HOW TO GROW HONEYCRISP™ APPLES FOR SUCCESS

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The acceptance of Honeycrisp™ by North American consumers has escalated stimulating strong demand. Gross returns to growers increased by 250% to 400% compared to other commercial fresh fruit cultivars grown in Nova Scotia. The North American apple industry has identified several challenges in the production and post-harvest management of this cultivar. The climatic conditions in the Annapolis Valley of Nova Scotia have been recognized as superior for color development of Honeycrisp™. To capitalize on our natural advantages and address the challenges, a group of producers, industry experts and scientists have come together to determine the production and storage factors that affect Honeycrisp™ apple quality in Atlantic Canada.

The parameters of this two-year project include field and storage studies. The crop density's effect on fruit size, color and internal quality were examined at the crop levels of 3, 6 and 9 fruit per cm^2 of the trunk's cross-sectional area (TCA). In addition, the return bloom and tree growth will be recorded the year following treatment. Fruit produced from the untreated control and the three crop levels were subjected to several post-harvest tests including delayed cooling, controlled atmosphere storage and storage interval treatment comparisons. Fruit firmness, soluble solids, acidity and ethylene production were recorded prior to storage and will be retested following both the four and eight month storage intervals. From the storage treatments, disorders such as internal browning and soft scald incidence will be recorded. Incidence of fruit rot will also be recorded as it can cause significant loss in Honeycrisp™ following storage. The overall goal of the project is to determine the optimum crop density that provides the optimum profitability for Honeycrisp™ producers.

To determine the response of crop density adjustments with grower management techniques, soil variations and microclimate differences, this experiment was set up at three grower sites. We selected 16 trees with uniform blossom densities for the experiment. All three of the grower cooperators planted their trees, which were all from the same nursery and grafted on M 26 rootstocks, in 1996. Including blossom counts the fruit on each of the 16 trees at each farm was counted up to eight times with the final crop adjustments completed by July 25th, 2003. Fruit size development was monitored weekly until harvest during the first week of October.

First year results indicate that fruit density adjustments are necessary to produce fresh market quality Honeycrisp™ apples. The average crop-load (kg/cm^2) for 9 and 6 fruit/cm^2 are similar because of increased fruit size at the lower average fruit density of 6 fruit/cm^2 (Table 1). Crop adjustments during the week of July 25th provided a significant increase in fruit size at harvest for all three crop densities. Average fruit color development at all three sites was disappointing, however, the fruit density had a significant effect (Table 1). There was also significant between-site differences in color development (Figure 1).

Table 1: Overall crop-load, fruit density, fruit color and fruit size response to crop adjustment treatments of Honeycrisp™ project.

Treatment	Crop-load	Average Fruit Density		Percent Fruit Color		Average Fruit Size
	kg/cm^2	/Tree	/cm^2 TCA	Avg	> 50	Grams
Control	1.8	531	20	39	21	99
9 fruit/cm^2	1.3	234	10	48	62	129
6 fruit/cm^2	1.2	157	7	55	70	168
3 fruit/cm^2	0.7	80	3	58	77	214

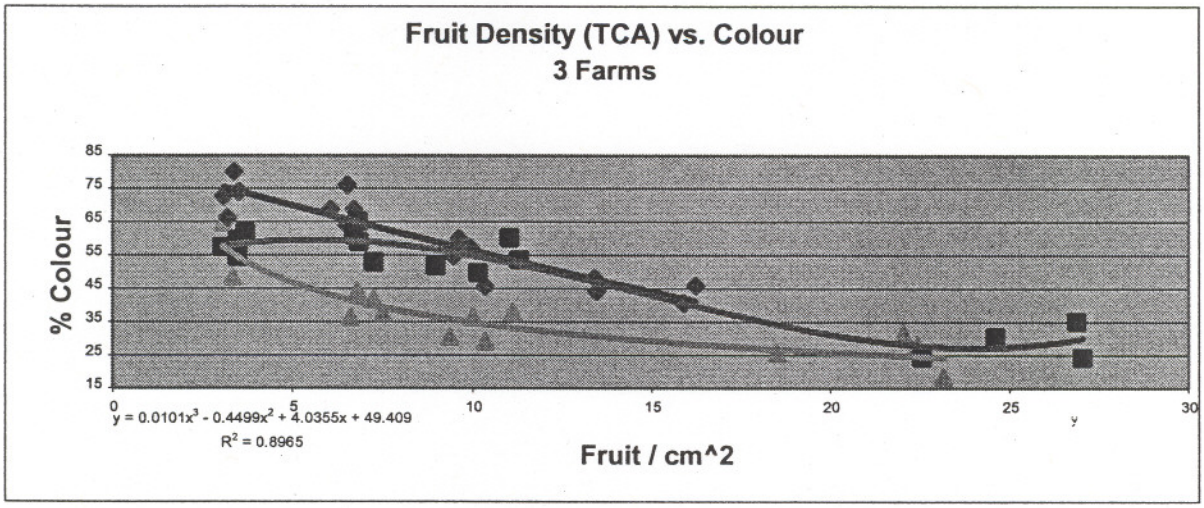

Figure 1: Honeycrisp™ crop density (ft/cm^2) influence of fruit coloration (%) is variable between sites.

The between-site colouration differences (Figure 1) are considered to be affected by tree canopy size and shape (Table 2). Using the "Contour Method" measurements (M^3) as a gauge for apple tree production potential, Table 2 shows there is considerable discrepancy between the sites; these cross-site differences were not apparent within the TCA cm^2 comparisons. Derived from the canopy volume per tree values, the estimated canopy volume per hectare differences were large. Low vigor of the Honeycrisp™ cultivar magnifies the importance of adequate canopy development for a productive orchard.

Table 2: Three Site Comparison of Tree Density, TCA and Canopy Volume of Honeycrisp™.

Site	Tree Density		TCA cm^2	Canopy Volume m^3	
	/Spacing	/Hectare	/Tree	/Tree	/Hectare
1	1.5 × 4.5	1,481	22.4	1.6	2,369
2	2.0 × 5.5	885	26.6	2.5	2,212
3	1.8 × 5.0	1,111	24.2	3.1	3,444

The TCA method to measure density compared to average fruit size was well correlated within sites yet not between sites. The canopy volume compared to average fruit weight was also found to be a closer relationship than TCA to average fruit weight for between site comparisons.

We applied a dollar value to the treatment effects using 2003 gross farm gate values for Honeycrisp™ fresh, processing and juice market fruit. The gross revenue was calculated assuming every apple was sorted perfectly and reached the best market available according to it's grade (Table 3). The most lucrative density varies with the canopy volume differences of the farm. The expenses associated with delivering the crop to market and grading expense were not included in this illustration. We do not take into account any costs, which would vary depending on the amount of sorting and the number of picks you were willing to do. The other costs associated with farming (spray, pruning, orchard management and establishment) are not included. To determine the optimum densities from this experiment is premature as treatment effects on fruit storage and return bloom will be important additional factors.

Table 3: Initial year site, canopy and treatment effects on potential gross value per tree and per hectare of Honeycrisp™ analyzed.

Farm	Dollars	Treatments			
		Control	9 fruit/ cm^2	6 fruit/ cm^2	3 fruit/ cm^2
1	/Tree	9.88	8.23	11.27	11.78
	/Hectare	14,622	12,180	16,679	17,434
2	/Tree	17.48	22.93	36.09	23.55
	/Hectare	15,469	20,293	31,939	20,841
3	/Tree	15.30	39.64	30.30	18.13
	/Hectare	16,998	44,040	33,663	20,142