The Best Practice Guide to UK Plum Production
Bacterial Canker

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Background

Bacterial canker of stone fruit affects orchards and nurseries worldwide, with substantial annual losses during nursery production and final planting (1). Bacterial canker of *Prunus* stone fruits (plum, cherry, peach and apricot) is caused by approximately 50 pathovars of *Pseudomonas syringae*, but in the UK it is caused principally by two pathovars (pv.): *P.syringae* pv. *syringae* (**Pss**) and *P.syringae* pv. *morsprunorum* (***Psm***). *Psm* is sub-divided into two races that are so divergent they almost form separate species: *Psm* race 1 is pathogenic to cherry, plum and apricot, while *Psm* race 2 affects mainly cherry, and possibly plum (2; 3). *Pss* is generally the most virulent pathovar for stone fruit (4). Bacterial canker causes significant damage to nurseries, causing reductions in yield and death of branches or the entire tree (5). Annual tree mortality rates as high as 30% have been recorded in a plum orchard in Germany (6).

Symptoms

The main symptoms of this disease are **cankers**, **gummosis** (orange-brown coloured sticky gum exuding from shallow hollows) and **necroses** on the bark and trunk, as well as **fruit lesions** (sunken spots with dark centres) and overall **yield loss** (4; 5). The cankers, which are flattened and slightly sunken (if one cuts into the bark, the tissue underneath is brown in the sunken area). On plum these cankers are mainly on the trunk and often kill the tree or girdle the branches, eventually killing them (5). Early symptoms during the growing season include leaf spots with the appearance of water-soaked lesions, often with a yellow halo ring around them (7). These lesions can turn brown and drop out causing the 'shot-hole' effect (2). Other symptoms include leaves becoming narrow, thin, rolled and yellow (5) and bud death (3). The visible symptoms of canker may not become visible for as long as 18 months after initial infection (3). The bacteria can overwinter in in dormant buds and cankers, re-emerging in spring when the disease can cause blossoms to become brown and shrivelled, and fall prematurely - referred to as **blossom blast or blossom blight** (4; 3). New shoots may become infected, causing them to wilt, turn brown and die-back (5).

Disease cycle

Bacterial canker overwinters in cankers and buds which were infected the previous autumn. In the spring the bacteria become free living on plant surfaces, including leaves, where is causes leaf spotting (brown spots with yellow halo) and shot holing (see Symptoms above). At leaf fall the bacterial move from plant surfaces to invade buds mainly making entry through leaf scars. From the leaf scars they develop into cankers, which stop extending with the onset of winter. Canker elongation recommences and continues in spring, the cankers eventually dying out in late spring.

Figure 1 Bacterial canker on plum tree stem (RHS). Note that gummosis symptoms are a sign of plant damage in plums and stone fruit. It has many causes and is not diagnostic of bacteria.

Contributing Factors

Bacterial canker infection risk is generally greatest during periods of frost, since this is when trees are weakened and vulnerable to pathogen invasions. **Frost-associated damage** provides the bacteria with a point of entry for infection, with other entry points being **pruning wounds**, **leaf scars**, other wounds arising from **mechanical damage** and **branch junctions** (2). **Waterlogging** may also promote canker formation as water-soaked tissues, stem water content and large stem diameter correlate with increased infection risk. The pathogen spreads between trees via water splashes from rain or irrigation (3). Tree age is another important factor as younger trees are more susceptible (4).

Control Treatments/Prevention

Mother trees should be grown in polytunnels if possible so that they are not exposed to rain thereby reducing the risk of bacterial canker infection in propagation. New plant material should be **quarantined** upon arrival in nurseries and checked for any signs of bacterial canker symptoms (3). Trees should be **spaced** as **widely** as possible, given **adequate nutrition**, maintained in **well-drained soil** with a minimum pH of approximately 6.4 and overhead irrigation should be avoided (3). Orchards should be monitored for signs of bacterial canker throughout the year - especially during early-to-mid bud swell and after harvest before leaf fall, ideally **examining a minimum of 20 trees per hectare** and recording the number with canker symptoms. This enables growers to monitor the efficacy of their orchard management and identify any areas for improvement (5). **Pruning** should be carried out during prolonged periods of **dry weather in May or June**, avoiding pruning during autumn or winter when there is a high risk of wet weather and/or of frost. Other practices to control for bacterial canker include protecting trees from wind-driven rain and pests that may cause damage to the wood (e.g. rabbits); disinfecting pruning tools between cuts (e.g. with 70% isopropanol impregnated disinfectant wipes or sprays); and avoiding applying nitrogen fertilisers in late summer as this encourages late season growth (7; 5; 3)**. Canker-infected branches should be removed**, making the cut at least 15 cm below the infected wood

(5). Destroy infected cuttings safely (e.g. by burning). Cover any large pruning wounds with **protective wound spray** (e.g. BlocCade, which does not contain pesticides)(5). Any seriously infected young trees should be removed entirely as they are unlikely to recover and pose an infection risk to the rest of the orchard (5).

There are currently no chemicals available to prevent bacterial canker infections in orchards (8). In the past **antibacterial copper sprays** (e.g. copper oxychloride products such as Cuprokylt) were applied during leaf fall to protect leaf scars from infection but these are no longer approved. Currently there are no approved spray treatments. Further, several strains of *Pss* have developed copper resistance (6; 9). Biocontrol agents may have some effect for example by helping to prevent bacterial canker infections but there is no trials evidence to support this and they tend to give inconsistent (often ineffective) results (3; 1).

Another approach is the selection of plum varieties that exhibit lower susceptibility to canker. Victoria plums and Laxton gage are reported to be more susceptible to canker (3), and growers may wish, therefore, to avoid these cultivars. More resistant varieties include rootstocks such as Myrobalan for plum and F12/1 for cherry (7).

Caution

The information contained within this Best Practice Guide is correct to the best of the authors' knowledge at the time of compilation but it must be understood that the biological material/systems and the regulatory framework referred to within these guides are subject to change over time. Anyone looking to make use of the information should check it against prevailing local conditions.

All pesticide recommendations and approvals are subject to change over time and the user of this Guide is reminded that it is his/her responsibility to ensure that any chemical intended for use by them is approved for use at the time of the intended application. The user is reminded that they must carefully read and follow the label on each chemical before applying any treatments.

References

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