

Chemical Control/New Products

Postharvest Ethephon Application on Advancing Fruit Maturity

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From our fruit maturity study, it was shown that codling moth (CM) larval infestation and survival are greatly influenced by fruit maturity. If postharvest fruit maturity can be advanced by the application of a plant growth regulator such as ethephon to a fruit pressure of 6 kg/cm² or less, or fruit color of H or greater, then CM will not be able to successfully complete its larval development. Reported here are the effects of a postharvest ethephon application on advancing fruit maturity.

Methods and Materials

A study was conducted on mature 'Bartlett' pear trees in a commercial orchard near Hood, CA. Four treatments were replicated four times in a randomized complete block design. Each replicate consisted of a single tree and there was one buffer tree in each direction from the experimental tree. The treatments were 0, 900, 1500 and 2100 ppm ethephon. Treatments were applied on August 23 with a hand-held orchard sprayer operating at 200 psi and delivering 300 gal/acre of finished spray.

The effect of ethephon on fruit maturity and percent fruit drop was evaluated at 9 and 14 days after treatment (DAT). A maximum of 10 rattail and 10 firm green fruit per replicate was flagged on the day of application. Percent fruit drop was determined on both 9 and 14 DAT based on the number of fruit remaining from the previous reading. Fruit maturity was determined by color on 9 and 14 DAT and by fruit pressure on 14 DAT. Fruit color was determined from a standardized peach maturity color chart. A standardized peach maturity color chart was provided by the California Tree Fruit Agreement. The color chart, with modification, was used because it was a nondestructive measure of maturity and allowed us to determine maturity without removing the fruit from the tree. We assigned color A=1, B=2, C=3, D=4, G=5, H=6, I=7 and J=8. Color A was the most immature (green) and color J was the most mature (yellow). Colors E and F were not used because in pears color E could not be readily distinguished from D, and color F could not be readily distinguished from G. Fruit pressure was determined by taking three pressure readings (kg/cm²) from the base of all pears remaining on the trees.

Results and Discussion

In rattail fruit, ethephon did not cause an increase in fruit drop. However, there was a significant increase in fruit color at 1500 ppm ethephon as compared to the untreated control at 9 DAT. The most striking increase in maturity occurred at 14 DAT. Fruit color increased from 3.7 in the untreated control to 6.5 in the 900 ppm ethephon treatment and pressure decreased from 12.7 kg/cm² in the control to 1.7 kg/cm² in the 900 ppm ethephon treatment. This increase in rattail maturity was most encouraging. A fruit that has a color of 6.5 which is about H or I in

color classification and a pressure of 1.7 is unlikely to produce a CM larva.

In firm green fruit, ethephon caused a significant increase in fruit drop and fruit maturity. At 9 DAT percent fruit drop was significantly increased in the 1500 ppm ethephon treatments and fruit color was significantly increased in the 900 ppm ethephon treatment as compared to the untreated control. Again, the most striking increase in maturity and fruit drop occurred at 14 DAT. Percent fruit drop increased from 27.5% in the untreated control to 74.4% in the 900 ppm ethephon. Fruit color was increased from 4.7 in the untreated control to 7.7 and pressure was decreased from 8.2 kg/cm² in the control to 1.0 kg/cm² in the 900 ppm ethephon treatment. A fruit that has a color of 7.7 which is about J in color classification and a pressure of 1.0 will not produce a CM larva.

This preliminary study with ethephon is very encouraging. The postharvest application of ethephon even at 900 ppm ethephon caused significant increase in firm green fruit maturity and drop, but more importantly 900 ppm ethephon caused a significant increase in rattail fruit maturity. If the return bloom and foliage next spring do not show adverse effects from the ethephon treatments, then ethephon may be substituted for postharvest fruit removal or insecticide applications to control the overwintering CM population.