

Ethephon as a Chemical Thinner of McIntosh and Macoun Apples in 2007

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We have published three articles previously (*Fruit Notes*, Spring 2005, Spring 2006, and Summer 2006) on the effects of ethephon on apple fruit set when used as a late-season chemical thinner. Those articles represented four years of study and gave clearly inconclusive results. In two of the four years ethephon performed very well when applied to McIntosh trees with fruit about 0.8-1 inch in diameter. Year 3 (2005) expanded the study to include Macoun as well as McIntosh. Ethephon thinned fruit and resulted in good return bloom, but the thinning was not adequate. Variations in temperature among the three first years

led us to try to study the temperature effects in year 4 (2006). Applications of ethephon were timed to occur at different temperatures. Average highs the day of and the day after treatment ranged from 64 to 85 in that season. Ethephon treatment, however, gave no thinning regardless of temperature. So, after the first four years, we are unable to make any clear recommendations regarding the application of ethephon as a late-season chemical thinner.

In 2007, we treated McIntosh and Macoun with a range of ethephon concentrations, hoping to get another year with different weather conditions and possibly

different results. All treatments were applied on June 11, 2007 to mature McIntosh and Macoun trees growing at the University of Massachusetts Cold Spring Orchard Research & Education Center in Belchertown, MA. Prior to application initial fruit set was counted on two limbs per tree and trees were allocated to 10 blocks according to initial set (Table 1). Treatments included 0 ppm (control), 200 ppm (2/3 pint/100 gallons), 300 ppm (1 pint/100 gallons), and 400 ppm (1-1/3 pint/100

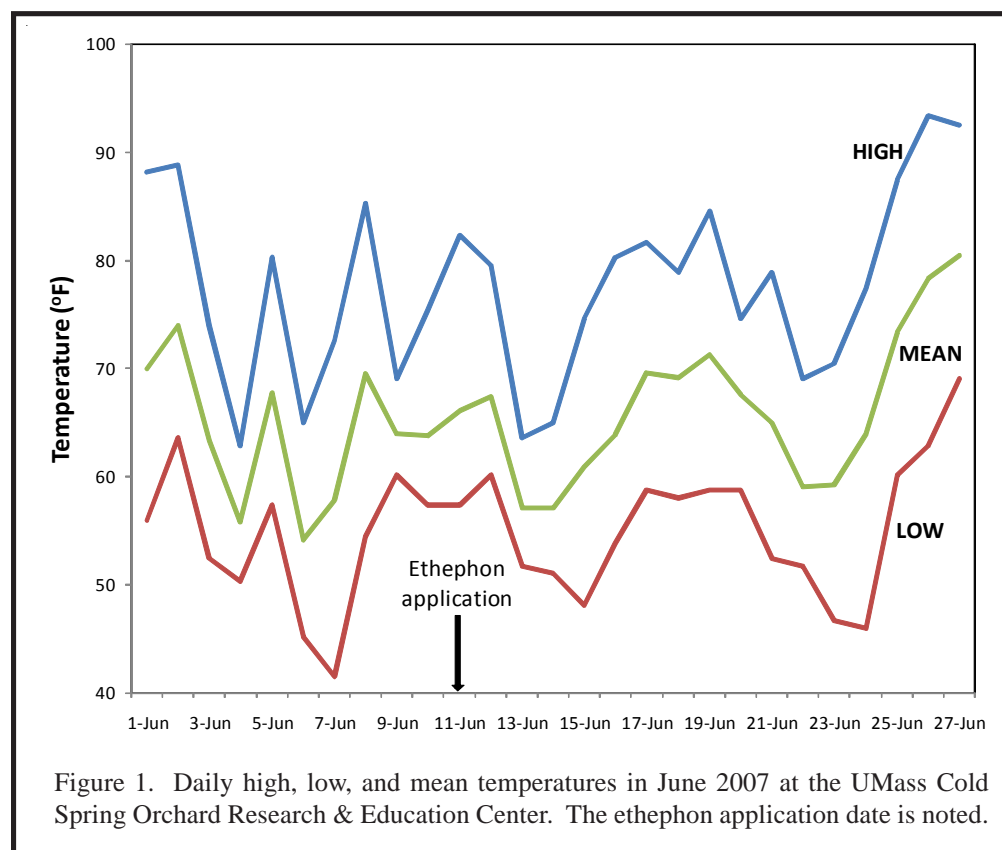


Figure 1. Daily high, low, and mean temperatures in June 2007 at the UMass Cold Spring Orchard Research & Education Center. The ethephon application date is noted.

Table 1. Responses of McIntosh and Macoun trees to ethephon treatment on June 11, 2007. Fruit were approximately 0.9 inch in diameter. Regulaid (0.1%) was included in all ethephon treatments as a surfactant.

Ethephon treatment (ppm, pints/100 gallons in parentheses)	Initial set (prior to treatment, no./cm ² limb cross-sectional area)	Ethylene evolution 1 day after treatment (nl/kg/min)	Final set (no./cm ² limb cross-sectional area)
McIntosh			
0 (control)	18.1	1.9	13.0
200 (2/3 pint)	18.3	9.7	13.8
300 (1 pint)	18.1	15.0	13.6
400 (1-1/3 pint)	18.3	15.1	12.9
Macoun			
0 (control)	15.9	4.6	10.6
200 (2/3 pint)	15.8	10.3	10.7
300 (1 pint)	15.9	16.2	11.4
400 (1-1/3 pint)	15.8	20.2	11.1

2003 and 2004, both showing significant increases in ethylene levels the day after application resulting from ethephon, with levels declining afterwards. Ethylene was not measured in 2005 or 2006. In 2007, ethephon resulted in dramatically increased ethylene evolution and increasing amounts with increasing concentration of ethephon (Table 1).

Well after June drop, final fruit set was counted on two previously selected limbs per tree. As in 2006, ethephon did not result in any fruit thinning (Table 1).

gallons) ethephon with 0.1% Regulaid included as a surfactant. The high temperatures the day of and day after application were near 80°F, but it cooled to the 60's for the following two days before rising to 75-85 for the following week (Figure 1).

One day after ethephon application fruit samples (each of about 50g) were taken from each tree. Fruit from a tree were sealed in a 133-ml Mason jar and sealed with a lid equipped with a septum cap. After three hours, a 1 ml gas sample was removed through the septum and injected into a gas chromatograph to measure ethylene concentration. These data were used to estimate ethylene evolution rate from fruitlets. Ethylene evolution after application was measured in

It is unclear why we had such poor results in 2005, 2006, and 2007 after having good results in 2003 and 2004. It is interesting to note that the ethylene response in 2007 was about half of what we measured in 2003 and 2004. The first two years, however, included carbaryl in the application. Carbaryl alone, however, resulted in no thinning, which was the reason that we eliminated it from the studies in the last three years. It is possible that a synergistic response occurs between ethephon and carbaryl. The 2008 studies will determine if carbaryl can result in ethephon responses of economic value.

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