harvest on internal bruising and shelf life of fresh market, machine harvested ‘Legacy’ – use this as a model for comparison of other cultivars in the future

Pruning treatments for ‘Mini Blues’ started in the winter of 2017-18 (after the second growing season). Pruning treatments for ‘Mini Blues’ are based on a combination of B. Strik’s experience with this cultivar and what would be economical for growers:

1) a conventional pruning method including bottom and top cuts to the bush [“control”];
2) “unpruned” for at least 3 years [goal is to prune hard every few years];
3) hand “speed” pruning in winter making only big cuts to base of bush; and
4) hedging soon after last machine harvest in summer [“hedge”; July 27 in 2018].

‘Legacy’ plants were pruned in the 2015-16 dormant season to remove all fruiting wood. In winter 2016-17, plants were pruned uniformly to encourage vegetative growth but still have a small crop in 2017. In winter 2017-18, pruning treatments were implemented and a divided “V” trellis installed. ‘Legacy’ pruning treatments are as follows:
Data collected includes: leaf and soil nutrient analysis (used to adjust nutrient management programs during planting life); time required to prune per treatment (for economic comparisons); fresh pruning weights per treatment; machine-harvested yield (starting in 2018 for ‘Mini Blues’) and hand-harvested yield for ‘Legacy’ (2017-2018) and hand plus machine harvested yield for ‘Legacy’ starting (from 2019 – onwards); average berry weight per harvest; a measurement of machine-harvest efficiency (collection of fruit on the ground and calculated as a percentage of total yield lost to ground).

2018 Update:

**Dormant season (2017-18).** In ‘Mini blues’, the control and speed pruned treatments had significantly higher pruning weights (0.3 and 0.4 lbs/plant, respectively) than hedged and unpruned treatments, where only low growth touching the ground was removed in winter. The control took longer than speed pruning, as expected, and the hedge and unpruned treatments required very little to prune in the dormant season.

In ‘Legacy’, pruning required a similar amount of time for all treatments (V and Control were pruned identically), averaging about 72 hours per acre. Pruning weight was highest for HB pruning (1.05 lbs/plant) compared to control (0.78 lbs per plant). V was most similar to the control at 0.8 lbs/plant, but not significantly different from the other treatments. In future years we plan to remove more wood from the center of the bush in V plots to better divide the canopy.

**Third growing season (2018).** ‘Mini Blues’ was in its first cropping year in 2018. Fruit were harvested by machine (Littau Harvesters) once on July 18th, since ripening is concentrated in a short time frame. Harvested yield (averaging 1.7 lbs/plant; 1.25 tons/acre) and Brix (average 19.6%) were not impacted by pruning method. Berry weight was highest in the “control” (0.7g/berry) and lowest in the “hedge” and “no pruning” treatments (0.6g/berry). The percentage of fruit dropped on the ground after harvest was also not impacted by pruning, averaging 16%.
This was the second cropping year for ‘Legacy’, but the first year after pruning treatments began. Plants were hand harvested 4 times, on July 12, 20, and 30 and Aug 9. Average yield was 10.4 lb/plant (7.55 tons/acre) with an average berry weight of 2 g. Pruning did not have a significant impact on yield per plant, berry weight, Brix (averaging 15.3), percent of fruit dropped on the ground during harvest (8.4% of hand-harvested yield), or in the time required for picking per pound of fruit (harvest efficiency).

Leaf samples were largely similar between treatments. However, in ‘Mini Blues’, leaf N was below the recommended range, which may be due to the vigorous growth and young age of these plants as they appeared healthy with good color. Leaf B and Zn were also low. In ‘Legacy’, leaf K and B were considered deficient. Foliar B was applied to both ‘Mini Blues’ and ‘Legacy’ in spring 2018 after leaf and soil tests in 2017 showed low B, and foliar B will be applied again in Fall 2018 and Spring 2019.

Hedging occurred on July 27, 2018 and was done with a gas-powered hedger. Plants were hedged just below the trellis wires to a height of approximately 20-24 inches. The sides of the plants were hedged in a V-shape reaching a width of approximately 24 inches at the top of the plant (approximately 2 to 3 inches outside the trellis wire on either side of the plant). Hedging required approximately 1.3 minutes per 4 plant plot and removed an average of 1 lb of plant material (leaves, shoots, and any remaining berries) per plant.

Starting in 2019, we will begin machine harvest for the later harvests of ‘Legacy’ and be able to assess impacts on bruising and shelf life compared to hand harvesting (Objective 4).