Effects of Sysstem-CAL on Jersey Peaches in Massachusetts and New Jersey

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It is well known that introducing nutrients into peach trees through foliar applications is difficult, so growers have been unable to take advantage of calcium applications to potentially improve fruit quality and storability. Sysstem™-CAL is a commercial formulation of calcium (4%) and copper (0.25%) intended for foliar applications. It is postulated that Sysstem-CAL may encourage uptake differently than other nutrient sources, and may be a way to apply foliar calcium and ultimately increase fruit calcium. To study this potential with peaches, we conducted experiments in 2010 and 2011 to determine if Sysstem-CAL could increase peach fruit calcium concentration.

Materials & Methods

In 2010, twenty 4-year-old PF14-Jersey/Lovell trees at the UMass Cold Spring Orchard (Belchertown, MA) and twenty-eight 3-year-old PF14-Jersey/Bailey trees at the Rutgers Snyder Farm (Pittstown, NJ) were selected for this trial. Four treatments were allocated randomly among the trees at each location, giving five trees in MA and seven trees in NJ receiving each treatment. Treatments began at bloom and were applied every two weeks until approximately 1 week before harvest: (1) control was not treated; (2) calcium chloride was applied at the equivalent of 2 pounds per acre per treatment; (3) Agro-K low was the equivalent of 2 quarts Sysstem-CAL per acre per treatment, but the last treatment was 2 quarts Vigor-CAL per acre; (4) Agro-K high was the equivalent of 2 quarts Sysstem-CAL plus 2 quarts Vigor-CAL per acre per treatment, but the last treatment was 2 quarts Vigor-CAL per acre only. All treatments included 0.1% Regulaid.

In 2011, thirty-six 4-year-old PF14-Jersey/Lovell trees at the Rutgers Snyder Farm (Pittstown, NJ) were selected for this trial. Three treatments were allocated randomly among the 36 trees, giving 12 trees per treatment. Treatments began at bloom and were applied every two weeks until approximately 1 week before harvest: (1) control was not treated; (2) calcium chloride was applied at the equivalent of 2 pounds per acre per treatment; (3) Agro-K high was the equivalent of 2 quarts Sysstem-CAL plus 2 quarts Vigor-CAL per acre per treatment, but the last treatment was 2 quarts Vigor-CAL per acre only. All treatments included 0.1% Regulaid.

In both years, 10-fruit samples were harvested from each tree. The weight and diameter were assessed. Fruit firmness was measured with a penetrometer (2 punctures per fruit after removing the peel). The juice released from the firmness assessment was combined for each 10-fruit sample and the soluble solids concentration was determined. A wedge of fruit in a longitudinal section (about 1/8 of a fruit) was taken from each fruit, and a bulked sample from the 10 fruit per tree was frozen for later calcium analysis. Samples were removed from the freezer, macerated in a blender, and freeze dried. Samples were then ground with a mortar and pestle, and ashed overnight at 500C. The ashed material was mixed with 1N HCl and diluted with water. Calcium concentration was then measured with an atomic absorption spectrophotometer.

Results

Table 1 shows the results from 2010 in Massachusetts and 2010 and 2011 in New Jersey. As expected,

Table 1. Effects of biweekly applications of calcium chloride, Sysstem-CAL, and Vigor-CAL from bloom to 1 week before harvest on Jersey peach fruit quality and calcium concentration in Massachusetts (2010) and New Jersey (2010 and 2011).

Treatment[z]	Average fruit weight (g)	Average fruit diameter (cm)	Flesh firmness (N)	Soluble solids concentration (%)	Fruit calcium conc. (ppm dry weight)
UMass Cold Spring Orchard 2010					
Control	222 a	7.41 a	48.1 a	11.5 a	193 ab
Calcium chloride	235 a	7.54 a	45.9 a	11.7 a	197 ab
Agro-K Low	219 a	7.37 a	49.1 a	11.1 a	213 a
Agro-K High	226 a	7.45 a	47.0 a	11.6 a	178 b
Rutgers Snyder Farm 2010					
Control	133 a	6.23 a	43.6 b	11.2 a	303 ab
Calcium chloride	133 a	6.27 a	45.3 b	11.1 a	279 b
Agro-K Low	113 b	5.90 b	49.7 a	10.9 a	332 a
Agro-K High	122 b	6.06 b	45.3 b	10.9 a	348 a
Rutgers Snyder Farm 2011					
Control	185 ab	6.9 a	40.8 ab	11.1 a	273 b
Calcium chloride	190 a	7.0 a	38.9 b	11.1 a	277 b
Agro-K High	175 b	6.7 a	42.6 a	10.6 b	308 a

[z]Treatments in 2010 began at bloom and were applied every two weeks until approximately 1 week before harvest: control was not treated; calcium chloride was applied at the equivalent of 2 lbs/acre; Agro-K low was the equivalent of 2 qts Sysstem-CAL per acre, but the last treatment was 2 qts Vigor-CAL per acre; Agro-K high was the equivalent of 2 qts Sysstem-CAL plus 2 qts Vigor-CAL per acre, but the last treatment was 2 qts Vigor-CAL per acre only. All treatments included 0.1% Regulaid. The 2011 treatments at Rutgers Snyder Farm were similar to those in 2010, except they included only the control, calcium chloride, and Agro-K High treatment and not the Agro-K Low.

calcium chloride had no measurable impact on fruit quality or fruit calcium concentration at either location or in either year. Sysstem-CAL (Agro-K Low) alone or with Vigor-CAL (Agro-K High) did not impact fruit quality in Massachusetts in 2010, but the Agro-K Low treatment resulted in a somewhat higher fruit calcium concentration than did the Agro-K High treatment. In New Jersey in 2010, both Agro-K treatments reduced fruit size and increased fruit calcium. The experiment in New Jersey in 2011 included only the Agro-K High treatment, and the results appeared similar to those for 2010, with fruit size reduced and calcium increased. Additionally, fruit firmness was higher for the Agro-K High treatment, and soluble solids concentration was slightly lower than the control.

Conclusions

Foliar calcium products have never proved efficacious in increasing fruit calcium. Agro-K's Sysstem-Cal and Vigor-CAL combination treatment is a foliar calcium system that can add calcium to peach fruit and increase fruit firmness. Additional work should be done to increase the amount of calcium taken up by peach fruit. If we can get some calcium in with foliarly applied Sysstem-CAL plus Vigor-CAL, there is the potential for adjusting the timing and rates to get more calcium uptake.