Blight-MOP

Development of a systems approach for the management of late blight in EU organic potato production

Potato is a major cash crop in many European organic farming businesses. Compared to conventional production yields organic production yields are estimated to be between 30-40 % lower, even when copper is used to delay blight development in crops. Copper fungicides are estimated to extend the growing period by between 2-4 weeks. This is estimated to result in between 10 and 40 % higher yields compared to crops not protected with copper. Yield reductions greater than 10-20 % resulting from the prohibition of copper fungicides could threaten the profitability of organic potato production and/or the entire organic farming businesses in many EU-countries.

The quantitative target for the Blight-MOP project is to maintain potato yields and quality at levels currently obtained with the use of copper fungicides. An important aspect of the project will be rapid dissemination of results and adaptation of strategies to local potato management systems.

Late blight – a very devastating disease

Late blight (caused by *Phytophthora infestans*) is the most devastating disease affecting organic (and conventional) potato production in the EU.

Under suitable environmental conditions (Temperatures between 15-23°C; high humidity/leaf wetness) the disease can spread very rapidly (Time between infection and sporulation 3-4 days) and can cause complete crop losses. Under blight conditions the use of fungicides or tolerant varieties can only delay symptom development/restrict the spread of disease. The recent emergence of sexual reproduction of *Phytophthora* in Europe is expected to pose additional problems for currently used blight management systems.

The use of copper fungicides

Protective copper fungicides, which are currently used to control the disease in most organic production systems, are estimated to extend the length of the growing season (the time period before foliage is killed to avoid tuber infection from infected leaves) by between 10 and 30 days. However, copper fungicides will be banned for the use in organic farming from the year 2002 (EU Regulation No 2092/91).

This level of income loss is expected to threaten the economic viability of organic potato production and/or whole organic farming businesses (especially those which rely heavily on the income from potato crops) in many areas of the EU. Since EU policies aimed at supporting an expansion of organic production in the EU, a replacement for copper containing and other chemical fungicides is urgently required.

To achieve this overall aim the following individual project objectives will be fulfilled:

1. **Assessment of socio-economic impact of late blight and 'state of the art' blight management practices in EU organic potato production systems**
   The effect of EU Regulation No 2092/91 banning the use of copper fungicides in organic potato production is difficult to assess, due to a lack of reliable data.

   This project will accordingly produce a detailed survey of the currently used blight management systems of organic potato production and the agronomic and economic impact of the disease on organic potato production in different regions of the EU.

2. **Assessment of varietal performance in organic production systems in different EU regions and interactions with local blight populations**
   Potato varieties with race specific and race non specific resistance are available. However, their suitability as part of a blight management strategy has mainly been evaluated in conventional production systems. Such results may be misleading because overall resistance may be influenced by the production system.

   The expected achievement will be a detailed field characterisation of the: (i) agronomic and economic suitability of a range of varieties for organic potato production in different areas of the EU; (ii) race structure and aggressiveness of local P. infestans populations and (iii) potential suitability of varieties for "in field diversification" strategies.

3. **Development of within field diversification strategies to prevent/delay blight epidemics**
   There is some evidence that blight epidemics can be prevented or at least delayed by growing potato varieties with different forms of resistance as mixtures or in alternating rows. Another approach is to grow potato in alternating rows with other crops that can provide physical barriers for spore dispersal. We will quantify the effect of these three different diversification strategies on late blight incidence and crop quality and yield.

   The expected achievement will be an agronomic and economic evaluation of the three different diversification strategies.

4. **Optimisation of agronomic strategies for the management of late blight**
   In addition to the use of resistant/tolerant varieties, ranges of other agronomic strategies have been shown to reduce the incidence or at least the severities of late blight development.

   The expected achievement will be blueprints for "locally adopted" agronomic management systems for late blight in EU-organic potato production.

5. **Development of alternative control treatments to copper fungicides, which comply with organic farming standards**
   Various alternative treatments have been developed for the control of fungal pathogens. However, there are few reports of successful alternative control approaches using these treatments against late blight and few methods have been evaluated in field trials.

   The expected achievement will be the evaluation and possible further development, field evaluation and a cost/benefit analysis of alternative blight control methods in organic production systems. This will facilitate commercial exploitation after completion of the project.

6. **Evaluation of novel application and formulation strategies for copper-free/ alternative and copper based late blight treatments**
   Air assisted and electrostatic sprayer systems have enabled a more complete and more uniform spread of the effective principle on leaves and a substantial reduction in application rates for pesticides in conventional agriculture. We will evaluate such systems for the application of any alternative treatment(s) that may be developed.

   The expected achievements of this study will be to (i) reduce the cost of biological treatments and (ii) provide blueprints for reduced copper fungicide usage in case the regulatory authorities for organic potato production agree a transitional period, during which novel compounds are developed and registered as commercial products.

7. **Integration of optimised resistance management, diversification, agronomic and treatment strategies into existing organic potato management systems**
   The effect of integrating components of management practices and/or novel treatments developed under objective 2-6 will be tested in replicated field trials.

   The expected achievement will be improved blight management systems, which are customised/adapted to organic production systems in different regions of the EU.

Facts on Blight-MOP

Blight-MOP is a EU funded research project.
It was commenced on January 2001 and will last for 54 months

List of Participants

1. University of Newcastle (UNEW), England
2. Research Institute of Organic Agriculture (FiBL), Switzerland
3. Institut National de la Recherche Agronomique (INRA), France
4. University of Kassel (KU), Germany
5. Elm Farm Research Centre (EFRC), England
6. Danish Institute of Agricultural Sciences (DIAS), Denmark
7. Federal Biological Research Centre (BBA), Germany
8. Swiss Federal Research Station of Agroecology and Agriculture (FAL),CH
9. Norwegian Centre for Ecological Agriculture (NCEA), Norway
10. Louis Bolk Instituut (LBI), Nederland
11. Groupe de recherche en agriculture Biologique (GRAB), France
12. Dutch Research Institute for Plant Protection (IPO-DLO), Nederland
13. Agricultural Economics Research Institute (LEI-DLO), Nederland

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How to follow the project

The primary website for the Blight-MOP project is at http://www.ncl.ac.uk/tcoa/producers/research/blightmop

All Blight-MOP publications will be uploaded on the website.

Upon completion of the project, an international workshop (Potato blight control in organic potato production) will be organized at Newcastle University. This workshop will be used to present the results of the programme in the context of related research carried out in other European Institutions.

A Technology implementation plan will be part of the final report submitted to the EU. Contract research organisations, which also provide agronomic advice and consultancy services to the organic industry (NCL/SAC, FiBL, KU, EFRC, DIAS, NCEA, LBI, GRAB), will set up annual workshops.

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