Post-Infection Apogee for Fire Blight Control?

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Changing consumer preferences for new apple cultivars has led to widespread planting of fire blight-susceptible cultivars in regions where fire blight is potentially a severe problem. Since the most widely available size-controlling rootstocks are highly susceptible to fire blight, there is a strong possibility of rootstock cankers that completely girdle the rootstock and kill the tree (Norelli et al., 2000; Steiner, 1998).

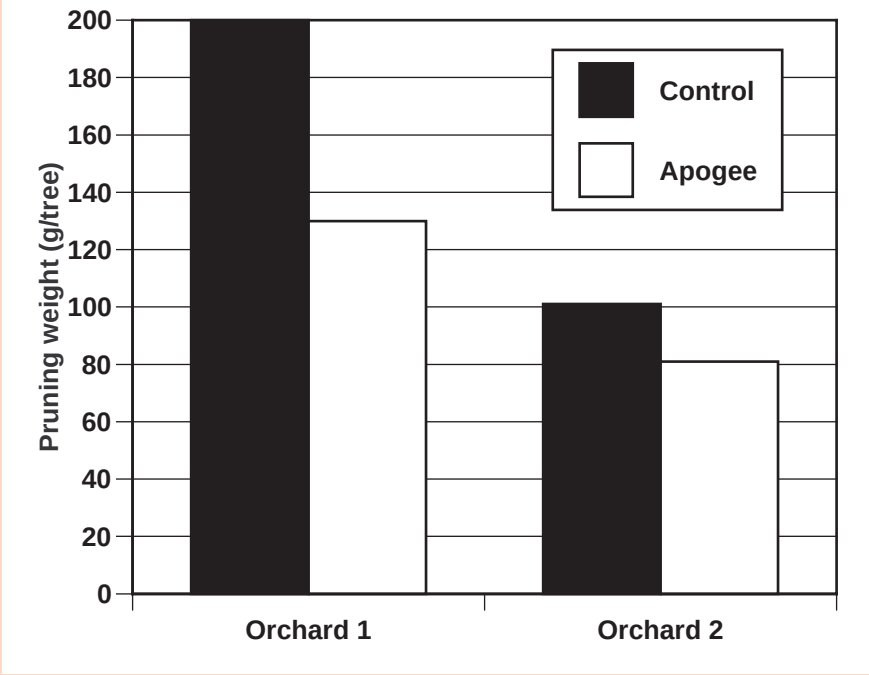
Studies have shown that Apogee can reduce the severity of shoot blight infection of apple when applied prior to the expression of symptoms (Yoder et al., 1999). The mechanism by which this resistance is imparted is not known, but could simply result from the cessation of growth. Rademacher et al. (1999) proposed that Apogee activates a biochemical resistance mechanism in the tree. If so, post-symptom sprays of Apogee might reduce the severity of injury or increase the survival of apple trees on highly susceptible rootstocks by reducing the incidence of rootstock blight.

Three to five-year-old trees normally would not be considered for treatment with Apogee because the reduction in growth would delay them in filling their space, however this age of tree seems to be especially susceptible to fire blight. The objective of these studies was to determine if Apogee could lessen the severity of pre-existing fire blight infections and increase survival of 3-year-old Gala trees on M.9 or M.26 rootstocks.

These studies were carried out in two commercial orchards in the Hudson Valley region of New York State in 2000. Both

FIGURE 1

Effect of post-infection Apogee sprays on total weight of prunings removed (g/tree).



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orchard blocks were composed of 3-year-old Gala trees trained to the vertical axis system. The first orchard, located in Livingston, NY, was on M.26 rootstock and planted at 7 x 16 ft spacing. The second was on M.9 and planted at 6 x 16 ft spacing. A natural fire blight epidemic developed in the region in 2000, and both orchards had blossom infections resulting from infection periods at the end of bloom. Frequent rain and thunderstorms throughout late May and early June provided favorable conditions for shoot blight infections.

The treatments were: 1) untreated control and 2) Apogee at 12 oz/100 gal with 0.125% Regulaid, applied by air-blast sprayer. Treated and untreated plots in each replicate were in close proximity to one another but were separated by an untreated buffer row to minimize spray drift. Replicates were arranged down the tree rows to account for any gradient in disease severity due to location in the orchard.

Thereafter, new fire blight strikes were removed at roughly weekly intervals until there were none. Pruning cuts were made several inches below the visible extent of the infection, in keeping with current recommendations (Steiner, 1998).

The number of primary scaffolds removed was recorded and the extent of leader damage was rated. The number of trees with visible fire blight cankers in the rootstock or scion and tree mortality were recorded at the end of the growing season.

Apogee reduced the total dry weight of fire blight strikes removed by pruning in Livingston (Orchard 1), but not in Modena (Orchard 2) (Fig. 1). Although the number of cuts per week did not differ among treatments, the values followed similar trends to those of the pruning weights, suggesting that the number of new strikes as well as the severity of the individual cuts contributed to differences in the total amount of diseased wood that was removed (Fig. 2).

Post-infection Apogee had no effect on tree mortality, the incidence of scion or rootstock cankers, the number of scaffolds removed or the amount of leader removed. Symptoms of red foliage resulting from rootstock cankers developed suddenly and dramatically during the first week of August. Tree mortality was 29% in Livingston and 5% in Modena.

Fire blight is an increasingly important disease in the apple growing regions of the eastern and midwestern United States. Recent trends to planting susceptible cultivars on highly susceptible rootstocks have greatly increased the likelihood of rootstock blight and the risk of tree mortality, as evidenced in southwest Michigan in 2000 (Longstroth, 2000). Treatment with Apogee prior to infection has been shown to reduce the severity of shoot blight infections (Yoder et al., 1999).

The value of pre-infection applications of Apogee and the possibility that Apogee might induce resistance mechanisms in the tree beyond that caused by the cessation of shoot growth raised hope that post-infection applications might reduce the severity of shoot blight damage and increase tree survival. We have demonstrated that post-infection treatment with Apogee is of no practical value in reducing fire blight symptoms and does not reduce the incidence of rootstock blight or mortality of young Gala trees on M.9 or M.26. This finding is consistent with the theory that the suppression of shoot blight conferred by Apogee is a result of growth control, and therefore Apogee must be applied well in advance of the appearance of fire blight symptoms to be effective for fire blight suppression.

LITERATURE CITED

Longstroth, M. 2000. The fire blight epidemic in southwest Michigan. Mich. State Univ. Internet publication: http:/www.msue.msu.edu/vanburen/fb2000.htm.

Norelli, J., H. Aldwinkle, T. Momol, B. Johnson, A. DeMarree and M.V.B. Reddy. 2000. Fire blight of apple rootstocks. NY Fruit Quarterly 8(1):5-8.

Rademacher, W., J.B. Speakman, G. Krack, M. Scholtissek, R. Wolf, J.R. Evans, S. Roemmelt and D. Treutter. 1999. Prohexadione-Ca: Induction of resistance against bacterial and fungal pathogens in apple. HortScience 34:535 (Abstr.).

Steiner, P.W. 1998. Problems in managing fire blight in high density orchards on M-9 and M-26 rootstocks. West Virginia Univ. Internet publication: http:/www.caf.wvu.edu/kearneysville/articles/SteinerHort1.html.

Yoder, K.S., S.S. Miller and R.E. Byers. 1999. Suppression of fire blight in apple shoots by Prohexadione-calcium following experimental and natural inoculation. HortScience 34:1202-1204.

FIGURE 2

Effect of post-infection Apogee sprays on total number of prunings removed (no./tree).