Horticultural Development Company

Grower summary

PC 291

Ornamentals: evaluation of control options for bacterial diseases of pot plants

Final Report 2009

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The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

Use of pesticides

Only officially approved pesticides may be used in the UK. Approvals are normally granted only in relation to individual products and for specified uses. It is an offence to use non-approved products or to use approved products in a manner that does not comply with the statutory conditions of use, except where the crop or situation is the subject of an off-label extension of use.

Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

Further information

If you would like a copy of the full report, please email the HDC office (hdc@hdc.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

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Headline

None of six foliar treatments (Amistar, Anthyllis, Cuprokylt, Farm-Fos 44 + Silwet-L77, Purogene and Signum) applied to cyclamen from one month after potting significantly reduced bacterial soft rot caused by *Pectobacterium carotovorum*.

Background and expected deliverables

A number of genera of bacterial pathogens cause disease in pot plants:

- Seed-borne *Xanthomonas* spp. e.g. on Begonia, Pelargonium, Cheiranthus and Lavandula
- *Pseudomonas* spp. causing leaf spots e.g. Camellia, Magnolia, Lonicera, Prunus and Canna.
- *Pectobacterium* and *Dickeya* spp. causing soft rot and stem wilts e.g. on Chrysanthemum, Cyclamen, Dahlia, Dianthus, Dieffenbachia, Euphorbia, Hyacinth, Kalanchoe, orchids, Pelargonium, Primula, Sedum, and Zantedeschia.
- *Agrobacterium* spp. causing crown gall of a range of ornamentals including chrysanthemum, roses, Euonymus, Prunus and many others.
- *Rhodococcus fascians* causing leafy gall on geranium.

Bacterial diseases causing significant losses on individual nurseries in recent years include cyclamen bacterial soft rot *(Pectobacterium carotovorum*), poinsettia bacterial leaf spot (*Xanthomonas axonopodis* pv. *poinsettiicola*), wallflower bacterial wilt (*Xanthomonas campestris* pv. *campestris*) and geranium bacterial wilt *Ralstonia solanacearum*.

Many bacterial diseases are favoured by high temperature and humidity and with global warming they may become a more significant problem if they are active over longer periods during the year. Others, such as bacterial soft rots on fleshy tissues (e.g. corms) have been persistent problems for many years.

Some control is possible through crop management, including avoiding high temperatures, waterlogged growing media, and mechanical and pest damage. Good nursery hygiene can also reduce the risk of persistent bacterial disease problems.

At present there are no chemical controls recommended for bacterial diseases other than

copper fungicides, which provide limited protective control.

There is opportunity to make use of recent developments elsewhere in bacteriology to improve the control of bacterial diseases of protected ornamentals in the UK, particularly the areas of induced host-resistance, phage therapy and accurate detection and quantification of bacteria.

This project aims to assess the benefit of some chemical and biological interventions that could increase the options available to growers for management of bacterial diseases.

The expected deliverables are:

- Greater awareness by growers of bacterial diseases and their management.
- An illustrated Factsheet on control of bacterial diseases on protected ornamentals.
- Sound data on the potential benefit of resistance inducers and phage therapy for control of bacterial disease of ornamentals.
- Potential benefit to growers of reduced losses through use of biological or chemical intervention, subject to regulatory approval where required.

Summary of the project and main conclusions

A review of treatments with efficacy against bacterial plant diseases revealed a scarcity of approved products with proven bactericidal activity. Copper compounds have mostly been used to limit spread of leaf spot pathogens (*Xanthomonas* spp. and *Pseudomonas syringae* pathovars) but the level of control is limited, they can be phytotoxic and resistance can develop. Use of antibiotics such as streptomycin, oxytetracyclin or kasugamycin is not permitted.

The effects on bacterial diseases of growth promoting phosphonate products, such as fosetyl-Al (eg Aliette 80WG) and phosphorous acid, have been quite widely tested on ornamentals. Moderate efficacy with relatively high doses and regular applications has been achieved inconsistently, especially for controlling spread of *Xanthomonas* leaf spots on various ornamental species.

Recent research has concentrated mainly on plant activators that induce systemic acquired resistance (SAR) such as acibenzolar-S-methyl (marketed as Bion in Europe) and methyl jasmonate. The rate of soft rot development in Calla Lily (caused by *Pectobacterium (Erwinia) carotovorum*) was reduced by Bion but completely inhibited after spraying leaves with methyl jasmonate. The efficacy of other plant activators marketed in the USA, such as harpin (Actiguard) and laminarin (Vacciplant) has yet to be tested on bacterial pathogens of ornamentals. There is also current interest among agrochemical companies in exploiting the induction of Systemic Acquired Resistance (SAR) by strobilurin and related fungicides such as Amistar (azoxystrobin) or Signum (boscalid + pyraclostrobin) to provide some protection against a range of fungal, viral and bacterial plant pathogens

Finally, there is revived interest in the use of specific viruses (phage) that infect and kill bacteria to replace chemical control of bacterial plant pathogens. Successful control of bacterial blight of geraniums by foliar applications of a mixture of phages against *Xanthomonas hortorum* pv*. pelargonii* strains has been demonstrated. Phages are available to evaluate control of a range of bacterial pathogens including *Pectobacterium carotovorum* and *Ralstonia solanacearum*.

The project has developed reliable methods for production of cyclamen plants affected by bacterial soft rot *(Pectobacterium carotovorum)* and ivy plants affected by bacterial leaf spot *(Xanthomonas hortorum)* in preparation for subsequent experiments on disease control.

Six treatments applied as foliar sprays were evaluated for control of cyclamen bacterial soft rot on a nursery with a history of the disease. The treatments were Amistar, Anthyllis growth stimulant (garlic extract), Cuprokylt (copper oxychloride), Farm-Foss 44 + Silwet L77 (potassium phosphate + silicon-based wetter), Purogene (chlorine dioxide) and Signum.
None of the treatments significantly influenced incidence of the disease.

Financial benefits

UK cyclamen production is around 16 million plants per year (4-6 million large-flowered and 10-12 million mini-cyclamen) valued at around £16 million (industry estimate, 2008). Assuming an average of 5% of plants are lost to bacterial soft rot (*Pectobacterium carotovorum*), the potential savings to growers by introduction of effective control measures would be worth around £800,000/annum.

Several UK nurseries growing poinsettia have recently suffered losses caused by

Xanthomonas leaf spot, affecting young plants from at least two different suppliers. Severely affected plants are unmarketable, others require more labour to remove affected leaves and product will also be downgraded. This disease is currently notifiable to PHSI. Information on treatments that prevent and/or reduce spread of this disease is therefore likely to be important for growers.

Action points for growers

1. Several potentially very damaging diseases of pot plants are caused by bacteria including soft rot of cyclamen and a leaf spot of poinsettia. Growers should make sure that they can recognise symptoms of potentially damaging bacterial diseases.

2. Due to the lack of approved products with proven bactericidal activity, it is suggested that affected plants are removed promptly.