

# Control strategies for late blight in organic potato production

John Zarb, Reza Ghorbani, Pintip Juntharathep, Peter Shotton, Joanna Santos, Steve Wilcockson, Carlo Leifert (corresponding author)  
*TESCO Centre for Organic Agriculture, University of Newcastle, Newcastle upon Tyne, NE1 7RU, UK*

Audrey M Litterick, Ruaridh A Bain  
*Scottish Agricultural College, Craibstone Estate, Bucksburn, Aberdeen, AB21 9YA, UK*

Martin Wolfe  
*IOR-Elm Farm Research Centre, Hamstead Marshall, Newbury, Berkshire, RG20 0HR, UK*

## ABSTRACT

Protective copper fungicides are currently used to control late blight in most organic production systems, but approval for their use in organic farming will be revoked in 2002. Evidence suggests that organic potato production will not be reliably economic in the absence of Cu. Current controls for late blight are reviewed including: variety selection/breeding for blight resistance, diversification strategies, agronomic strategies for the management of late blight, and alternative treatments to Cu-fungicides.

## INTRODUCTION

Yields in organic production are estimated to be approximately 40% lower than in conventional production systems and losses due to late blight (caused by *Phytophthora infestans*) are thought to be the most important reason (Tamm *et al.*, 1999). Research to optimise current control systems and to develop new strategies for control in the absence of copper is therefore urgently required.

## VARIETY SELECTION AND BREEDING FOR LATE BLIGHT RESISTANCE

Potato varieties with race specific (based on R-genes) and race non-specific resistance (partial resistance/tolerance) are available (Tamm *et al.*, 1999). Race-specific resistance is usually highly effective, but often not durable, due to selection and build-up of virulent populations of the pathogen. Race non-specific resistance, on the other hand, covers all races of the pathogen, but may be less effective. Very little is currently known about the suitability of different blight resistant varieties for organic production systems.

## ALTERNATIVE CONTROL TREATMENTS TO COPPER FUNGICIDES

Alternative control products based on microbial antagonists or plant or compost extracts have so far not given control of *P. infestans* in the field. Compost extracts have, however, shown good activity against late blight when enriched with selected microbial antagonists (Weltzien, 1998).

## WITHIN FIELD DIVERSIFICATION AND OTHER AGRONOMIC STRATEGIES

There is preliminary evidence that within field diversification strategies may be useful as part of a blight control strategy (Andrivon, 1995; Finckh & Wolfe, 1997). Within field diversification can be achieved by (a) intercropping of rows/beds of different potato varieties, by planting rows of barrier crop (e.g. a cereal) or (b) by use of variety mixtures.

Other agronomic strategies have also been shown to reduce the late blight incidence/severity (Tamm *et al.*, 1999). These include:

- a) avoiding periods of high blight pressure (e.g. chitting of seed)
- b) avoiding excessive crop nutrient supply (especially of nitrogen)
- c) reducing periods of leaf wetness/high humidity in the stand
- d) preventing incidence of primary inoculum sources
- e) preventing tuber blight (e.g. by early foliage removal).

Due to the aggressive nature of *P. infestans*, satisfactory levels of control are unlikely to be achieved through improvement/development of just one component of the blight management system (Tamm *et al.*, 1999). Control systems for late blight in organic production will therefore rely on the appropriate integration of different control strategies.

## ACKNOWLEDGEMENTS

The authors are grateful for support from the European Union (EU; project QLK5-CT-2000-01065 BLIGHT-MOP) and the UK Department for Environment, Food and Rural Affairs (DEFRA; project OF0167). Co-sponsorship of the DEFRA project and/or advice from the British Potato Council, Glenside Organics Ltd., and Greenvale plc is also gratefully acknowledged.

## REFERENCES

- Andrivon, D (1995) Spatio-temporal analysis of epidemics of *Phytophthora infestans* in homogeneous and heterogeneous potato plots. In: *Phytophthora infestans* 150. L J Dowley; E Bannon; L R Cooke; T Keane; E O'Sullivan (Eds.) Boole, Dublin, Eire, p 375
- Finckh M R; Wolfe M S (1997) The use of biodiversity to restrict plant diseases and some consequences for farmers and society. In: *Ecology in Agriculture*, L E Jackson (Ed.), Academic Press, San Diego, pp 199-233
- Tamm L; Schueler C; Möller K; Finckh M R (1999) The current situation of organic potato production in Europe. In: *Global Initiative on Late Blight: Late blight: a threat to global food security.* (Eds.) Centro Internacional de La Papa, Lima, Peru, p. 26
- Weltzien H C (1998) Biocontrol of foliar fungal diseases with compost extracts. In: *Microbial Ecology of Leaves*, J H Andrews; S S Hirano (Eds.), Springer, New York, pp 431-450.

From: Powell et al. (eds), *UK Organic Research 2002: Proceedings of the COR Conference, 26-28<sup>th</sup> March 2002, Aberystwyth*, pp. 221-222.