Enhancing Return Bloom of Honeycrisp Apples with Ethephon

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Getting adequate return bloom is very difficult with some varieties, particularly after a relatively heavy crop. Honeycrisp is particularly difficult and often is cropped at lower than average levels simply to enhance return bloom. Plant growth regulators can alter the process of flower-bud formation, and if used properly can provide significant enhancement in return bloom. Ethylene is one of those compounds, and we can manipulate ethylene levels in the plant tissue easily with the application of ethephon.

Once fruit progress past one inch in diameter, ethephon is less effective as a chemical thinner, but during the following weeks, it can encourage flower-bud formation. Current recommendations suggest starting treatments for increasing return bloom when fruit reach about 1.2 inches (30 mm) in diameter. Simply to gain experience with this approach, we chose to treat Honeycrisp in 2007 with the hope of increasing return bloom in 2008.

Twenty mature Honeycrisp trees were selected at

Table 1. Effects of three applications of ethephon on fruit set, average fruit weight, and fruit ripening in 2007 and return bloom in 2008 of Honeycrisp at the UMass Cold Spring Orchard Research & Education Center.

Treatment	Fruit set (2007, no./cm^2 LCA)	Average fruit weight (g)	Internal ethylene concentration (ppm)	Climacteric fruit at harvest (%)[z]	Return bloom (2008, blossom clusters/cm^2 LCA)
Control	6.4	233	0.11	12	5.9
Ethephon[y]	6.4	238	0.19	15	6.7

[z] Percent climacteric fruit refers to the proportion of the sample where the internal ethylene concentration was greater than 1 ppm, indicating that the fruit had begun to ripen.

[y] Ethephon was applied as Ethephon 2 at 0.5 pints of formulated product per 100 gallons (150 ppm) plus 0.1% Regulaid® on June 18, 25, and July 2, 2007, when average fruit diameter was 30 mm, 35 mm, and 42 mm, respectively.

the University of Massachusetts Cold Spring Orchard Research & Education Center in Belchertown, Massachusetts. These trees were allocated to 10 sets of two trees each depending on fruit set. Within each set one tree was not treated and served as the control, and the other was treated with a series of three ethephon applications. Specifically, sprays of 150 ppm ethephon (0.5 pints of Ethephon 2 per 100 gallons plus 0.1% Regulaid®) were administered on June 18 and 25, and July 2. Fruit diameter at the three sprays was 1.2 inches (30 mm), 1.4 inches (34 mm), and 1.7 inches (42 mm), respectively.

Average fruit set in 2007 was good, but not as high as we might have hoped for the purposes of this experiment (Table 1). One concern about the use of ethephon to enhance return bloom is its effects on fruit size and ripening in the year of application. In 2007, average fruit weight and ripening were not affected by the three ethephon applications (Table 1). Bloom in 2008 was quite light, and ethephon increased it by only 14%, much less than we had hoped and certainly only a modest effect.

These results were somewhat encouraging, obtaining some increase in return bloom while not advancing ripening or affecting fruit size. The next experiments will study the potential benefits of a greater number of ethephon applications, specifically four, five, and six weekly treatments.

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