

Project title: Improving integrated pest and disease management in tree fruit

Project number: TF223

Project leader: Dr Robert Saville
East Malling Research

Report: Annual report, March 2017 (Year 2)

Previous report: Annual report, March 2016 (Year 1)

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Date project commenced: 01/04/2015

Date project completed: 31/03/2020

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The results and conclusions in this report are based on an investigation conducted over a one-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.

AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

Robert Saville

Project leader, Plant Pathologist

NIAB EMR

Signature Date

Michelle Fountain

Entomologist

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GROWER SUMMARY

Objective 4 – Stone fruit diseases

Headline

Early progress has been made to generate a collection of bacteriophage, bacteria killing viruses, which will be further characterised and evaluated in the remainder of the project.

Background and expected deliverables

Project TF 223 is a five year project which was commissioned to tackle a number of current pests and diseases affecting tree fruit crops. Objective 4 deals with the development of bacteria killing viruses to control bacterial canker in Prunus species.

Summary of the project and main conclusions

With the withdrawal of copper for biocidal use confirmed in 2016, treatment options for bacterial canker control in Prunus are no longer available causing significant concern for stone fruit growers. Phage therapy, using bacteria-killing viruses to prevent or cure an infection, may offer potential in the future as a targeted, non-toxic biocontrol agent.

Bacteriophage are one of the most abundant entities on the planet. Phage specific to the target host can be readily isolated wherever the host bacteria (in this case *Pseudomonas syringae syringae* and *Pseudomonas syringae morsprunorum*) can be found.

Soil and leaf samples were collected from stone fruit orchards around Kent, processed to collect any phage that may be present and plated on to Petri dishes containing a lawn of *P. syringae*, known as a 'double-agar plaque assay'. The presence of phage in the sample results in circular clearings in the agar called plaques. Phage morphology was determined using transmission electron microscopy (TEM) following isolation and purification. In total, 20 different phage morphologies were collected and these have been put into storage for future characterisation.

Financial benefits

The area of UK cherries is currently 600 ha, producing 4,500 tonnes and is worth £22.5 million (Source: British Summer Fruits). The area of UK plums is 825 ha, producing 7,200 tonnes and is worth £12.7 million (Source: Defra Horticultural Statistics 2014).

Bacterial canker has been a continuing problem for plum and cherry growers for many years. There are no definitive estimates for losses caused by bacterial canker and the impact of the

disease on individual growers is likely to vary considerably depending on factors such as orchard age, intensity of production, etc. However, even a conservative estimate of average losses of ca. 5% p.a. would result in the cherry industry losing £1.12 million and the plum industry losing £635,000 p.a.

Developing a method of control would therefore save this level money and potentially more each year.

Action points for growers

- The research into phage specific to *Pseudomonas* species has not yet reached a stage where action points can be recommended to growers.