



Agriculture & Horticulture
DEVELOPMENT BOARD



Grower Summary

FV 367

Spinach: biology and
management of damping-off
disease

Final 2012

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HDC is a division of the Agriculture and Horticulture Development Board.

Project Number: FV 367

Project Title: Spinach: biology and management of damping-off disease

Project Leader: Dr Kim Green (to March 2011) and Dr Peter Gladders (from April 2011)

Contractor: ADAS UK Ltd

Industry Representative: John Allan, Emmetts UK Ltd

Report: Final Report 2012

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Previous report/(s): Annual Report 2011

Start Date: 01 April 2010

End Date: 30 June 2012

Project Cost: £55,165

Headline

Pythium and *Fusarium* species are potentially the most important pathogens causing damping-off disease in spinach. Seed stocks that germinated rapidly were less severely affected by damping-off in this project.

Background and expected deliverables

Damping-off was identified as a major problem on UK baby-leaf spinach in late summer 2008. Crops were affected particularly at the cotyledon stage and at canopy closure. In some cases losses were severe, with one grower losing a whole planting of a particular variety. Problems were less severe in 2009 (following a largely dry season) but growers remain concerned that management options are limited. The overall aim of this project was to determine the causal pathogens, provide a clearer understanding of the factors that contribute to outbreaks of spinach damping-off, and to evaluate management practices. The specific objectives are to:

1. Confirm the pathogens most commonly causing damping-off disease on spinach in the UK;
2. Determine the effect of cultivation and environmental factors on the development of damping-off on spinach;
3. Determine the efficacy and persistence of seed treatments and pre-emergence fungicide soil treatments against spinach damping-off.

Summary of the project and main conclusions

Sample collection

Samples were obtained from 11 growers in September 2010, from problem areas that developed following heavy rainfall in August. Losses reached 70-80% in the most severely affected areas. Earlier in the season, few problems were encountered. Damping-off occurred in various crop rotations and despite the use of seed treatments.

Isolations and identification

Pythium and *Fusarium* species were frequently isolated from seedlings with damping-off and are likely to be the main pathogens in the 2010 crops. *Pythium ultimum* and *Pythium* (Hyphal Swelling group) isolates were shown to be the main pathogens in this project. Growers need to be aware that other pathogens could cause problems as well.

Pathogenicity tests

Fusarium isolates caused leaf rotting in pathogenicity tests. Both *Pythium* and *Fusarium* isolates when added to soil-based compost did not show strong pathogenicity in all experiments. *Pythium* isolates were the main cause of damping-off.

Fusarium spp. and *Mortierella* sp. were common soil fungi recovered from roots and both were found to enhance growth in pathogenicity and seed treatment experiments.

Seed treatments and pre-emergence fungicide sprays

No control of damping-off was achieved with a range of standard and novel seed treatments under field conditions. Fungicide sprays applied just after drilling also had no effect.

Cultivars and seed quality

There were significant differences in the incidence of damping-off between cultivars in inoculated and field experiments. This may be due to differences in the seed lots rather than to cultivar resistance to damping-off.

The results of standard laboratory seed tests for germination, abnormal seedlings, thousand seed weight and time to reach 50% germination were correlated with plant emergence and damping-off in a replicated experiment with naturally infested soil in seed trays. There were promising indications that seed stocks that germinated rapidly were less severely affected by damping-off.

Financial benefits

Experience from 2008 shows that damping-off can cause significant economic loss even in a single planting (grower estimated loss of £42 k at one farm). From this project, growers will have a clearer understanding of the factors that contribute to outbreaks of spinach damping-off, enabling them to reduce risk and improve management practices. The findings may also be of more generic use for management of damping-off on other field vegetable crops.

Action points for growers

- Maintain a record of spinach cultivars that appear susceptible to damping-off, and environmental conditions that are high risk for the disease.
- Ensure cropping areas have good drainage.