

# Using Decision Support Systems to Combat Late Blight

## Summary

Decision Support Systems (DSS) integrate all relevant information to generate spray recommendations and much can be gained by their wider adoption. DSS increase the efficacy of control strategies without increasing risk and can also be used to justify fungicide inputs and as a source of advice in situations where the number of sprays or product choice is limited by legislation.

ENDURE's Potato Case Study has considered all DSS in Europe, where all potato growing regions have one or more DSS available. These DSS can improve the efficacy of control strategies and optimal timing of sprays can, on average, produce a saving of one or two sprays per season. Applying an effective preventive strategy can also avoid dramatic disease outbreaks that have to be stopped by using intensive spraying regimes.

This Guide examines the DSS currently in use in Denmark, France, Italy, The Netherlands and Poland and what the immediate future holds for these systems. The Danish system ([www.planteinfo.dk](http://www.planteinfo.dk)), for example, is part of the wider Web-blight monitoring network which covers all countries around the Baltic Sea. A Nordic test-and-development DSS called Blight Management is currently being used to test new applications before implementation in each country's own DSS. In France, the Plant Protection Service and ARVALIS have each developed a DSS, but are now working on a single DSS scheduled to go online from 2009.

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## About ENDURE

ENDURE is the European Network for the Durable Exploitation of Crop Protection Strategies. ENDURE is a Network of Excellence (NoE) with two key objectives: restructuring European research and development on the use of plant protection products, and establishing ENDURE as a world leader in the development and implementation of sustainable pest control strategies through:

- > Building a lasting crop protection research community
- > Providing end-users with a broader range of short-term solutions
- > Developing a holistic approach to sustainable pest management
- > Taking stock of and informing plant protection policy changes.

Eighteen organisations in 10 European countries are committed to ENDURE for four years (2007-2010), with financial support from the European Commission's Sixth Framework Programme, priority 5: Food Quality and Security.

## Website and ENDURE Information Centre

[www.endure-network.eu](http://www.endure-network.eu)

This publication was funded by EU grant (Project number: 031499), under the Sixth Framework Programme, and is catalogued as ENDURE Potato Case Study – Guide Number 2, published in September, 2008.

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## Using Decision Support Systems to Combat Late Blight

### Across Europe a variety of Decision Support Systems are available to ensure efficient spraying

Decision Support Systems (DSS) integrate all relevant information to generate spray recommendations. While there is room for improvement in DSS, they operate at such a technically high level that we estimate any effect will be small. More can be gained by increasing the use of DSS (or parts of DSS) by farmers and advisers.

It is important to understand that information from DSS will increase the efficacy of farmers' control strategies without increasing risk. In other words, DSS should primarily not aim at a large reduction in the number of sprays but should aim at effective control of late blight (including a large enough safety margin). DSS can also be used to justify the input of fungicides and as a source of advice in situations when the number of sprays (or product choice) is limited by legislation. ENDURE's Potato Case Study has considered all DSS in Europe, where all potato growing regions have one or more regional DSS available. Of course, growers and advisers will only use these DSS when they help to increase the efficacy of their control strategy. By timing the sprays in an optimal way, on average a reduction of one to two sprays per season can be achieved. Applying an effective preventive strategy can also avoid dramatic disease outbreaks that have to be stopped by using intensive spraying regimes. Information regarding all aspects of DSS can be transferred to other European potato growing regions.

### Denmark: a joint approach

Information and decision support about the control of late blight is available via [www.Planteinfo.dk](http://www.Planteinfo.dk). Three partners jointly operate this system: the University of Aarhus (AU), the Danish Agricultural Advisory Service (DAAC) and the Danish Meteorological Institute (DMI). A dedicated web page integrates all the available information about late blight control, including tools such as monitoring of early attacks (similar to the UK's Fight against Blight campaign), weather-based late blight infection pressure, general weather information and forecast, regional blight weather and forecast, fungicide information (based on EuroBlight), cultivar database with information about late blight resistance based on methods from EucaBlight etc.

Experts from DAAC and AU can include comments on the blight situation, report observations from the field and offer advice on how to use the tools available. The separate DSS components are not integrated to provide specific decisions on timing and fungicide type and dosage. However, PlanteInfo provides advice on some basic strategies for the control of late blight, and how the user can use the tools in PlanteInfo to make decisions about first spray, spray intervals, fungicide type and dosages, when to use systemic compounds and how to protect against tuber blight.

Several components of the DSS were developed as part of an ongoing collaboration between the Nordic countries. The Web-blight monitoring network covering all countries around the Baltic Sea has been in operation since 2000. A Nordic test-and-development DSS called Blight Management is currently being used to test new ideas and applications before implementation in each country's own DSS.

### France: single DSS for 2009

The French Plant Protection Service has issued late blight warnings since the mid 1960s. These were initially based on the Guntz-Divoux forecasting model, later complemented with the MILSOL model. During the past few years, the French Plant Protection Service and ARVALIS have each developed a DSS, known as MILPV and MILDI-LIS respectively. MILPV is based on the MILSOL forecasting model, and includes an explicit tailoring of recommendations according to the levels and types of cultivar resistance. It also includes information on the regulatory and technical rules applicable to the products ([www.srvp-centre.com](http://www.srvp-centre.com)). MILPV includes an organic version, where the recommendations take into account



MILDI-LIS offers recommendations according to cultivar resistance

### Italy: regional advice for Emilia-Romagna

To forecast the appraisal and evolution of late blight infections on potato and tomato crops in the Emilia-Romagna region (Servizio Fitosanitario Emilia-Romagna), two models based on climatic variables are applied: Model IPI (Indice Potenziale Infettivo) and Model MISP (Main Infection and Sporulation Period). Model IPI is informative about the occurrence of the disease and suggests if it is necessary (and when) to proceed with the initial treatment, based on a series of climatic parameters. It was set up in 1990 by the Servizio Fitosanitario Regionale in Emilia-Romagna and is integrated, for potato, by Model MISP, elaborated in Switzerland, which provides indications on the following infective events ([www.regione.emilia-romagna.it](http://www.regione.emilia-romagna.it)).

### Netherlands: complete advisory service

PLANT-Plus was developed and is marketed by Dacom Plant Service BV ([www.dacom.nl](http://www.dacom.nl)), supplying information about the optimum time to spray and the type of fungicide to use. The model takes as a starting point the protection offered to the crop by the previous spraying, in combination with the risk of disease infections occurring. The calculation is clearly presented for each step of the way, using a graph and a report. With inputs of weather data such as temperature, wind speed, rainfall and humidity combined with inputs from the grower on crop conditions, PLANT-Plus calculates when an infection will occur. This results in crop protection advice: when to apply a new spray and what type of chemical to use.

ProPhy is developed and marketed by Opticrop ([www.opticrop.nl](http://www.opticrop.nl)). Local weather stations and regional weather forecasts are used to identify critical conditions for the development of blight. The duration of the protection of the crop through using fungicides is calculated. The duration of this protection depends on the fungicide used, dose rate, varietal resistance, rain-fastness of the fungicide, disease pressure and growth of the crop.

In combining weather and fungicidal protection a recommendation is calculated: a preventive spray is necessary as soon as critical conditions are expected in combination with an insufficient level of fungicidal protection of the crop. The system provides the grower with complete advice (yes or no to spraying, product choice and dose rate).

It is estimated that of approximately 10,000 potato growers in the Netherlands, 30% use one of these DSS, either a PC-version or through fax, phone and internet. As a part of the Masterplan Phytophthora, every grower and adviser in the Netherlands receives by telephone a message during the growing season when a critical period for late blight development is expected. In 2007 information about critical weather and blight-infected fields was also provided at [www.kennisakker.nl](http://www.kennisakker.nl).

### Poland

NegFry has been developed in field experiments in a few agricultural institutes (IHAR-Bonin, IUNG-Pulawy and IOR-Poznan) and in the fields of the protection services since 2001, following a joint project with the University of Aarhus. The model supplies information about the optimum time to spray and the type of fungicide to use. A start date for protection is accessible to all farmers via the internet ([www.dss.iung.pulawy.pl](http://www.dss.iung.pulawy.pl)), based on nearest synoptic weather station data and calculated by NegFry.

Almost one-third of Dutch potato growers use a DSS



PlanteInfo is the result of collaboration between scientists, advisers and meteorologists

