New Project Summary Report for SF 142: Blackcurrant project: Phomopsis dieback of blackcurrants

Project Number	31701420
Title	Blackcurrant project: Phomopsis dieback of blackcurrants: methodology development and control
Short Title	SF 142
Lead Contractor	Food and Environment Research Agency (Fera)
Other Contractors	
Start & End Dates	30 April 2013 - 30 March 2014
Industry Representative	Mr R. Saunders – GlaxoSmithKline and Mr T. Maynard – Maynards Fruit
Project Budget	£9,970

The Problem

In recent years dieback in commercial blackcurrant plantations, particularly of the varieties Ben Avon and Ben Tirran, has been a significant problem. The severity of the problem and its speed of spread through a plantation varied between sites.

Typical symptoms in the spring/early summer include the failure of branches to leaf out or the production of leaves of reduced size. One or both of these symptoms can often be present, along with healthy-looking branches on the same bush. In extreme cases all of the branches on an affected plant may fail to produce leaves. As the summer progresses wilting of leaves may

develop and these then generally turn yellow and then brown. Cutting open of symptomatic tissue reveals a firm, brown decay of the wood, with an associated brown decay of the pith at the base of the branch. Tiny, black fungal fruiting bodies may be found on branches that have been dead for some time.

HDC project SF 12-223 showed that Diaporthe strumella, (asexual state Phomopsis ribicola), was the only potential pathogen isolated consistently from blackcurrant plants showing symptoms of dieback that was capable of reproducing dieback symptoms when inoculated into healthy plants. As part of project SF 12-223, visits were also made to stoolbed sites which supplied cutting material for use on fruiting plantations. These visits revealed low levels of D. strumella at the majority of stoolbed sites. In some cases the stoolbed stems from which the fungus was recovered showed internal symptoms of wood and pith decay identical to those found in the affected plantations, but in others the fungus was found on stems that had appeared healthy at the time of sampling.

At present the sources of the fungus and the route by which it spreads through a plantation are poorly understood.

Aims and Objectives

(i) Project aim(s):

To develop methodologies to improve on-site detection and control options for Phomopsis dieback in blackcurrants, with the longer term aim of identifying inoculum sources of Diaporthe strumella (Phomopsis ribicola) and determining key infection stages in propagating stock and fruiting blackcurrant crops.

(ii) Project objective(s):

1. To develop methodologies to help gain a greater understanding of inoculum sources, methods of spread and infection timing of Phomopsis ribicola.
2. To determine the effect of fungicides on the naturally occurring beneficial microbe B. leucophthalma and Serenade ASO on P. ribicola.

Approach

For the purposes of this proposal the pathogen responsible for causing Phomopsis die back will

be referred to by its asexual state of P. ribicola.

(i) Methods

A range of laboratory methods will be utilised in this project as described in the work plan below. Statistical advice will be sought before the onset of laboratory experiments to ensure that all the work undertaken is statistically robust.

(ii) Workplan and approaches to be taken

1. Detection

1.1. ELISA

Preliminary work using a PTA- ELISA method and polyclonal Phomopsis genus-specific antiserum has shown that the antiserum can detect P. ribicola from woody tissue. Further validation of the antibody, for the detection of P. ribicola, will be carried out through analyses using artificially and naturally infected blackcurrant tissue. The results of this work will determine the suitability of the antibody for the widespread screening of blackcurrant mother plants, stool beds and plantations for infection by P. ribicola.

1.2. PCR

Currently there are no PCR primers available for the detection of P. ribicola. Such a diagnostic would be useful for the detection and quantification of inoculum, in particular from rain traps and soil. Internal funding at Fera is currently being sought to develop such a PCR diagnostic. Any new diagnostic methods developed will be validated and adopted by the project as appropriate.

2. Infection of blackcurrants by P. ribicola

Laboratory experimentation will be used to help establish the key factors involved in the infection of blackcurrants by P. ribicola.

A model system, based on that described by Mundy and Robertson (2010) , will be used to establish:

a) Techniques for consistent and repeatable infection of blackcurrant plantlets with P. ribicola.

b) The optimum temperatures required for infection and subsequent symptom development by P. ribicola.

3. Control

Work undertaken as part of project SF 12-223 has shown that Bloxamia leucophthalma, a fungus found growing in close association with fruiting bodies of D. strumella on blackcurrant

material affected by dieback, had the potential to reduce growth of P. ribicola on agar. This project aims to continue the work started in project SF 12-223, and will determine how fungicides currently applied to blackcurrant bushes affect naturally occurring beneficial microbes such as B. leucophthalma. This will be done on up to five fungicides using two in vitro tests:

a) Fungicide amended agar to indicate the effect of fungicides on mycelial growth.

b) A photometric test to indicate the effect of fungicides on spore germination.

Other work carried out in project SF 12-223 also showed that the bio-control product Serenade ASO gave 100% reduction in growth of P. ribicola at the three concentrations used (10, 20, and 40 ml L-1). This work will be repeated to establish the lowest concentration at which control of P. ribicola can be achieved using Serenade ASO and then try to determine how this relates to the field concentration applied to a blackcurrant crop.