# Grower Summary

## HNS 179

Management of Bacterial Canker in Prunus spp.

Annual 2011

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Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

## Further information

If you would like a copy of the full report, please email the HDC office (hdc@hdc.ahdb.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

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| **Project Number:** | HNS 179 |
| **Project Title:** | Management of bacterial canker in *Prunus* spp. |
| **Project Leader:** | Dr Steven J Roberts |
| **Contractor:** | Plant Health Solutions |
| **Industry Representative:** | Mr Nick Dunn and Mr John Hedger |
| **Report:** | Annual Report, March 2011 |
| **Publication Date:** | 28th July 2011 |
| **Previous report/(s):** | - |
| **Start Date:** | 01 April 2010 |
| **End Date:** | 31 March 2013 |
| **Project Cost:** | £75,139.00 |

## Headline

- Two potential bacterial canker pathogens *(Pseudomonas syringae* pv. *morsprunorum (Psm)*; and *P. s.* pv. *syringae (Pss)*), behaved differently on plums and cherries and the spray treatments appeared to have different effects on their populations.
- Levels of both *Psm* and *Pss*, but especially *Psm* were greater on plum than on cherry.
- Levels of *Psm* were reduced by sprays with Cuproykylt and Serenade ASO, however, spray treatments appeared to have little effect on *Pss.*
- Disinfection of pruning knives or tools using a quick wipe or dip in disinfectant is unlikely to be effective.

## Background and expected deliverables

Bacterial canker of *Prunus* spp. has been an on-going problem for HNS growers for many years and also causes losses to stone fruit growers. It was identified as a major concern during a survey of bacterial diseases of HNS in 1996-97 (HNS 71).

Bacterial canker may be caused by two distinct pathovars of *Pseudomonas syringae*: pv. *morsprunorum* (*Psm*) and pv. *syringae* (*Pss*). *Psm* is host specific to *Prunus* spp., whereas pv. *syringae* has a much wider host range, with the potential for cross infection between a number of different plant species and genera. Although the stem canker phase is the most economically important, these pathogens may also cause leaf spots/shot-holes, shoot die-back and flower blights. It is important to note that stem cankers result from infections which have been initiated in the previous year, and may not always be obvious in the first year after infection. Thus cankers may not be observed until 18 months after the initial infection has taken place.

For many years (based on work done at East Malling Research Centre in the 1960's and 70's), *Psm* was considered to be the primary cause of the disease in the UK. During a MAFF-funded survey of 'Farm Woodland' cherries, led by the author, in 2001-02, it became clear that both pathogens were causing canker in England, it was also clear that trees were already contaminated with the pathogen on the nursery.

It is generally considered that the most effective way to control bacterial diseases is by an avoidance strategy, i.e. avoiding introduction/carryover of (pathogen) inoculum. Such a strategy can usually be implemented effectively for seed-raised annual crops, but presents considerable challenges for vegetatively propagated perennials.

Growers are aware that good hygiene practices are important, and that secateurs/pruning knives, etc. should be disinfected, but the most practical and effective method(s) to achieve this are not clear.

The overall aim of the project is to identify management options which will be of benefit in the control of bacterial canker of *Prunus* spp. To achieve this the project will: aim to identify the main sources of primary inoculum on propagation nurseries; examine the potential of targeted treatments to reduce/eliminate inoculum; examine the relative merit of approaches for cleaning/disinfection of pruning knives/secateurs; and critically review relevant scientific and advisory literature and draw together with the new experimental work to produce a HDC Factsheet with clear practical recommendations.

## Summary of the project

### *Spray trials and epidemiology*

Spray trials were located at two commercial tree production nurseries in the UK (England), one in the South and one in the Midlands. Following discussions with the project's Industry Representatives, two rootstocks ('Saint Julien A' and 'Colt') and three scions (plum cv. 'Victoria'; cherries cvs. 'Stella' and 'Kiku-shidare Sakura') were selected for the experimental work. The stock hedges used to produce cuttings for rootstocks and the mother plants used to produce bud-wood for grafting were located at one nursery. The rootstocks were planted, budded, and grown-on at both nurseries.

Six (five plus an untreated control) different treatments were examined for their effects, on leaf/bud populations of bacterial canker pathogens during this first year. These same plants will also be monitored for canker symptoms in subsequent years. The treatments are summarised in the table opposite. They include: Coprokylt (copper oxychloride); the newly-approved biological control agent Serenade ASO (a strain of *Bacillus subtilis);* Bactime Cu L4F (*a* glucohumate product) which has shown promise against a bacterial disease on walnuts in Italy; Aliette 80 WG which showed promise in previous work (HNS 91: Roberts and Akram 2002); Dithane NT (mancozeb) in combination with Cuprokylt, which is also widely used in France and Australia for the control of bacterial pathogens of stone fruits and nuts.

Applications were made according to the following timings: 2 sprays at bud burst in spring, 2 sprays prior to budding and 2 autumn sprays. Sprays were applied 7-14 days apart depending on weather conditions, and planned for days when no rain was predicted in the following 24 h and applied as late in the day as possible. Approximately 12 individual stock hedge plants were allocated to each treatment, 2-3 mother plants and 100 rootstocks.

**Treatment codes, products and rates used in spray trial.**

| Code | Product | a.i. | Rate | Approval status |
|---|---|---|---|---|
| A | Cuprokylt plus adjuvant (Activator 90) | copper oxychloride | 3 g/L Cuprokylt + 0.25 mL/L Activator | LTAEU for outdoor ornamental plant production |
| B | Serenade ASO | Bacillus subtilis | 10 mL/L | SOLA for ornamental plant production |
| C | Bactime Cu L4F | copper + glucohumate | 4 g/L | Not approved.<br>Foliar fertiliser |
| D | Aliette 80WG | Fosetyl-aluminium | 1 g/L | On-label approval for ornamental plant production |
| E | Dithane NT + Cuprokylt | Mancozeb + copper oxychloride | 2 g/L Dithane + 3 g/L Cuprokylt | Dithane NT LTAEU for outdoor ornamental plant production<br><br>Cuprokylt (see Code A) |
| U | Untreated control | - | - | - |

Leaf/bud samples were collected from each treatment from each nursery on four occasions during the growing season and taken to the laboratory to determine the presence or absence and numbers of *Psm* and *Pss.* Visits were timed to occur shortly after sprays had been applied.

Both of the target pathogens were isolated from samples at both nurseries throughout the year. The main significant differences can be summarised as follows:

- Levels of both *Psm* and *Pss*, but especially *Psm* were greater on plum than on cherry.
- *Psm* was more frequent on buds and stock hedges.
- *Pss* was less frequent on stock hedges.
- Levels of *Psm* were reduced by sprays with Cuproykylt and Serenade ASO.
- Spray treatments had little effect on levels of *Pss.*
- Levels of *Pss* increased in the autumn.

***Disinfection of pruning tools***

The cutting edges of secateur blades or 'Stanley' knife blades were contaminated with a standard amount of a known strain of *Psm.* An attempt was then made to disinfect the blades by one of several methods using 70% iso-propanol, Jet 5 (0.8%), bleach (1% chlorine, prepared using Presept$^{(TM)}$ tablets), or a hand sanitising gel (Deb, FloraFree). Following

'disinfection' each blade was then used to make ten cuts in a plate of agar medium. Disinfection efficiency was then assessed on the basis of the number of cuts in the agar with bacterial growth. Three rounds of testing were done.

In the first round of testing it was clear that quick dips in Jet 5 or hypochlorite were ineffective, so in the second and third rounds, longer exposure durations were introduced. It appears so far the most reliable treatments are 15 or 30 second dips in Jet 5 or hypochlorite, with a repeated alcohol (iso-propanol) spray, the next best. However the relatively long dip treatments are not really practical for routine use during field operations. Wiping with disinfectant wipes or rubbing the blade with hand gel were almost completely ineffective. However, in this first round of testing, a high number of bacteria were applied to the blade and were allowed a long time (1 – 2 hours) to dry on to the blade before the cuts in the medium were made. A second round of testing will be conducted next year that will attempt to replicate commercial conditions more closely.

## Financial benefits

Current industry estimates indicate potential losses from bacterial canker during nursery production and soon after final planting in the range of £125,000 to £200,000 per annum.

## Action points for growers

- No clear action points have been identified at this early stage in the work. The spray trials and assessments will continue over the three years of the project to establish evidence-based action points.
- However, good hygiene practices are important and knives and secateurs should be disinfected as frequently as possible.
- Be aware that canker symptoms may not become apparent until 18 months after infection has occurred, thus actions taken in one growing season may potentially have an impact on appearance of disease two seasons later.