Grower Summary

SF 150

Review of the identification and control of progressive die-back symptoms in blueberry

Final *2015*

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Further information

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Project title:	Review of the identification and control of progressive die-back symptoms in blueberry
Project number:	SF150
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Report:	Final Report (October 2015)
Previous report:	n/a
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Location of project:	UK
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Date project commenced:	March 2014
Date project completed (or expected completion date):	December 2015

GROWER SUMMARY

Headline

Blueberry dieback may result from infection by several different pathogens and there is a strong interaction between growing conditions and symptom development.

Background and expected deliverables

Since 2010 there has been an increasing concern about the extent of dieback symptoms in UK blueberry plantations. AHDB Horticulture project SF132 involved an extensive survey of affected plantations in an attempt to discover the causes of dieback. Fera, FAST and EMR collaborated to gather samples and experienced pathologists isolated the fungi associated with visible symptoms. The project showed that a surprisingly wide range of fungi may be found associated with dieback symptoms but it also established that certain species were more commonly associated with severe problems.

Laboratory tests were undertaken to prove that selected species of *Phomopsis* and those from the *Botryosphaeria* family were able to cause disease directly. During the work required to prove this, it was found that apparently symptomless plant material may harbour infection by these and other species within its tissues.

A lack of UK based knowledge about the occurrence, epidemiology and control of many of the species isolated from and associated with blueberries, prompted the funding of this project (SF150).

John Scrace, an experienced plant pathologist working under contract to Fera and who had also worked closely with blackcurrant growers affected by a similar dieback problem, was tasked with carrying out the literature survey, for which he lists more than 104 scientific papers as references from countries as diverse as USA, Canada, Chile, Italy, Spain, France, Poland and New Zealand.

Summary of the project and main conclusions

The results of SF132 were shown to be different from those of similar work in blackcurrants (SF012) in that instead of showing that a single species (*Phomopsis ribicola*) was largely responsible for the problem, a wide range of fungi were found to be associated with blueberry dieback.

The literature survey has established that in other countries this situation is normal for blueberries, rather than the exception. These pathogens may be present in the same plantation, on the same plant and even sometimes in the same lesion.

While some of the earlier books and papers on blueberry diseases might give the impression that there are a limited number of dieback, blight and canker pathogens with quite clearly defined symptoms, it has become obvious from more recent studies that the association of a complex of fungi with such symptoms is nothing new. Having said that, it is also obvious that the presence of the crop in many 'new' growing areas will have exposed it to a greater range of potential pathogens than might be found in their native North America.

There has also been a change in the techniques used in the diagnosis of plant diseases – particularly in the development and use of DNA analysis, which has changed our understanding of the true identity of some pathogens and the relationship between species. SF150 has confirmed the importance of several *Phomopsis* species and of species from the *Botryosphaeria* family.

The survey has also provided a helpful summary for all of the known disease causing agents which are conveniently listed in the contents pages of the Science Section of this report: Literature.

Results of the review

For each of the pathogens described information gleaned from the scientific papers is broken down into the following headings:

- Symptoms
- Epidemiology
- Control (cultivar selection and use of fungicides)

The impact of plant stress factors and the risk presented by apparently symptomless infections are discussed. The following are the main conclusions:

- Symptoms are often associated with the presence of a complex of fungi.
- Studies have shown that several different *Diaporthe* species (asexual states = *Phomopsis*) can cause very similar symptoms. A similar situation exists for some other pathogens, including those from the *Botryosphaeria* family.
- Symptoms may arise as a result of complicated interaction between more than one species of fungus and abiotic factors such as mechanical damage and drought stress. Growers should be aware of the likely importance of irrigation problems (pots and soil) and soil structural factors affecting root growth (organic matter, aeration) as factors in the development of symptoms.

- Species associated with dieback in UK blueberries, for which pathogenicity to blueberries was confirmed by SF132 and which are reported as being responsible for disease in other countries, include *Phomopsis eres / conorum* complex*, Phomopsis theicola*, *Neofusicoccum australe, Botryosphaeria obtusa*. A number of fungicide active ingredients and plant defence boosting materials (harpin, chitosan) are reported to contribute to disease reduction. Unfortunately, of the fungicides, several have been withdrawn from use in the UK or are not currently registered for use in any similar crop.
- Epidemiology studies show that the more commonly found species produce spores that survive on twigs and stem lesions and are readily dispersed in wet conditions. Many are more active at temperatures above the normal for UK but that does not preclude infection of material held under warm, moist conditions during propagation and early establishment. It is common practice in propagation to grow plants at very high densities, to trim the plants at least once during the growing season and to employ overhead sprinklers as the main source of irrigation. The use of clean stock and ultra-careful hygiene practices must therefore be given priority both in nurseries and during crop establishment when plants are grown in pots at high densities and under humid tunnel conditions.
- While fungicides may be useful for disease prevention (blossom, leaf/fruit scar and wound infections) they are not generally effective against established / deep-seated infections. Latent, symptomless / endophytic infections have been demonstrated or strongly suspected as a cause of later plant failure. A controversial subject but one that is no less important for study by blueberry scientists as by those concerned with other crops.

Financial benefits

The annual farm-gate value of blueberries produced in the UK is thought to be c.£20 million.

Before the start of Projects SF132 and SF150, growers were starting to see widespread and costly bush dieback. In one instance a young plantation had been grubbed one year after establishment using expensive potted plants. The authors are aware of several other plantations that have failed or are declining due dieback problems. Furthermore within most, if not all commercial plantations, growers are seeing an unacceptably high number of bushes affected by dieback symptoms – perhaps 1% or more.

The authors believe that identification of the pathogens involved, a better general understanding of their epidemiology and possible control methods gained from contact with

scientists from other countries, has already improved the position of growers. Given improved understanding and communication of some of the findings about the way the disease may be spreading during propagation and early establishment, and knowledge of interactions between soil conditions and disease resistance, the cost of SF132 and SF150 will have been more than justified given that even a 1% increase in yield would generate c. £130,000 *per annum* in extra income net of picking and post harvest costs.

Action points for growers

- Seek ways to eradicate infection of plant pathogens, especially *Phomopsis* spp., fungi from the *Botryosphaeria* family, *Botrytis cinerea* and *Conithyrium* spp. in nurseries and during establishment of new plantations. Look to review overhead irrigation practices, plant density and options for the use of plant protection products pre- and post-trimming operations.
- Recognise that dead, twiggy shoots often found at the base of young plants and wounds caused by vine weevil grubs, may be infected with *Phomopsis* and/or other important dieback fungi. Implement thorough monitoring and quality control procedures.
- Respect the risk of infection via pruning and transplanting wounds.
- Recognise that the combination of moist substrate and raised temperature provided by closed tunnels, is likely to widen the range of species able to infect blueberries and shorten the infection time for all.
- Recognise that infections are most likely to spread within tissues and strangle branches or whole blueberry plants when they are not ‘happy’ for other reasons – perhaps especially when roots are struggling to adapt to drought, water-logging or other problematic soil/growing media conditions.

Where possible, use available plant protection products or otherwise manage conditions to suppress disease pressure, especially during the periods of bud break - fruit set, immediately post-harvest and at leaf fall.