

Evaluate strategies for management or prevention of fire blight infection of apple rootstocks.

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The loss of trees due to rootstock blight is becoming less of a headline with the increased awareness growers have in managing blossom blight in new plantings for susceptible varieties and susceptible rootstocks. A second change is that the industry is switching from M9 to B9 rootstocks. Although B9 is susceptible to fire blight infection, it survives under field conditions with high disease pressure when used as the rootstock under the scion variety. Nurseries are reporting the sales of more B9 vs. M9.

However, the 2004 bloom period presented a research opportunity to observe the effects of copper applications (+ or -) with pruning out infections (+ or -) in a Gala orchard that was showing symptoms of shoot infection and some blossom blight around June 8. The grower was responding to market demands of bigger Gala by increasing nitrogen applications and not using Apogee as a preventative shoot blight strategy due to the limitation on the use of Apogee by the UK market.

Procedures:

The planting consisted of 2 sets of 4 rows of Gala on M9/106 separated by 2 rows of McIntosh. Trees in each row were surveyed for the number of infections present at the beginning of the study and selected for inclusion in the study with an average of 6 infections per tree per replicate. Ten trees were included in each of 2 replicates per treatment. The treatments included copper with and without pruning out infections and no copper with and without pruning out infections.

Copper was applied to one set of 4 rows of Gala at a rate of Champ at 8 oz/acre on Jun 9. To remove infections, the cuts were made a minimum of 12 inches behind visible symptoms of infection without any attempt to sterilize pruning shears in the process. The pruning sessions to remove infections were limited to very clear, sunny, high pressure weather systems with low relative humidity. Pruning was done on June 12 and June 23. At the same time of pruning, the trees in the unpruned treatments were evaluated for infections counting the number of theoretical pruning cuts that would be made as in pruned treatments. As the season progressed, rootstock blight symptoms were noted and trees were evaluated for visible symptoms of rootstock infection throughout the block. The plots will be re-evaluated in Spring of 2005, to confirm rootstock blight and incidence of tree death.

To evaluate phytotoxicity, 50 fruit were examined from each of 5 trees in each plot for russet on skin using a grading scale of 0-4 based on percentage of fruit surface with russet, and 0-3 for amount of stem bowl russet. Each apple was evaluated based on a range of russet as follows:

0 = 0-3% of skin with russet or rough skin

1 = 4-20% of the skin with russet or rough skin

- 2 = 21-45% of skin surface with russet
- 3 = 46-74% of skin surface with russet
- 4 = > 75% of skin surface with russet

The level of stem end russet was also recorded within the following description:

- 0 = no stem end russet
- 1 = stem end russet only in stem bowl
- 2 = stem end russet starting to expand up over the shoulder around stem bowl
- 3 = stem end russet extending over shoulder around entire stem bowl

Stem end or whole fruit russet was calculated as: $[(\text{rating} \times \text{the number of fruit with the rating}) / (\text{highest rating} \times \text{total number of fruit})] \times 100$. (Burr, 2002)

Results:

The number of cuts made to remove fire blight infections was greater than the number of potential cuts that would have been made in the non-pruned treatments between the first and second pruning date. This may suggest that pruning out infections can exacerbate the situation. But the number of potential cuts stayed steady for the remainder of the season. The actual dates for removing infections when we had appropriate weather conditions were June 11, June 23, and a final removal date of Sept 1 on the grower's request before harvest. There was a significant increase in the number of infections noted between Jun 11 and June 23, but that was most likely due to infections that had already occurred by June 11 but had not yet developed symptoms. That is always the most critical period for concern for shoot blight development. The remainder of the season was too wet to consider pruning, so evaluations reported for other dates were all numbers of potential cuts made to remove FB.

Figure 1 shows the trend of the number of infections is similar between the pruning and no pruning treatments without regard to the application of copper.

The biggest question was whether we could control rootstock blight if copper or pruning out infections were applied. Although statistical analysis has not been completed, Figure 2 suggests there is no difference among treatments of copper and pruning. This is consistent with previous research done that showed the bacteria detectable in the rootstock of nursery trees within 3 weeks after the infection event, not the appearance of symptoms.

The fruit russet evaluation for the copper plots vs. the no copper plots showed a small increase in fruit russet overall and in the stem bowl, but not sufficient to impact on the marketability of the fruit. The conditions in which the copper was applied while fruit was highly susceptible were perfect, with sunshine, 87F, 56% humidity, and winds at 11 mph to provide very fast drying conditions.

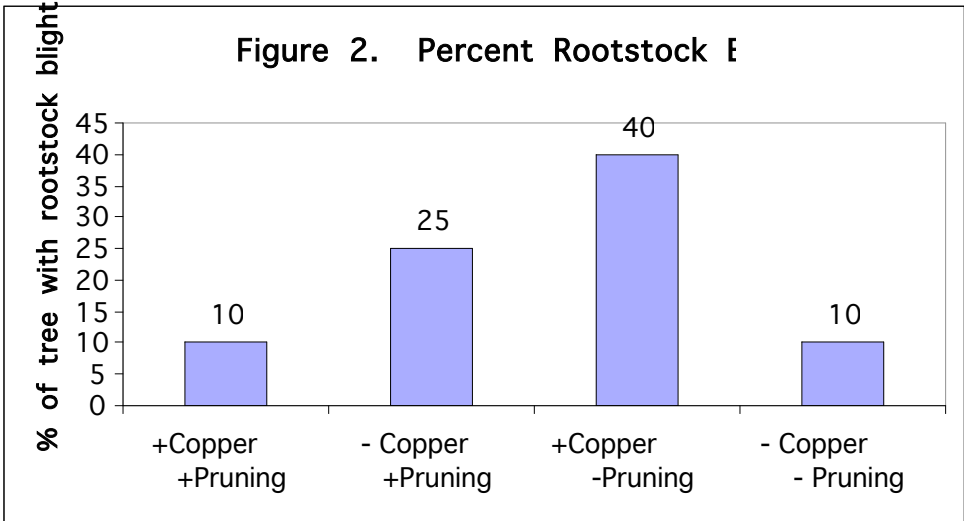
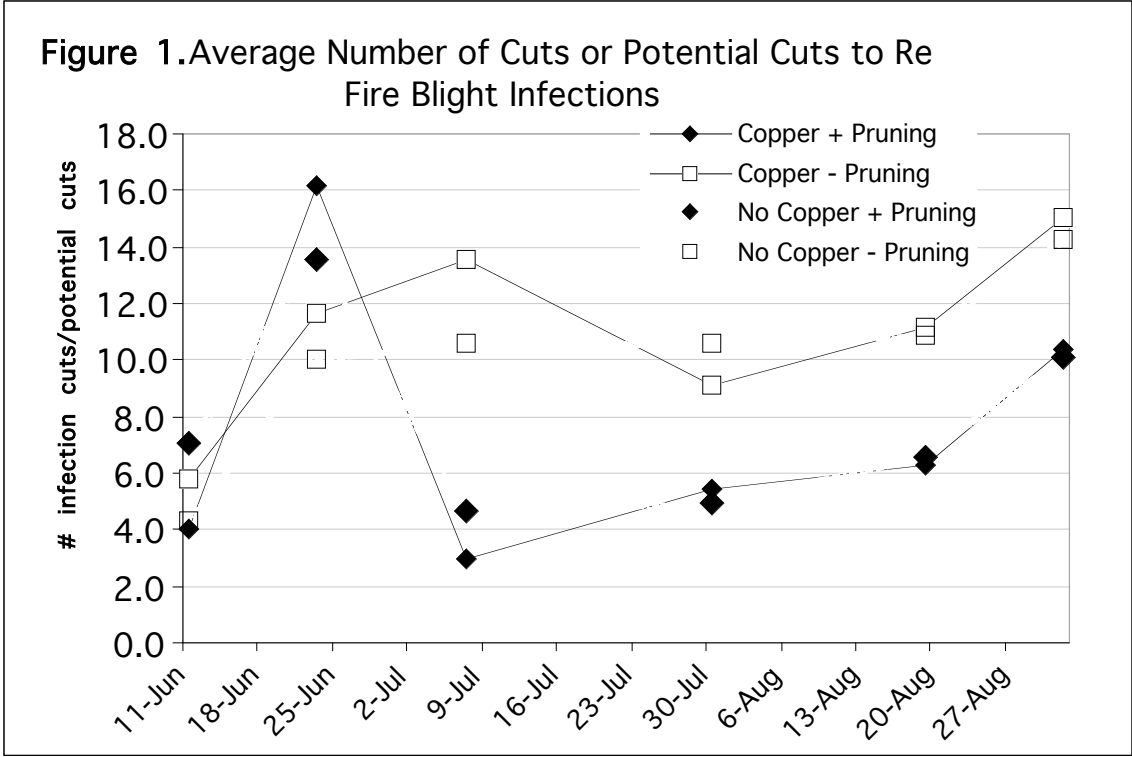


Table 3. Russet evaluation

Treatment	Fruit Russet	% Fruit rated 0-1	Stem Russet	% Stem Russet rated 0-2
+ Copper	13.9	88.4	42.1	90
- Copper	7	98	29.5	96

Why did the orchard have so much fire blight infection? In hindsight, and looking at spray records for streptomycin applications and the Maryblyt risk predictions, there were 2 alternate row middle applications made on May 12 and 13, followed by a complete application on May 14 and May 21. In the absence of any sprays, the model predicted “high” risk or “infection” with sufficient accumulation of heat for bacterial multiplication, May 11 through May 18 and again May 20-21. Spray coverage and therefore, efficacy of the applications on May 12 and 13 may have left an opening for some infections to escaped control. After the application on May 14, the threshold of degree hours for potential infection was reached on May 18 with a possible window of vulnerability. The May 21 application was well-timed since Gala has significant rattail bloom on 1 year old wood. The other possible vulnerable window was a short hail storm and wind that occurred over the weekend of May 16 in this location contributing to the significant amount of shoot blight.

Plans for 2005-2006:

- ✓ Follow-up with rootstock blight and tree death in the various treatment plots.
- ✓ Will conduct data analysis on trial.
- ✓ Extension programs will continue to promote the whole management program for fire blight in new plantings through workshops, extension mailings, faxes and emails.