



Horticultural  
Development  
Company

# Grower summary

## **HNS 169**

Choisya: surveys of the  
occurrence of root rotting and  
potential causes

Final Report 2009

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## **Further information**

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

AHDB – Horticulture  
Stoneleigh Park  
Kenilworth  
Warwickshire  
CV8 2TL

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## Headline

*Choisya* root rots, mainly caused by species of *Phytophthora* and *Thielaviopsis basicola*, are linked to plant stress caused by high temperatures or poor drainage.

## Background and expected deliverables

*Choisya* are prone to root rots resulting in a loss of crop vigour and marketability. Root rot can result in up to 60% crop losses. Losses in recent years may equate to tens of thousands of pounds in lost sales. There have been reports that *Choisya ternata* cv. Sundance is the worst affected variety on most UK nurseries. *Choisya* species naturally grow on rocky slopes in the USA and Mexico where their rooting environment is extremely free draining. It is possible that some growing conditions on nurseries may favour the development of root rots. Recognising contributory factors to losses, including the identification of potential pathogens, is essential to enable the correct decisions to be made for control.

The project was undertaken to collate information on pathogens affecting *Choisya*. Growers of the crop were also surveyed to record current husbandry and best practice. The aim was:

1. To determine whether there are consistent husbandry factors in the production stages of *Choisya* that affect the incidence of root rotting.
2. To collate information on fungal pathogens most consistently associated with root rot in *Choisya*.

## Summary of the project and main conclusions

Information from *Choisya* samples received by four British plant clinics and 21 UK *Choisya* growers showed root rotting to be widespread, and attributable across the samples to several fungal species. *Phytophthora* spp., *Thielaviopsis basicola*, *Pythium* spp., *Fusarium* spp. and *Rhizoctonia* sp. were all recorded, with *Phytophthora* spp., and *T. basicola* both dominating the pathogen species isolated by the Food and Environment Research Agency (Fera) plant clinic. *Armillaria* spp. were also important in samples received by the Royal Horticultural Society (RHS), but were not reported from commercial nurseries. Only the RHS plant clinic identified the *Phytophthora* species isolated, with *P. citricola*, *P. cryptogea*, *P. cinnamomi*, *P. nicotianae* and *P. citrophthora* recovered. The RHS also identified some

*Pythium* species, including the pathogenic *P. ultimum*. At ADAS it was shown that more than one pathogen can occur in a single plant, with combinations of *Phytophthora* sp. plus *Pythium* spp., *Rhizoctonia* sp. plus *Pythium* spp., and *Fusarium* sp. plus *Pythium* spp.

In both France and Italy, *Phytophthora* spp. was isolated from *Choisya* together with *Fusarium* spp. In the USA, *Phytophthora* spp. and *Rhizoctonia* sp. were recorded. In southern France *Fusarium* spp. and *Pythium* spp. supplanted earlier root infection by *Phytophthora* spp., contributing to plant death. French research showed that water stress increased *Choisya* susceptibility to infection, with greater plant survival on capillary beds compared with overhead irrigation, particularly if shaded. In the hot conditions of the south of France, plants potted with more peat than wood-fibre had less disease, probably because the roots retained more moisture and so had less heat stress.

The symptoms and epidemiology of the root rots identified on *Choisya* were reviewed. The growth of *Pythium* spp. was favoured at the lowest temperatures of 10-15°C, growth of *T. basicola* between 17-23°C, and *Phytophthora* spp. (in particular *P. cinnamomi*) were favoured by higher temperatures of 20-30°C. *Pythium* spp. and *Phytophthora* spp. zoospore spread is favoured by wet conditions.

Seventy-five percent of the nurseries surveyed had experienced some *Choisya* loss to root rot. The proportion of pots lost to root rot ranged from less than 5% to 50%, with liner losses reported from across this range. At the final pot size most growers lost 5% or less of their stock. There were higher incidences of root rot in *C. ternata*, *C. ternata* cv. Sundance and *C. x derwitteana* cv. Aztec Pearl compared with *C. x derwitteana* cultivars Goldfinger and White Dazzler. Growers reported the diagnosis of *Phytophthora* root rot on *Choisya* more frequently than that of other pathogens, but black root rot (*T. basicola*) and *Pythium* root rot were also confirmed on a number of samples in the last five years. Fungicides and bio-stimulants were applied to *Choisya* to reduce root rotting.

Root rots or reduction in vigour became apparent to a number of growers between May and August. Where growers were potting early in the season, from late February to early April, most reported a reduction in losses. It was important to get plants well established before the onset of hot weather and to achieve fast establishment by not over-potting. Most crops were grown under protection, and there was less root rotting where a range of measures was used to reduce heat stress, including shading and ventilation. Potting *Choisya* into a

well-drained mix (containing 15 – 50% bark / wood fibre) also aided establishment resulting in a reduction in losses. Grading plants prior to potting reduced root rotting as smaller plants were kept apart from more strongly growing material and so not over-watered. Most growers watered plants overhead, and principally used either mains water or water from boreholes.

## Financial benefits

The findings of this research report will enable growers to reduce the unacceptable losses experienced in recent years. Production planning can be improved so that potting can be scheduled to a time of year when losses should be minimal. This combined with other cultural techniques should reduce losses and thereby increase profitability. Staff costs relating to *Choisya* production are also likely to reduce with less time spent removing affected plants. Recognition that several fungal species can cause *Choisya* root rot should ensure that diagnosis is sought and the appropriate fungicides are then selected. It is estimated that the information contained within this report will enable growers to save £500 for every 1000 finals produced, due to reductions in wastage. Changes in production scheduling will not result in additional capital expenditure on most nurseries.

## Action points for growers

- Pot *Choisya* liners and stock for summer sales by April.

The following points could also help to minimise losses, particularly where stock is potted later than April:

- thorough plant grading prior to potting;
- a high % of bark / wood fibre in the growing medium (air-filled porosity Index 2);
- careful grading to prevent smaller plants sitting wet;
- good irrigation management with a well-drained growing medium;
- good bed drainage (e.g. Mypex over sand rather than soil);
- blanket shading from May / June to September or production under milky polythene;
- good ventilation to prevent excessive temperatures within protected structures;
- regular applications of potassium phosphite (e.g. fortnightly);

- select appropriate fungicide drench products according to the diseases present.