

# THE USE OF TEMPERATURE THRESHOLD TREATMENTS IN THE CONTROL OF FIREBLIGHT ON *PYRUS KAWAKAMI*

by Pamela M. Elam and Keith Holmes<sup>1</sup>

**Abstract.** Ornamental pears are extensively planted within the urban forest. In many climate zones, they become heavily infected with the bacterial disease, fireblight (*Erwinia amylovora*), which causes severe branch dieback and can kill young trees. This disease is also very serious in nursery stock, and trees are no longer grown in some areas. The objective of this study was to evaluate the usefulness of a temperature treatment threshold used in commercial pear production and to compare copper, streptomycin and aluminum tris for use in the prevention of fireblight on 5 gallon nursery stock of *Pyrus kawakami*. The temperature treatment threshold is based on daily mean temperatures. In this study, it was found that the best preventative material was copper, followed by aluminum tris. All three compounds provided high degree of control. The daily mean temperature treatment threshold for commercial pear production appears to be later than would be appropriate for nursery production.

Flowering ornamental pear, *Pyrus kawakami*, is a highly utilized landscape tree. Its usefulness is in its flower display and its unique shape and size suitable to small gardens. In recent years there has been an increase in the incidence of fireblight caused by *Erwinia amylovora*. Fireblight, a bacterial disease, infects trees primarily through the blossoms, however, all parts of the pear tree may become infected. Infected plant parts wilt, blacken and die. Beads of bacterial ooze may be observed along the flower stem and on green tissue. In many cases, trees have died due to this disease. Many nurseries have discontinued growing *P. kawakami* due to the frequency and cost of preventative chemical treatments.

Current treatments include copper or streptomycin (1) applications every 5 to 7 days during the bloom period to protect blossoms from the bacterial infection. Additionally, infected wood is pruned out 8 to 12 inches below the infection cankers or visible injury. After each pruning cut, shears are disinfected to avoid spreading the disease through

pruning wounds (2).

Our objective was to evaluate the usefulness of a daily mean temperature treatment threshold currently used in commercial pear production to time chemical applications for prophylactic effect. We also evaluated chemical materials now being used with Aliette, a product registered for *Phytophthora collar* and root rot in nursery stock and other crops.

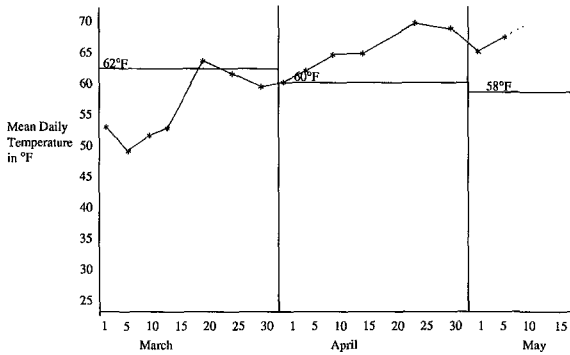
## Methods and Materials

The first treatments were applied, using daily mean temperature threshold data developed by Thompson, et al. (5). The daily mean temperature threshold is defined as when the mean of the daily high and low temperature reach a designated threshold temperature. According to Thompson, the treatment threshold is reached when daily mean temperatures during March reach 62°F. If March temperatures are generally low, then one would treat in April when the daily mean temperatures reach 60°F. If the daily mean of 60°F had still not been reached during April, then treatment would be postponed until May when the daily mean temperatures reach 58°F.

During the Spring of 1990, the daily mean temperature threshold of 60°F was reached on 17 March according to CIMIS (California Irrigation Management Information System) data collected at California State University, Fresno (Fig. 1). Treatments were applied at that time with repeat treatments applied at 5-day intervals.

Five gallon trees were treated with copper hydroxide (Kocide 101) at 1/4 lb. per 100 gal water, streptomycin 17% (Agristrep) wettable powder at 4.8 oz. per 100 gal. or aluminum tris (0-ethyl phosphonate) Aliette) wettable powder at

<sup>1</sup>Rhone Poulenc, Fresno, California



**Figure 1. Temperature threshold for treatment of fireblight in *Pyrus kawakame*. Temperature data from the CIMIS weather station at California State University, Fresno. March - May 1990**

2.5 lb. per 100 gal. Control plants received a water treatment. Each tree was treated with approximately 12.8 oz of mixed product. Treatments were applied every 5 days for a three week period, to coincide with bloom, using a Wilber-Ellis manufactured pressurized tank sprayer equipped with a 5300 High Pro Pump at 100 psi. Trees were arranged in a randomized complete block design with four treatments replicated four times. Each plot contained eight trees. Treatments were analyzed using ANOVA with mean separation by Duncan's multiple range test at .05 LSD.

**Results**

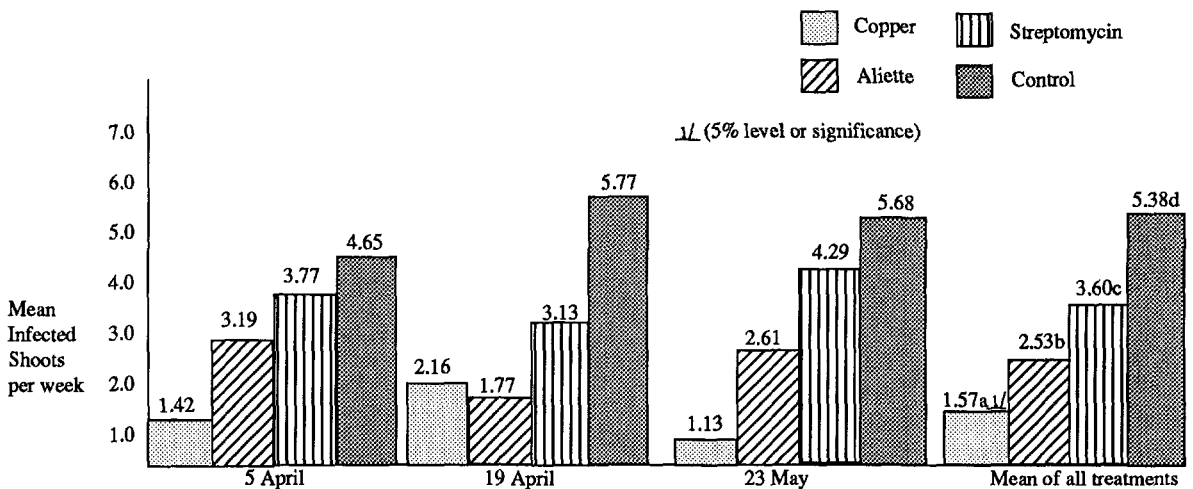
Shoots naturally infected with bacteria were evaluated two weeks after the first application on 5 April, 1990. Additional evaluations were made on 19 April and 23 May, 1990. Copper treatments showed the least number of infected shoots per evaluation with a mean of 1.57 strikes per tree after three weeks. Both Aliette and streptomycin significantly reduced diseased shoot incidence over the control (Fig. 2).

**Discussion**

All treatments resulted in a significant level of control of the disease. On site temperature monitoring is important since reflected heat off gravel, paved surfaces and close spacing may accumulate higher mean temperatures than reported by the CIMIS weather system. Both bloom and chemical treatments are advanced and do not correspond directly to the bloom and treatment schedules used by commercial pear growers.

**Conclusion**

Aliette appears promising as a means of fireblight suppression. This is especially encouraging since many orchardists have encountered Streptomycin resistant bacteria and copper fungicides can cause fruit russetting. Aliette appears



**Figure 2. Incidence of fireblight infected shoots following temperature threshold determined treatments in ornamental pear. May 1990.**

to be a desirable alternative where both efficacy and resistance avoidance is an issue. Alternating the use of Aliette with streptomycin should be explored with both goals in mind.

The standard temperature treatment threshold for orchard trees may not directly apply to the nursery, but may be useful as a treatment guide. It may be more beneficial to treat a degree or two earlier than one would in standard fruit production situations. More research is needed to confirm the preliminary results of treatment thresholds for nursery trees.

Aliette®, Rhone Poulenc, Research Triangle Park, North Carolina.

Kocide®, Griffen Agriculture Products, Incorporated, Valdosta, Georgia.

Agristrep®, MSD Agvet, Div. of Merck Co. Inc., Rahway, New Jersey.

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University of California Cooperative Extension  
1720 S. Maple Avenue  
Fresno, California 93702