



Grower Summary

TF 183

Apples and Pears

The use of Biological Control

Plant Health Promoters and

Copper to Effect Control of

Fireblight (*Erwinia amylovora*)

Project title: Apples and Pears: The use of Biological Control, Plant Health Promoters and copper to Effect Control of Fireblight (*Erwinia amylovora*)

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Project leader: Tim Biddlecombe
FAST Ltd
Crop Technology Centre
Brogdale Farm
Brogdale Road
Faversham
Kent
ME13 8XZ

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Key workers: James Shillitoe
Tim Biddlecombe
James Carew

Location: FAST Ltd
Crop Technology Centre
Brogdale Farm
Brogdale Road
Faversham
Kent
ME13 8XZ

Project Coordinator:

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GROWER SUMMARY

Headline

In one year of this project when infection levels were high, Serenade ASO and Sentry P provided significant levels of control of fireblight.

Background and expected deliverables

Fireblight, caused by the bacterium *Erwinia amylovora*, is a widespread destructive bacterial disease of pome fruit trees and related plants. The prevalence of the disease tends to be cyclical depending on spring and summer weather conditions. There was a sharp increase in the incidence of the disease in 2006-2008. Typical symptoms include wilting and death of flower clusters and of young shoots causing a loss of fruiting wood but when infections become severe, it can lead to the death of the tree. Control in the U.K. is currently limited to cutting out diseased material and use of copper sprays which can lead to russetting of the fruit surface. In fact Defra states that "There are no effective chemical measures available in the U.K. to control Fireblight" (Defra, 2005). In the USA and parts of Europe, antibiotics are used but they are not permitted in the U.K.

A suitable method of control would benefit the industry by increasing cropping potential and reducing the need for cutting out infected shoots.

The introduction of certain biological control agents and plant health promoters offers the opportunity for potential Fireblight control. This project aimed to determine the effectiveness of PreTect (active ingredient Harpin), Regalis (active ingredient Prohexadione-calcium), copper, Sentry P (active ingredient *Bacillus pumilis*) and Sentry S (active ingredient *Bacillus subtilis*). In January 2009 Serenade ASO was granted a SOLA for use on tree fruit, and since the active ingredient (*Bacillus subtilis* - strain QST 713) is identical to that used in Sentry S, HDC agreed that Serenade ASO be used instead.

Summary of the project and main conclusions

Egremont Russet apple and Concorde pear are known to be particularly susceptible to the disease and were therefore chosen for the first year of this project. However, due to very

low levels of infection within the Egremont Russet trial site, treatments were only applied to the Concorde site during the project's second (2009) and third (2010) year.

The only treatments that had a significant effect were Serenade ASO and Sentry P in the second year of the project (2009). Serenade ASO was the most effective treatment where it reduced infection levels by 89.5% compared to the control. In 2010, both Serenade ASO and Sentry P did reduce infection levels but to a reduced extent.

It should be noted that neither Sentry P, nor Pre-Tect are currently approved as crop protection products in the UK.

Figure 1 shows the effect of treatments on the percentage of shoots infected with Fireblight. Although PreTect and copper reduced infection levels of fireblight, the reductions were not statistically significant.

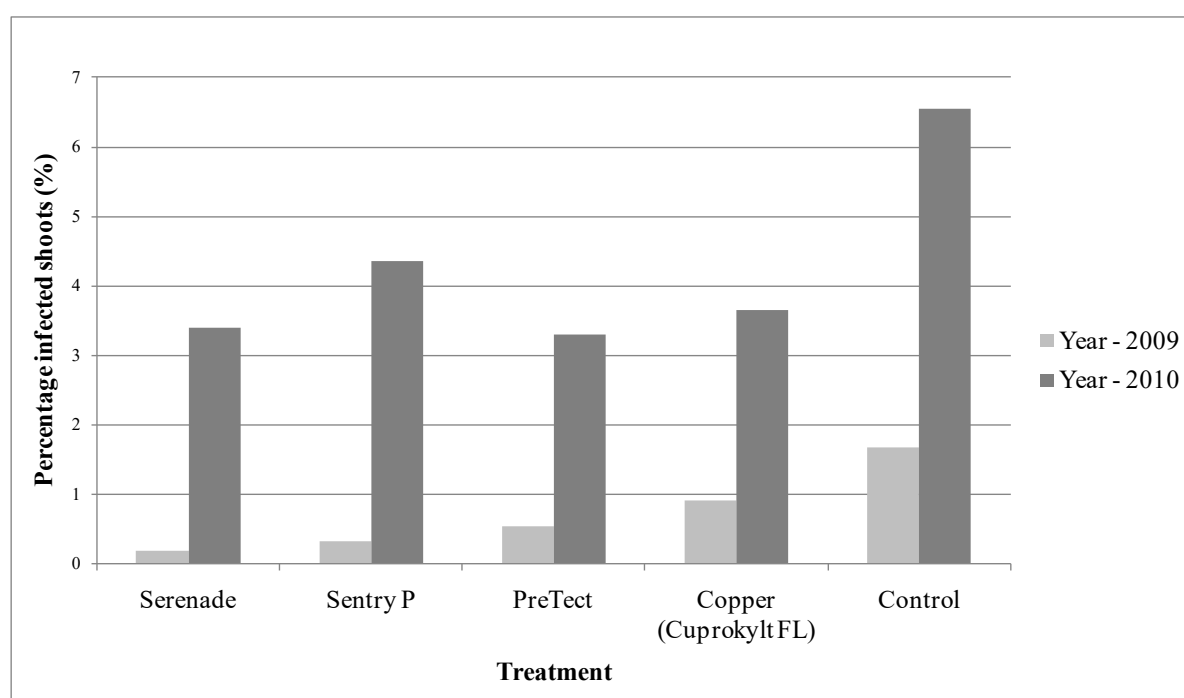


Figure 1. The effect of treatment on percentage of shoots infected with fireblight in 2009 (light grey bars) and 2010 (dark grey bars).

All treatments were less effective at controlling fireblight in 2010 than in 2009. This is probably explained by greater disease pressure caused by the higher rainfall during the blossom period in 2010. This disease pressure was calculated from the RIMpro *Erwinia*

computer prediction model.

Because no treatment completely eliminated Fireblight, the use of any of these products should not be seen as the sole method of control, but rather should be used in conjunction with other methods. A single fireblight infection can, if left uncontrolled, ultimately lead to the death of the tree and provide a source of infection for further spread. The results show that even the most effective treatment did not achieve complete control with there being less than 1% infected shoots remaining in 2009, and therefore the use of other control methods such as cutting out of any infected shoots and burning, would still be required.

Further work is required to assess the impact of spray timings to specifically target infection periods, with the aim of reducing the number of applications and therefore improving the economic benefit of these treatments.

Financial Benefits

Yields were not recorded as part of the trial and it is difficult to make assumptions as to potential yield losses due to the nature of the disease. Cultural methods of control involve removing and burning infected shoots and branches, and disinfecting pruning tools. These are clearly expensive operations. The costs of some of the treatments are compared in Table 1.

Although Serenade ASO was the most effective treatment, it is expensive to purchase. Based on the increase in yield and typical savings made in labour costs achieved from its use, application could be difficult to justify except in seasons where infection risk is high and leads to significant numbers of tree deaths.

Table 1. Treatment Costs

Product	No. of Treatments	l/ha per treatment	£/ l or kg of Product	£/ha
Serenade ASO	15	10	£10.70	£1,605.00
PreTect	15	1	£29.00	£435.00
Copper (Cuprolyt FL)	1	2.5	£5.11	£12.78

Action points for growers

- Inspect vulnerable orchards routinely for fireblight symptoms during winter pruning, soon after bud break, during mid June, from late July to early August and soon after leaf fall. Inspect young trees more frequently.
- Make additional inspections after frost, following storms and when fireblight warnings are issued.
- Slice off bark to determine the extent of infection and then cut out diseased wood at least 30cm below the stained tissue on smaller wood (< 2cm diameter) and at least 50 cm below on larger wood (Figure 2).



Figure 2. An example of fireblight staining of apple wood (var. Egremont Russet). These samples come from the same shoot.

- Disinfect tools between cuts and burn diseased wood. Burning of diseased plant material is legal providing the grower has obtained the appropriate exemptions from the Environment Agency under 'The Environmental Permitting (England and Wales) Regulations.
- Apply a copper treatment at bud burst. This will give protective cover against fireblight and also scab. In orchards vulnerable to high levels of infection, consider applications of Serenade ASO timed to cover high risk infection periods e.g. blossom. Where possible, use disease forecasting models such as RIMpro Erwinia and ADEM Fireblight to identify these periods.