Factsheet 19/13
Project SF 12 (223)

Soft Fruit

Blackcurrant dieback

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This factsheet summarises the findings from a recent project to identify the organism responsible for blackcurrant dieback, what is already known about the disease and further work to develop control measures.

Action points

- Remove affected branches and clear and dispose of all dead branch material at the base of blackcurrants to reduce the spread of the disease.
- Where possible, avoid physical damage to bushes during cultural operations.
- Choose only the best growing sites for the most susceptible varieties (Ben Avon, Ben Dorain and Ben Tirran).

1. **Typical symptoms of blackcurrant dieback displaying dead leaves which can remain attached to branches for a considerable time**

Introduction

Branch dieback of blackcurrant (Figure 1 - front cover) has been a recognised, but relatively infrequent problem for many years. A number of different diseases and pests can cause dieback. Some of these attack the branches directly, such as grey mould (*Botrytis cinerea*), coral spot (*Nectria cinnabarina*), Botryosphaeria dieback (*Botryosphaeria ribis*), leopard moth (*Zeuzera pyrina*) and currant clearwing moth (*Synanthedon tipuliformis*). Others affect water flow through the roots or xylem vessels, resulting in wilting and branch dieback, such as honey fungus (*Armillaria* species) and Verticillium wilt (*Verticillium dahliae*).

In recent years, however, branch dieback has become a much more significant and serious problem, particularly on certain blackcurrant varieties such as Ben Avon, Ben Dorain and Ben Tirran. The severity of the problem and its speed of spread varies widely between plantations, but in the worst cases up to 80% of plants have become affected, with very serious yield loss. The problem has resulted in the premature grubbing of some plantations.

A research project (SF 12 – 223) funded by the Blackcurrant Growers Association and HDC, and undertaken by Fera, has identified the fungus *Diaporthe strumella* (also known as *Phomopsis ribicola*) as the cause of the current problem.

Symptoms

External symptoms will vary according to the time of year. Internal symptoms may be found at any time.

External symptoms

In spring and early summer, typical symptoms include:

- Failure of branches to leaf out.
- Production of leaves of reduced size on branches.

One or both of these symptoms may be present on a bush, often together with healthy-looking branches (Figure 2). In extreme cases, all of the branches on an affected plant may fail to produce leaves. As summer progresses, the above symptoms may still be seen, but additionally:

- Wilting of leaves may develop on some branches (Figure 3).
- Affected leaves turn yellow and then brown; dead leaves remain attached to the branches for a considerable time.
- The wilting symptom may develop on branches that had produced leaves of reduced size in spring, or on branches that had previously appeared healthy.

Tiny, black fungal fruiting bodies (visible with a hand lens) may be found occasionally, particularly if a branch has been dead for some time. They are most often found in the lenticels (air pores).

2. Infected plants in late spring, with a mixture of branches that are either healthy, dead or producing leaves of reduced size

3. Wilting can occur during the summer

Internal symptoms

At any time of year, typical internal symptoms include:

- A firm, brown decay of the wood within affected branches, particularly at the base, and an associated brown decay of the pith (Figure 4).
- The decay of the pith often extends beyond the limits of the wood decay.
- Fungal mycelium (usually only visible with a low-power microscope) is present within the decayed pith.
- Parts of the crown may be affected by a brown decay (Figure 5), usually linked closely to the affected branches.
- The tops of some of the main roots, immediately below affected parts of the crown, may also be decayed.

4. Internal decay of wood and pith. Infection has occurred via a bark wound created by harvesting machinery

5. Internal decay in crown

Life cycle and disease spread

At present the life-cycle is not known, but further research commissioned by HDC (SF 12 – 226) should help to clarify matters.

The fungal pathogen produces two types of spore. Somewhat confusingly the pathogen is given a different Latin name depending on which spore type it is producing. Both spore types are produced in tiny, black fruiting bodies. Asexual spores (conidia) are produced in fruiting bodies called pycnidia; when the fungus is producing these spores it is called *Phomopsis ribicola*. Sexual spores (ascospores) are produced in fruiting bodies called perithecia and when it is producing these spores, the fungus is called *Diaporthe strumella*. The perithecia have long necks (up to 2mm long) and these can sometimes be seen as small black 'bristles', usually protruding in clusters from the lenticels (air pores) of branches killed by the disease.

Both types of spore are most likely to be spread between plants by water splash, but there may also be potential for air-borne spread or dispersal by insects. Examination of affected plants and subsequent inoculation testing, has shown that infection via bark wounds is possible. Other possible routes for infection (requiring further investigation in blackcurrant, but recorded for diseases caused by *Phomopsis*/*Diaporthe* species on some other host plants) include flowers and leaf scars. As the fungus can cause root decay, spread by contact between the root systems of affected and unaffected plants may also be a possibility.

Once the fungus is present within the crown, it may be capable of spreading repeatedly into the base of the stems/branches. Following the cutting back of bushes in an affected plantation to ground level, dieback has been seen to develop in new branches, apparently spreading into these from residual infection in the crown.

The fungus has been detected occasionally on stoolbed plants grown for the supply of hardwood cuttings. This could be a potential source for long-distance spread of the problem.

Circumstantial evidence suggests that plants which are already under stress due to adverse growing conditions (e.g. drought, poor soil conditions) are more likely to be affected by *Phomopsis*/*Diaporthe* dieback.

Control

Until the precise way in which the pathogen infects or spreads between plants is known, it is difficult to offer detailed guidance on control. However, based on the results of the research so far and knowledge of the way some other *Phomopsis*/*Diaporthe* species affect plants, the following general recommendations can be offered:

- Removal of branches affected by dieback, coupled with clearing up and disposal of all dead branch material at the bases of the plants, should reduce the likelihood of production of fruiting bodies and spores of both the *Phomopsis* and *Diaporthe* states of the fungus.

- Avoidance, where possible, of physical damage during cultural operations will reduce the number of wound sites through which *D. strumella* may be able to infect branches.
- Provide the best possible growing conditions, so that plants do not come under stress. Avoid planting the varieties most prone to attack (Ben Avon, Ben Dorain and Ben Tirran) on all but the most suitable sites. For example, avoid sites prone to drought, waterlogging or desiccating winds.
- If branch dieback develops, laboratory diagnosis is recommended to determine the cause of the problem – as mentioned earlier a range of other pests and pathogens can cause this type of symptom.

Preliminary *in vitro* screening of fungicides has shown that some products, already used in many blackcurrant spray programmes for the control of other diseases, have activity against *Phomopsis*/*Diaporthe*, but effective spray timings have yet to be identified. The potential for use of biocontrol agents is also being investigated.

Advice for growers of stoolbed crops producing hardwood cutting material has been prepared by the Plant Health and Seeds Inspectorate (PHSI) as part of the Plant Health Propagation Scheme (PHPS).

Further information

Further work

HDC is currently funding two projects to improve our understanding of blackcurrant dieback and how to gain control.

Project SF 12 (226) is evaluating biological control agents and fungicides for control of *Phomopsis* when applied following flailing down in a blackcurrant plantation affected by the disease. As part of this project, a disease predictive model developed on grapes for *Phomopsis viticola* control, is being developed for use on blackcurrants to improve the timing of spray applications. This project is being managed by ADAS and runs until December 2015.

Project SF 142 seeks to understand inoculum sources, methods of spread and infection timing of *Phomopsis ribicola*. Previous work showing 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. Project SF 142 is investigating this further and assessing the effect of fungicides on this fungal organism and the pathogen itself. This project is being led by Fera and runs until March 2014.

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