Managing Honeycrisp for Production and Quality

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Honeycrisp is being extensively planted, as growers seek profitable new cultivars to diversify their variety mix. Being new, Honeycrisp has not been well studied and there is little information for making recommendations about specific horticultural practices. As growers, extension advisors and researchers gain more experience with growing Honeycrisp, the challenges involved in producing this cultivar are becoming more apparent.

Honeycrisp leaves often develop a zonal chlorosis that resembles the damage caused by potato leafhopper (PLH). The specific nature of this chlorosis and its significance in terms of tree growth and productivity are unknown. However the affected trees take on a chlorotic, unhealthy appearance that causes growers to be concerned.

Because misdiagnosis of the cause of these symptoms could lead to unnecessary pesticide applications, a replicated trial was conducted on Honeycrisp/M.9 trees at Cornell's Hudson Valley Laboratory. Whole-tree cages designed to exclude leafhoppers were placed over four Honeycrisp trees, while uncaged Honeycrisp trees served as checks. The trees were monitored throughout the summer for the presence of PLH on the leaves and for chlorotic symptoms.

Results showed that 75% of the caged trees developed symptoms by 17 June. On uncaged trees, 75% developed symptoms by 17 June, while one uncaged tree remained free of symptoms throughout the entire monitoring period. Very low levels of PLH infestation occurred in the uncaged trees, while all caged trees eventually developed symptoms in the absence of PLH (Fig. 1). The timing and severity of symptoms on caged or uncaged trees varied greatly. We concluded that the chlorotic symptoms on Honeycrisp are not due to PLH but to some physiological factor or inherited trait(s) unique to affected trees.

A study was conducted in 1999 and 2000 to evaluate the effect of chemical thinners on yield, fruit size and fruit quality of Honeycrisp. This study was conducted in a commercial orchard in Milton, NY, on 6-year-old Honeycrisp/M.26 trees. The trees were planted at 8 x 16 ft spacing with trickle irrigation and trained to the vertical axis system. The treatments were 1) untreated control; 2) Sevin XLR™, 1 pint/100 gal; 3) Fruitone N™, 1 oz/100 gal (2.5 ppm NAA); 4) Fruitone N™, 2 oz/100 gal (5 ppm NAA); 5) Fruitone N™, 3 oz/100 gal (7.5 ppm NAA); 6) 2.5 ppm NAA plus Sevin™; 7) 5 ppm NAA plus Sevin™ and 8) Accel™, 53 fl. oz/100 gal plus Sevin. Chemical thinners were applied to drip with an airblast sprayer when the largest fruits were 10 to 12 mm in diameter.

All the chemical thinners tested in this study provided thinning activity on Honeycrisp. Thinning activity increased with increasing NAA concentration up to 5 ppm. The tank mix sprays of 5 ppm NAA plus Sevin™, and Accel™ plus Sevin™ both severely overthinned Honeycrisp (Table 1). All thinning treatments increased fruit size relative to unthinned trees. Average fruit diameter exceeded 3 inches for all thinning treatments. Fruit from excessively thinned trees was especially large and more prone to bitter pit than fruit from moderately thinned trees.

The severity of "leafhopper like" symptoms was inversely related to yield (Table 1). This supports our earlier conclusion that the leaf chlorosis seen on Honeycrisp is a physiological disorder and suggests a relationship to the synthesis and transport of assimilates from the leaves.

Developing attractive red fruit color has been problematic for many Honeycrisp growers.

Honeycrisp is a large fruited cultivar that appears to be easy to chemically thin at the traditional 10 to 12 mm growth stage. For young bearing trees, try NAA at 2.5 or 5 ppm. If initial set is heavy and a stronger thinning response is needed, try the combination of 2.5 ppm NAA plus 1 pint Sevin XLR™/100 gal. Honeycrisp appears to be

very sensitive to Accel™ used in combination with Sevin XLR™. It is suggested that growers be cautious using Accel to thin Honeycrisp until further research is concluded. Considering only 2 years of results and that the trees in this study were fairly young, these recommendations should be viewed as preliminary.

Developing attractive red fruit color has been problematic for many Honeycrisp growers. The amount of fruit color and appearance of Honeycrisp fruit are highly variable from tree to tree for reasons which are not fully understood. Some trees produce attractive fruit with a solid red blush, while others produce less attractive fruit with a striped and/or blotchy appearance. The possible causes for this variability include environmental stresses, virus expression or genetic variation.

It appears that the sensitivity temperatures prior to harvest may affect color formation of Honeycrisp in the same way that they affect McIntosh and other cool climate cultivars. The production of such cultivars is confined to northern apple growing regions for this reason. New York's Hudson Valley is considered by many to be the southern limit for cool season cultivars such as McIntosh. Whether Honeycrisp of marketable color can be produced consistently in regions such as the Hudson Valley is yet to be determined. Particle film sprays such as Surround™ have been recommended for improving red fruit color in situations where temperatures are supra optimal. A study was conducted in Milton, NY, in 2000 to determine the effect of Surround™ on fruit color and fruit maturity of Honeycrisp apples.

Surround™ applied weekly for the first 7 weeks following petal fall had no effect on fruit color of Honeycrisp apples, while seven weekly Surround™ applications starting in July reduced red fruit color. Discussions with the grower cooperator revealed that Surround™ applications resulted in undesirable residues at harvest that were not satisfactorily removed by brushing on a commercial packing line (Jeff Crist, Crist Brothers Orchards, personal communication). These white, chalky residues found in the basin and in the cavity (the depressions around the stem and the calyx, respectively) had to be removed manually. These results suggest that Surround™ should not be used to increase red fruit color of Honeycrisp apples.

Growing Honeycrisp presents several challenges relating to fruit maturity. These can include poor fruit color, preharvest fruit drop, uneven ripening of the fruit within a given tree and the development of off-flavors and soft scald of overmature fruit held in refrigerated storage. An experiment was undertaken to determine if ReTain™ can be used alone or in combination with Ethrel™ to reduce preharvest drop, improve fruit quality at harvest and following storage, and increase red fruit color of Honeycrisp.

ReTain™ at 50 g a.i./acre was applied to Honeycrisp/M.26 apple trees, 4 weeks prior to anticipated first harvest. The ReTain™ was applied with 0.1% Silwet and in 150 gal of spray per acre. Ethrel™ was applied at 1 pint/100 gal, 7 days prior to the first harvest. Fruit samples were harvested on 5 Sept. and on 11 Sept. for evaluation of fruit maturity and quality at harvest and after storage. All the fruit per tree were counted and, subsequently, all the fallen fruit were counted after harvest to calculate the percentage of fruit drop for each treatment.

Ethrel™ increased fruit drop of Honeycrisp, however application of ReTain™ prior to Ethrel™ resulted in a level of drop similar to that of the untreated controls (Fig. 2). ReTain™ reduced internal ethylene concentration (Fig. 2) and red fruit coloration at harvest (Table 2), and it increased fruit firmness. Except for preharvest drop,

TABLE 1

Effect of chemical thinners at the 10 to 12 mm stage on Honeycrisp yield and leaf chlorosis (1=0% of leaf, 5=100%).

Treatment	Yield (lb/tree)	Leaf chlorosis rating
Control	107	1.8
Sevin XLR	81	2.5
NAA, 2.5 ppm	90	2.3
NAA, 5 ppm	90	2.8
NAA, 7.5 ppm	73	3.0
NAA 2.5 + Sevin XLR	80	2.3
NAA 5 + Sevin XLR	54	3.3
Accel + Sevin XLR	12	4.5

FIGURE 1

Incidence of leafhopper-like symptoms (yellow chlorotic areas on the leaf) in caged and uncaged Honeycrisp trees.

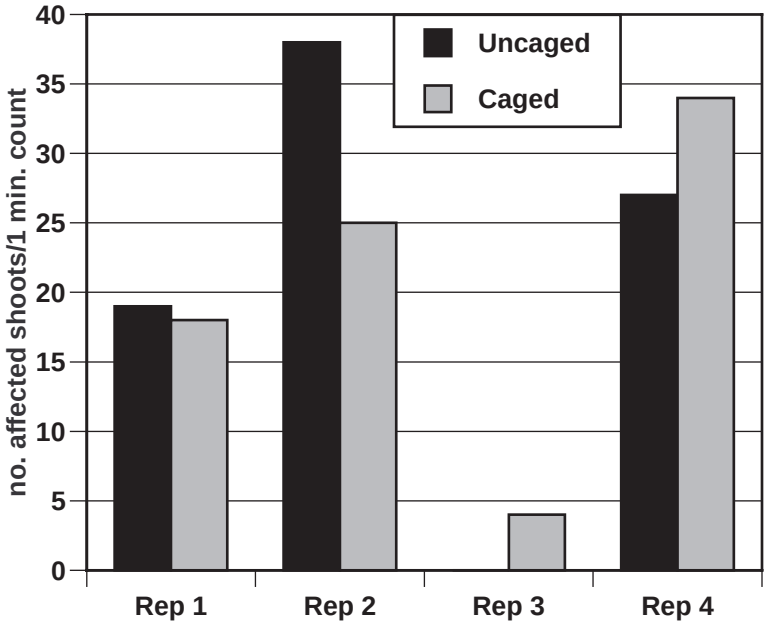

TABLE 2

Effect of ReTain and Ethrel on Honeycrisp fruit color.

Treatment	% blush 9/5	% blush 9/11
Control	71	73
Ethrel	69	71
ReTain	63	65
Both	59	65

Ethrel™ had little or no effect on any fruit maturity or fruit quality parameter. The internal ethylene concentration of Honeycrisp declined between the two harvest dates (Fig. 2). We have observed this unusual pattern of ethylene production in several recent studies of Honeycrisp fruit maturity.

Ethrel™ with or without ReTain™ did not increase Honeycrisp fruit color, while ReTain™ blocked the expected effects of Ethrel™ on maturity indices. Maintaining Honeycrisp fruit quality in storage has been a major obstacle to the commercial development of this variety and the effect of ReTain™ on postharvest quality may be of major importance. The storage samples have not been analyzed.

Growing high quality Honeycrisp presents a number of challenges, and we have tried to address several of these in this report. Much of the information is preliminary, and more research results are needed to improve Honeycrisp production and quality. Honeycrisp is a high potential/high risk cultivar, and the ultimate amount of Honeycrisp in an individual's total production will depend to a large extent upon that person's attitude toward risk. The key to success with Honeycrisp is a skilled, motivated grower.

FIGURE 2

Effect of ReTain and Ethrel on preharvest drop and internal ethylene concentration (IEC) of Honeycrisp apples.