PREHARVEST DROP CONTROL WITH RETAIN AND NAA COMBINATIONS

Duane W. Greene, James Krupa, and Maureen Vezina
Department of Plant, Soil, and Insect Sciences
University of Massachusetts
Amherst, MA 01003
dgreene@pssci.umass.edu

Retail sales continue to be an important component in the overall business model for growers in the Northeast. The pick-your-own component of this model is playing an increasingly important role in the overall business. Many varieties, including McIntosh and Macoun, are especially prone to drop. In previous business models, it was sufficient to control preharvest drop for a period of time sufficient for fruit to develop market maturity and to allow a timely harvest. This scenario has changed and we now ask available preharvest drop control compounds to be effective over a much longer period of time. The early weekends in October, especially the extremely busy Columbus Day weekend, are extremely important and growers are now attempting to keep fruit on the tree at least through this holiday weekend. ReTain and NAA are our primary drop control compounds and, by themselves and used as we have done in the past, they do not control drop for this extended period of time. The purpose of this project was to explore strategies using ReTain and NAA to extend the control of drop through the Columbus Day weekend without adversely affecting fruit quality. Both NAA and ReTain have the potential to influence fruit quality, ripening and storage potential.

Materials and Methods

A block of Gatzke McIntosh/M.9 was selected to do this drop control experiment. There were 9 treatments that included an untreated control, trees that received a full rate of ReTain either alone or with one or two applications of NAA at either 10 or 20 ppm and other trees received three half rates of ReTain applied at 2-week intervals that contained 10 or 20 ppm NAA or no NAA. All treatments were replicated 5 times with two trees treated per treatment per replication. One of the treated trees served as the drop tree and no fruit was harvested from this tree. A second tree was designated as the sample tree and all samples for evaluation and storage were harvested from this tree. There were 9 dates when samples for evaluation were taken starting on 26 August and ending on 14 October. Data generally taken on the sample dates included: fruit weight, flesh firmness, soluble solids, red color, internal ethylene and starch rating. A 20 kg sample was harvested on 13 September. Firmness on this sample was taken after 6 and 12 weeks in regular air storage and storage disorders were evaluated after 12 weeks on the remaining fruit in the box. All or a portion of the treatments were applied with a commercial airblast sprayer on 18 August and combination sprays were tank mixed. All fruit that dropped was picked up and discarded and then the number of fruit that subsequently dropped was picked up under each tree and discarded two times per week until 26 October. All remaining fruit were harvested from the drop trees on 26 October, counted and then the cumulative drop calculated over the whole drop period.

Results

Preharvest drop was followed over a 9-week period. Untreated control trees displayed the normal and severe preharvest drop problem associated with McIntosh. By 7 September 25% of the fruit were on the ground and one week later over 50% of the fruit had dropped. All other drop control treatments were effective but there were significant differences among treatments. A full rate of ReTain applied once on 18 August (the industry standard) was effective until the last week in September, when it started to loose its effectiveness. All drop control treatments were statistically better than the ReTain standard. This trend continued through the Columbus Day weekend. NAA when combined with ReTain improved the drop control of the ReTain standard. This was true whether one application of either 10 or 20 ppm NAA was applied with the initial ReTain application or whether two applications of NAA at 10 or 20 ppm were applied at 2 week intervals (one with the initial ReTain and then one alone 2 weeks later). In this experiment the treatment with 3 half rate applications of ReTain at 2 week intervals was superior to the one full rate of ReTain, However, there was no appropriate check (1 application using 1.5 pouches of ReTain) for this treatment so it is unresolved if it is the split application or the total amount of ReTain applied that is the important factor. The treatment involving application of 3 half rates of ReTain where each contained 20 ppm NAA was less effective. Starting as early as 10 September, the drop control of this treatment diminished more than any of the other drop control treatments. It should be noted that this is the only treatment that contains a low rate of ReTain and a high rate of NAA and this may be the major reason. Columbus Day weekend ended on 11 October. On that date the best drop control was achieved where a full rate of ReTain was applied on 18 August with 10 or 20 ppm NAA followed by another 10 or 20 ppm NAA treatment on 10 September. Equally good at this time were the 3 half rates of ReTain and the 3 half rates of ReTain with 10 ppm NAA.

Fruit quality parameters were evaluated and statistically analyzed over the whole sampling period from 26 August to 14. Flesh firmness is an extremely important parameter, not only for fruit quality but also because NAA has the potential to reduce firmness, especially when applied alone. The flesh firmness results were quite unexciting in that there were no substantive differences among treatments. The inescapable conclusion is that ReTain is able to counteract any tendency for NAA to reduce flesh firmness, regardless of time of application. From a flesh firmness standpoint, ReTain makes NAA a much safer compound to use on apples during the harvest period. In general, fruit treated with ReTain had less red color and the addition of NAA with ReTain did not result in an increase in red color. ReTain-treated fruit had slightly lower starch rating and the addition of NAA to the ReTain did not result in any higher starch rating. On 4 October it was noted that the trees that received 3 applications of either 10 or 20 ppm NAA had more cracked fruit. When quantified, it averaged slightly more than 6%. Flesh firmness of fruit following regular air storage for 6 and 12 weeks. A difference among treatments or major trends is absent. The general lack of response seen following storage is similar to results documented at the various harvest dates. The influence of treatments on storage disorders is either nonsignificant or if significant, as with brown core, they are difficult to interpret.

Conclusions

The results of this experiment clearly demonstrate that there is potential benefit of including NAA in a drop control program. The addition of NAA in the initial ReTain application or supplemental applications did enhance the drop control of ReTain. One of the major concerns associated with the use of NAA at harvest time is the potential that it can advance ripening thus adversely affect fruit quality at harvest and following a period of storage. This appears not to be the case. Flesh firmness of fruit held in cold storage for either 6 or 12 weeks showed no differences between ReTain-treated fruit and fruit that received combinations of ReTain and NAA. The multiple applications of 20 ppm NAA with half rates of ReTain raises the question that there may be a ratio between the amount of ReTain applied and the amount of NAA that ReTain is able to negate ripening effects. This must be established in another year, but until this is resolved it seems quite safe to say the one or two applications of NAA at 10 ppm with ReTain is treatment that is likely to enhance overall drop control without resulting in advanced ripening or the shortening of the storage period.