



Final Report

***'Dickeya solani'* – survey of seed crops in England & Wales 2011**

Ref: R454

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1. SUMMARY

A survey conducted in England and Wales during the 2011 growing season identified '*Dickeya solani*' in 3% (5 stocks) of the seed potato stocks in which blackleg infected plants were found during field inspections. This represented a reduction from 7% the previous year and accounted for around only 0.6% of all stocks entered for classification in 2011. All of these stocks had been grown from seed imported directly from the Netherlands. In contrast, the cause of blackleg in the large majority (74%) of affected seed stocks was *Pectobacterium atrosepticum*. These stocks were almost exclusively grown from seed of UK origin and represented some 16% of all stocks entered for classification.

2. INTRODUCTION

'*Dickeya solani*' was first isolated on potato in England and Wales in 2007 and has also been found on potato crops in Belgium, Finland, France, Israel and Poland. In 2009, all cases of *Dickeya* in ware potato crops sampled in England and Wales for testing at Fera were confirmed as '*D. solani*'. All cases were in crops originating from Dutch seed, some of which had been multiplied in England the season before. The 2010 survey of seed crops in England and Wales showed that of 257 seed stocks in which blackleg was observed, *D. solani*' was identified as the causal bacterium in only 18 (7%) of these stocks. Of these, 15 stocks had been grown from seed obtained directly from the Netherlands. The other three stocks had been grown from seed multiplied in England but which had originated in the Netherlands.

The ongoing research project (R437) "Investigating the biology and appropriate control of *Dickeya* spp. affecting GB potato" is jointly funded by PCL and Scottish Government, and began in July 2010. This project has five main objectives:

- a) Refine, validate and apply diagnostic methods for specific detection and typing of '*D. solani*'.
- b) Determine the extent of '*D. solani*' infection in the GB potato crop and evaluate the risks of spread to home-grown GB seed potatoes.
- c) Improve understanding of the epidemiology of '*D. solani*' infections and risks of pathogen establishment and spread following introduction of infected crops.
- d) Assess the aggressiveness of a range of '*D. solani*' isolates in response to changes in temperature and humidity, and in comparison with earlier data obtained for *P. atrosepticum* and *D. dianthicola*.
- e) Refine specific recommendations for avoidance and control of this pathogen.

The work to determine extent of '*D. solani*' infection in the GB potato crop and to evaluate the risks of spread to home-grown GB seed potatoes was originally agreed to involve a single survey of seed crops in England and Wales, in addition to access to information from the annual *Dickeya* Growing Crop Inspection Survey for Scotland. The original project did not include provision for a further survey of seed stocks in England and Wales. However, in discussion with PCL it was agreed that an additional survey in 2011 in England and Wales would provide valuable information on the extent and geographical distribution of '*D. solani*' infections.

3. MATERIALS AND METHODS

Collection of plants with blackleg symptoms

As in 2010, samples of blackleg plants were collected by Fera PHSI inspectors during routine seed certification inspections and mailed directly to Fera. At least one sample was provided for every seed stock entered for certification in England and Wales in which blackleg symptoms were observed during first or second field inspections. A total of 250 samples were analysed from 172 seed stocks in which blackleg was observed, representing around 21% of all stocks entered for certification. The samples were labelled in such a way that the grower or business was not identified, but further trace-back of the stock could be done for samples testing positive for *Dickeya* and for which the origin of the seed stock was not known.

Isolation and identification of pectolytic bacteria

Pectolytic bacteria were isolated from the leading edge of blackleg affected stems on double layer selective CVPm medium. Pectolytic colonies were purified on NA and TSBA media and identified according to fatty acid profile, according to Stead (1992). Isolates identified as *Dickeya* spp. were further identified by *recA* sequence determination, as described by Parkinson *et al.* (2009) and real-time PCR assays specific for *D. solani* and *D. dianthicola* (Elphinstone *et al.*, 2011).

4. RESULTS

Of 172 seed stocks in which blackleg was observed, *Dickeya* was identified as the causal bacterium in only 5 (3%) of these stocks. *Dickeya dianthicola* was isolated in one of these cases and '*Dickeya solani*' in the other 4 cases. All 5 *Dickeya* cases occurred in crops which had been grown from seed imported directly from the Netherlands.

In comparison, blackleg caused by *Pectobacterium atrosepticum* was identified in 128 (74%) of the infected stocks. Almost all of these stocks (124) were grown from seed originating in the UK, with the remainder being grown from seed originating from the Netherlands (3 stocks) and Denmark (1 stock). *Pectobacterium carotovorum* subsp. *carotovorum* was the only pathogen isolated from blackleg affected plants taken from 11 stocks (6%), grown from seed originating either in the UK (8 stocks) or the Netherlands (3 stocks). Both *P. atrosepticum* and *P. carotovorum* subsp. *carotovorum* were isolated from blackleg plants in a further 8 stocks (5%), all of which were grown from seed of UK origin. No cases were found in which both *Pectobacterium* and *Dickeya* were isolated from blackleg plants in the same crop. From the remaining 23 sampled stocks (13%), no causal pathogens could be isolated. These stocks were grown from seed originating from the UK (15), the Netherlands (4), Denmark (1) and Germany (3).

5. DISCUSSION

As in 2010, the results from the 2011 England and Wales seed potato survey strongly suggest that the principal source of *Dickeya* was infected seed imported directly from the Netherlands. All 2011 crops with detected *Dickeya* infections had been grown from seed imported directly from the Netherlands. Unlike 2010, there were no cases detected in seed stocks of non-UK origin but which had been multiplied in England/Wales in the previous season. Nevertheless, additional findings of '*Dickeya solani*' in samples of ware potatoes submitted voluntarily to Fera for testing, confirmed that *Dickeya* had survived in some seed stocks multiplied in 2010 in the UK from seed of NL origin, leading to extensive blackleg incidence of 10-20% in ware crops grown in 2011. Four of 11 samples of blackleg plants but only 4 of 140 samples of harvested tubers submitted from commercial ware potato crops were diagnosed with '*Dickeya solani*'.

As in the previous year the majority of blackleg was caused by *Pectobacterium atrosepticum* coming from seed of UK origin. The low incidence of '*Dickeya solani*' amongst seed stocks (only 2% of blackleg affected stocks) again indicated that this pathogen is not established in England and Wales, being spread only via infected seed. Similarly, as in 2010, only a single case of blackleg caused by *Dickeya dianthicola* was detected.

6. CONCLUSIONS

- As in the previous year, imports of non-GB origin seed stocks appeared to be the source of '*Dickeya solani*' found to be causing blackleg in around 0.6% of the seed potato stocks entered for classification in England and Wales.
- However, *Pectobacterium atrosepticum* from seed of UK origin remains the most prevalent cause of blackleg disease, found to occur in some 16% of the total number of seed stocks entered for classification.

7. References

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8. ACKNOWLEDGEMENTS

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