ENDURE Potato Case Study: control of late blight

Huub Schepers

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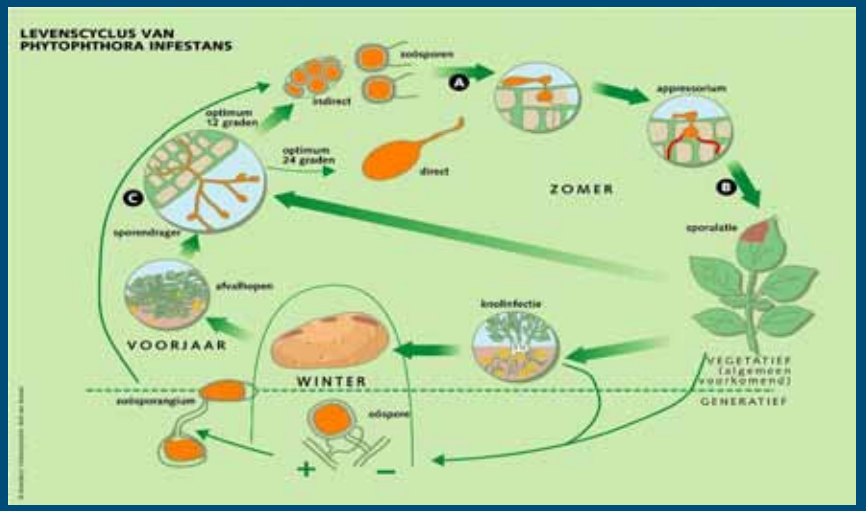
Outline of presentation

- Relevance in a European context
- Potato Case Study
- Reducing primary inoculum sources
- Decision Support Systems
- Fungicides
- Cultivar resistance
- Conclusions

Relevance in European context

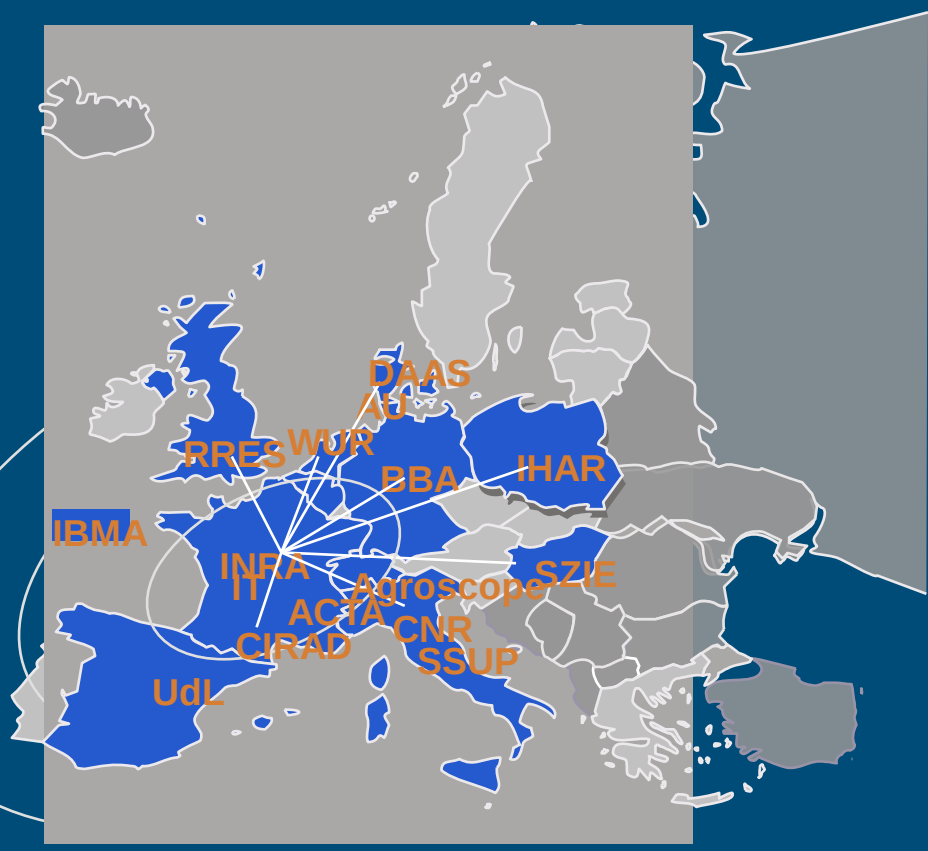
- 4th most important staple food
- 7.4 million ha
- 128 million tonnes
- Control of late blight
  - Input of fungicides: up to 15-20 sprays per season
  - Costs: 2 billion Euro's
- Possibilities for Integrated control and reduction of fungicide input



Symptoms late blight: *Phytophthora infestans*

Potato Case Study

- 7 participating institutes
  - INRA, IHAR, IBMA, AU, CNR, ACTA, WUR
- Surveys
  - Ongoing research/facilities
  - State of the art control strategies
  - Analysis of Control strategies
- Leaflets of the 4 most important Good Practices



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EuroBlight

EU.NET.ICP & EUCABLIGHT

Potato Late Blight Network For Europe

27 October 2008

PROJECT INFORMATION
- News
- Events
- About EuroBlight
- Participating institutions
- Links
- Related projects

WORKSHOP - Hamar, 2008
- 1st Announcement
- Scientific programme
- Previous workshops

30 September 2008 — **ENDURE: Best ways to tackle late blight**

ENDURE has launched the first four examples of its From Science to Field series, practical guides aimed at agricultural advisers and extension services

The guides are being written by scientists involved in ENDURE's case studies, which aim to make significant short-term progress in optimising and reducing pesticide use in current farming systems.

These case studies are examining specific problems in major crops such as wheat, apples and pears, tomatoes, potatoes, bananas, field vegetables and maize, in addition to integrated weed management (IWM).

The first four guides were launched at Potato Europe 2008, the major international event for the potato industry held in northern France last week, and deal with strategies for tackling late blight (Phytophthora infestans), the devastating tuber-rotting disease that can plague both professional and amateur growers.

Each four-page guide was jointly written by scientists from Denmark, France, Italy, The Netherlands and Poland and tackles a different aspect of combatting late blight. You can download, print or read the guides by clicking on the link below.

Read or download them here

18 August 2008 — **Registration for the Hamar workshop has now closed**

The deadline for registration to the Hamar workshop was exceeded on 15 August. The maximum number of participants - 70 - was exceeded, and right now we can not guarantee that all people registered can participate. All people who have registered with a valid e-mail address will be announced about their participitation within two weeks. After this announcement, we start working on the detailed programme via e-mail. The final programme will be announced as soon as possible, but not later than 1 October

Jens Grønbech Hansen

03 June 2008 — **Registration for the Hamar workshop is open**

Please register for the Euroblight workshop, 28-31 October before 15 August. Select Registration / workshop. Fill out the registration form - press the registration button at the buttom af the registration web-page. You will

LOGIN
Login name:
Password:
OK
Forgot password ?

RESULTS
- Fungicide comparison
- Fungicide comparison (New)
- Protocols
- Country report
- Summary report
- Weather report

DATABASES
- Host
- Pathogen

ENDURE's publications

As the ENDURE Network of Excellence develops, a range of publications is being produced.

For ease of use, we have divided these into general publications about the ENDURE project and those aimed at advisers and extension services (which will of course be of interest to journalists and the general public too).

The latter are part of the ENDURE Case Study Guides series (From Science to Field), which provide practical and scientifically sound advice for farmers and their advisers.

General publications about ENDURE

ENDURE 2008 brochure [pdf - 1.60 MB]
ENDURE 2007 brochure [pdf - 434.70 kB]
ENDURE 2007 brochure (French) [pdf - 1.06 MB]

ENDURE Case Study Guides (From Science to Field)

Potato Case Study Guides (in English)

Potato Case Study Guide Number 1 [pdf - 380.91 kB]
Potato Case Study Guide Number 2 [pdf - 433.32 kB]
Potato Case Study Guide Number 3 [pdf - 430.04 kB]
Potato Case Study Guide Number 4 [pdf - 720.23 kB]

Potato Case Study: Guide No. 1

From Science to Field
Potato Case Study – Guide Number 1

Reducing Primary Inoculum Sources of Late Blight

Summary

The first step in an integrated control strategy for late blight is reducing the primary sources of inoculum. This Guide identifies the most common sources and ways to reduce the risk.
In a number of European countries it has been shown that in most years late blight epidemics start from infected plants on dumps and in the Netherlands, for example, a regulation forces growers to cover dumps with black plastic before April 15 each year.
Infested seed tubers are another major inoculum source and certified seed should be used where possible. Testing for latent infections in seed tubers remains problematic and this Guide provides advice on strategies for tackling this.
Oospores are another threat, especially when short crop rotations are employed, and volunteer potatoes, which are readily found in European countries with mild winters, must be controlled, even though this may be difficult and labour-intensive. Indeed, there were strong indications that in 2007 infected volunteers acted as primary infection sources rather than serving to accelerate the late blight epidemic.
Early crops covered with perforated polythene also pose a threat and this Guide recommends spraying fungicides (plus adjuvants) over covered crops to provide a level of protection for potato leaves combined with measures such as warning neighbouring growers when covers are to be removed and immediate spraying after cover removal.

For further information please contact:
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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

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 1, published in September 2008.

From Science to Field
Potato Case Study – Guide Number 1

Reducing Primary Inoculum Sources of Late Blight

Didier Andrivon, INRA, France; Bert Evenhuis and Huub Schepers, WUR, Netherlands;
Denis Gaucher, ACTA, France; Jozefa Kapsa and Renata Lebecka, IHAR, Poland;
Bent Nielsen, AU, Denmark; Michelina Ruocco, CNR, Italy

Photo © Belchim Crop Protection

endure diversifying crop protection

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Infected seed


Oospores

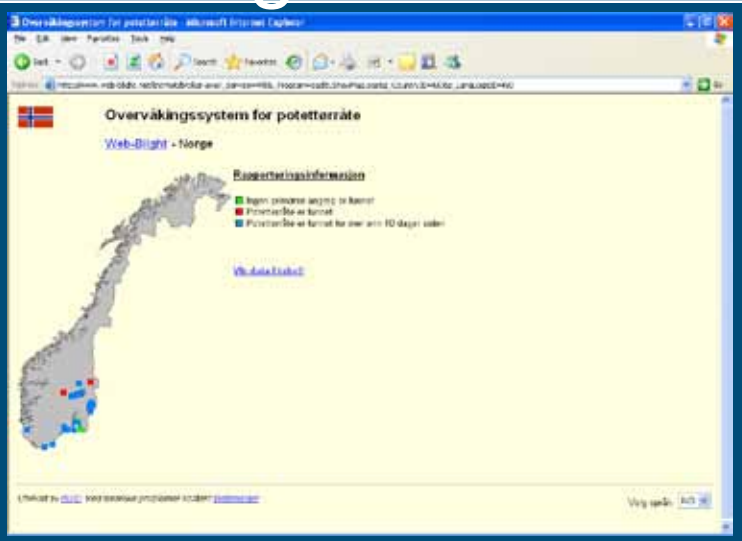

Dumps

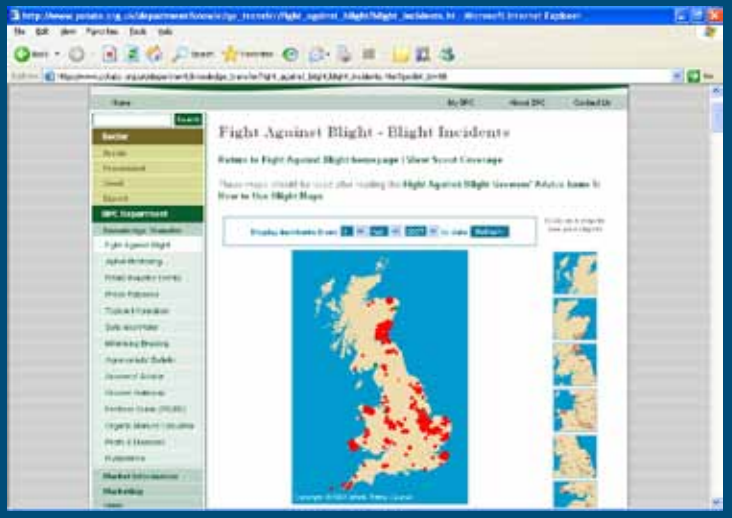

Infected fields

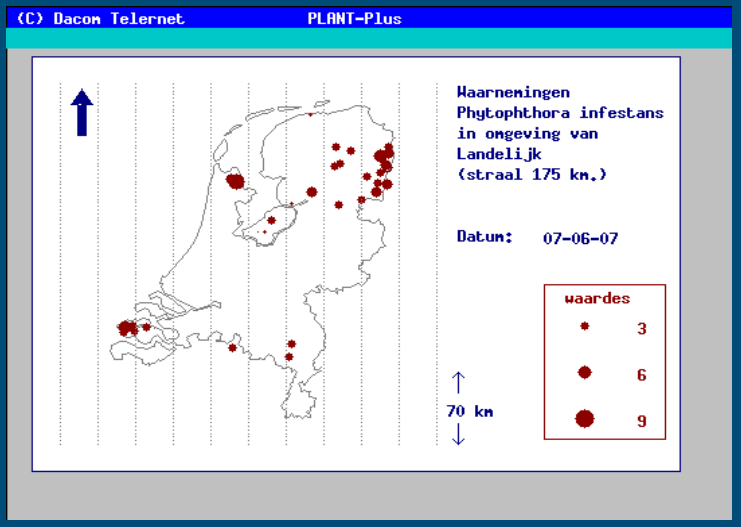
Primary sources

- Dumps, volunteers, oospores, early crops, excessive infections
- Climate change influences survival of tubers in winter
- Crop rotation: oospores!
- Regulation in NL, Fight for Blight Campaign in UK

Monitoring infected fields in Europe







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Dumps: Regulation in NL

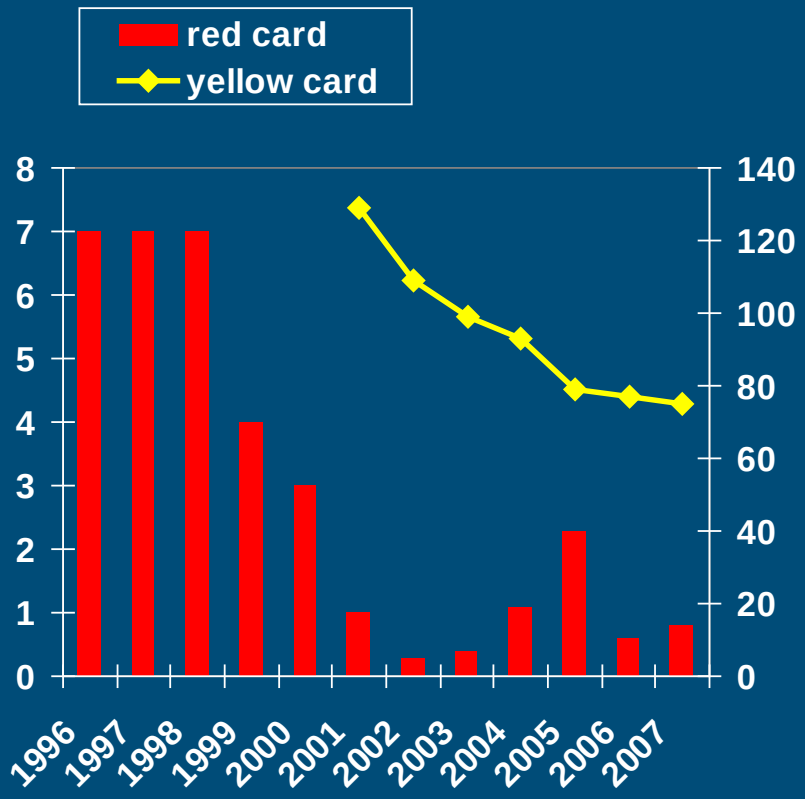

Photo: Belchim Crop Protection

Potato Case Study: Guide No. 2

From Science to Field
Potato Case Study – Guide Number 2

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), 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.

For further information please contact:

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Website and ENDURE Information Centre

www.endure-network.eu

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From Science to Field
Potato Case Study – Guide Number 2

Using Decision Support Systems to Combat Late Blight

Didier Andrivon, INRA, France; Bert Evenhuis and Huub Schepers, WUR, Netherlands;
Denis Gaucher, ACTA, France; Jozefa Kapsa and Renata Lebecka, IHAR, Poland;
Bent Nielsen, AU, Denmark; Michelina Ruocco, CNR, Italy

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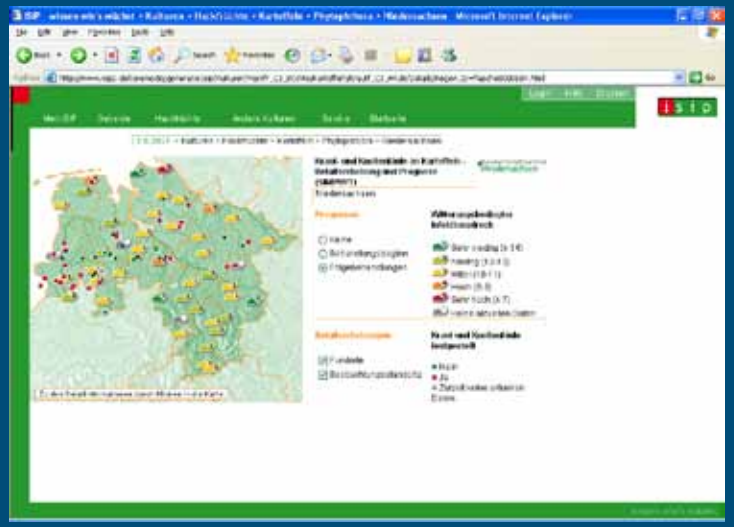
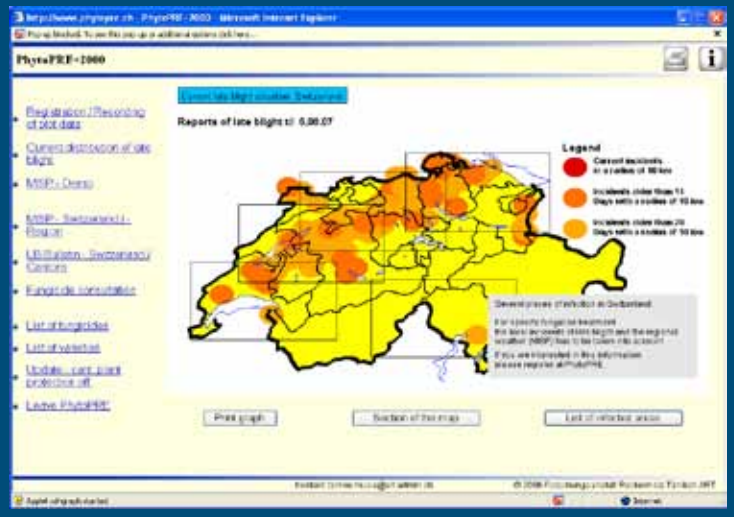
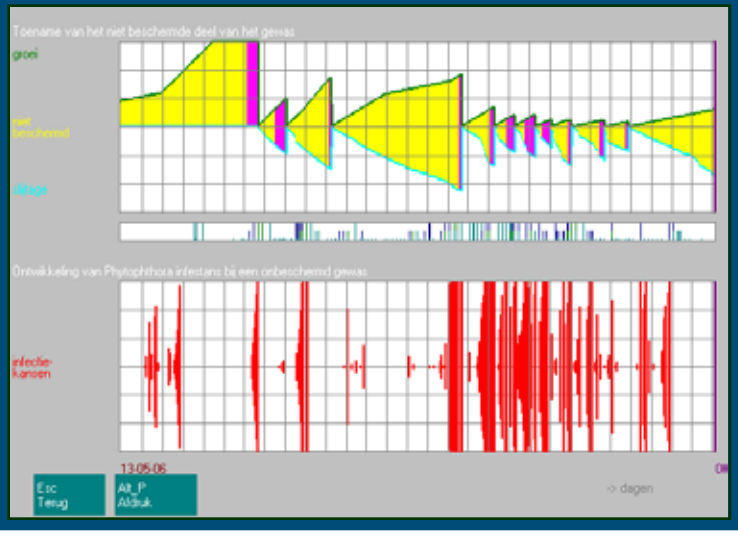
DSS in Europe







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Potato Case Study: Guide No. 3

From Science to Field
Potato Case Study – Guide Number 3

Fungicides for Tackling Late Blight

Summary

Fungicides play a crucial role in the integrated control of late blight. Integrated Pest Management strategies to control late blight balance a number of factors concerning fungicides including efficacy and side-effects (both environmental and toxicity) but also economic and social factors in addition to the legislation in place.

Control strategies are primarily preventive, but when blight enters the crop the strategy must focus on stopping or reducing the epidemic. This means growers and advisors need all the information and tools necessary to control blight efficiently.

A control strategy can be based on a schedule with more or less fixed intervals or based on recommendations derived from a Decision Support System (DSS). In a strategy, the first spray, product choice, dose rates, timing and last spray are important elements that can differ from country to country depending on growing conditions, varieties, registered fungicides and weather conditions.

Important phases in crop growth can also be identified: emergence to start of rapid haulm growth, rapid haulm growth, end of rapid haulm growth to start of senescence and start of senescence to complete haulm destruction. It is important that information on all these elements is available and that the adviser and/or farmer make his decisions accordingly.

This Guide identifies sources for obtaining this information and a table of fungicides registered for late blight control in five European countries.

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From Science to Field
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Fungicides for Tackling Late Blight

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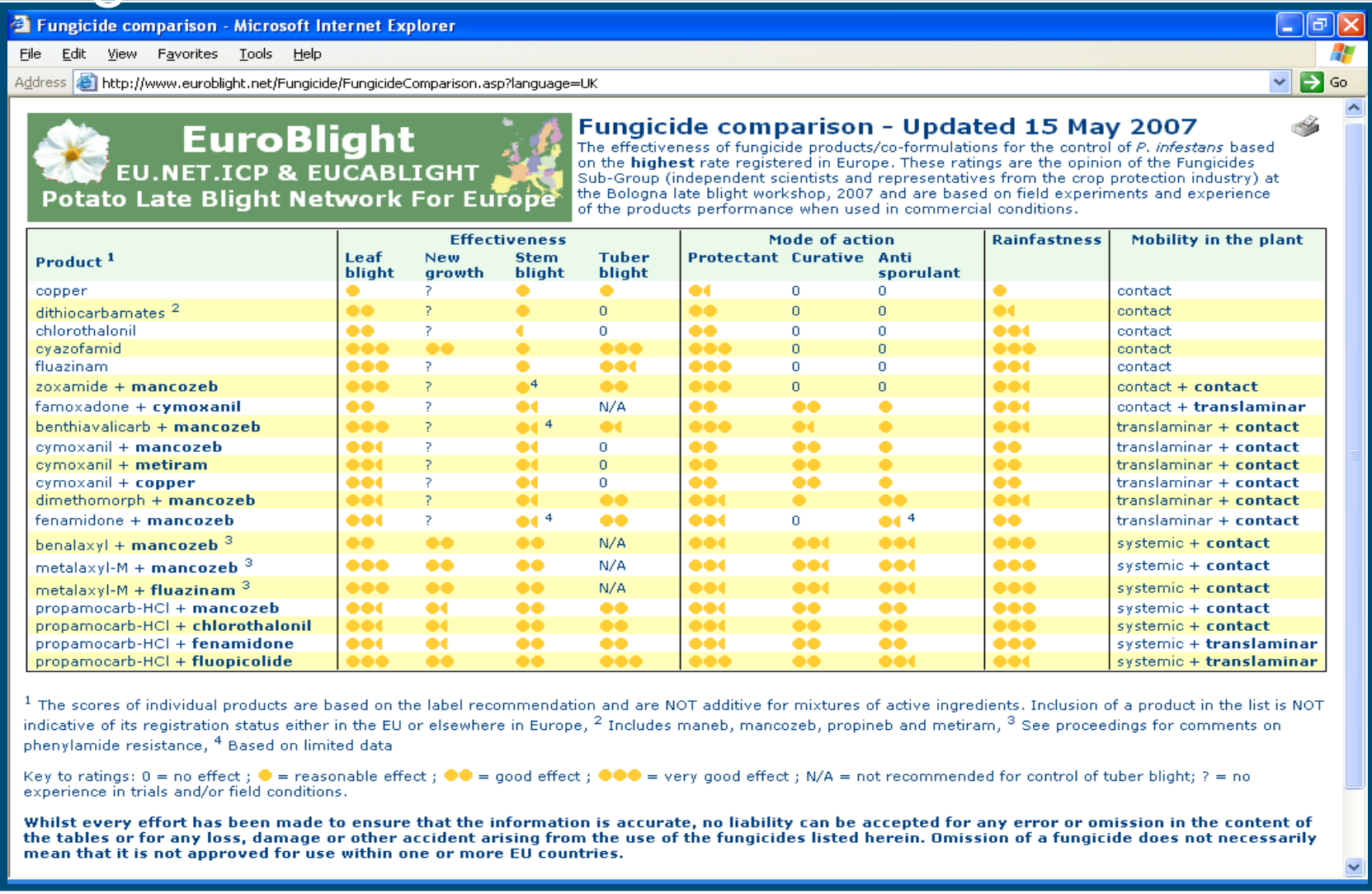
Control strategy

- More and more fungicides have a limited number of treatments on the label
- Use fungicides in those conditions (*growth stage, disease pressure*) in which their strong characteristics are used in the best possible way

Fungicide characteristics



Fungicide comparison - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://www.euroblight.net/Fungicide/FungicideComparison.asp?language=UK

Go

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Fungicide comparison - Updated 15 May 2007

The effectiveness of fungicide products/co-formulations for the control of *P. infestans* based on the **highest** rate registered in Europe. These ratings are the opinion of the Fungicides Sub-Group (independent scientists and representatives from the crop protection industry) at the Bologna late blight workshop, 2007 and are based on field experiments and experience of the products performance when used in commercial conditions.

Product [1]	Effectiveness				Mode of action			Rainfastness	Mobility in the plant
	Leaf blight	New growth	Stem blight	Tuber blight	Protectant	Curative	Anti sporulant		
copper	●	?	●	●	●◀	0	0	●	contact
dithiocarbamates [2]	●●	?	●	0	●●	0	0	●◀	contact
chlorothalonil	●●	?	◀	0	●●	0	0	●●◀	contact
cyazofamid	●●●	●●	●	●●●	●●●	0	0	●●●	contact
fluazinam	●●●	?	●	●●◀	●●●	0	0	●●◀	contact
zoxamide + **mancozeb**	●●●	?	●[4]	●●	●●●	0	0	●●◀	contact + **contact**
famoxadone + **cymoxanil**	●●	?	●◀	N/A	●●	●●	●	●●◀	contact + **translaminar**
benthiavalicarb + **mancozeb**	●●●	?	●◀ [4]	●◀	●●●	●◀	●	●●◀	translaminar + **contact**
cymoxanil + **mancozeb**	●●◀	?	●◀	0	●●	●●	●	●●	translaminar + **contact**
cymoxanil + **metiram**	●●◀	?	●◀	0	●●	●●	●	●●	translaminar + **contact**
cymoxanil + **copper**	●●◀	?	●◀	0	●●	●●	●	●●	translaminar + **contact**
dimethomorph + **mancozeb**	●●◀	?	●◀	●●	●●◀	●	●●	●●◀	translaminar + **contact**
fenamidone + **mancozeb**	●●◀	?	●◀ [4]	●●	●●◀	0	●◀ [4]	●●	translaminar + **contact**
benalaxyl + **mancozeb** [3]	●●	●●	●●	N/A	●●◀	●●◀	●●◀	●●●	systemic + **contact**
metalaxyl-M + **mancozeb** [3]	●●●	●●	●●	N/A	●●◀	●●◀	●●◀	●●●	systemic + **contact**
metalaxyl-M + **fluazinam** [3]	●●●	●●	●●	N/A	●●◀	●●◀	●●◀	●●●	systemic + **contact**
propamocarb-HCl + **mancozeb**	●●◀	●◀	●●	●●	●●◀	●●	●●	●●●	systemic + **contact**
propamocarb-HCl + **chlorothalonil**	●●◀	●◀	●●	●●	●●◀	●●	●●	●●●	systemic + **contact**
propamocarb-HCl + **fenamidone**	●●◀	●◀	●●	●●	●●◀	●●	●●	●●●	systemic + **translaminar**
propamocarb-HCl + **fluopicolide**	●●●	●●	●●	●●●	●●●	●●	●●◀	●●◀	systemic + **translaminar**

[1] The scores of individual products are based on the label recommendation and are NOT additive for mixtures of active ingredients. Inclusion of a product in the list is NOT indicative of its registration status either in the EU or elsewhere in Europe, [2] Includes maneb, mancozeb, propineb and metiram, [3] See proceedings for comments on phenylamide resistance, [4] Based on limited data

Key to ratings: 0 = no effect ; ● = reasonable effect ; ●● = good effect ; ●●● = very good effect ; N/A = not recommended for control of tuber blight; ? = no experience in trials and/or field conditions.

Whilst every effort has been made to ensure that the information is accurate, no liability can be accepted for any error or omission in the content of the tables or for any loss, damage or other accident arising from the use of the fungicides listed herein. Omission of a fungicide does not necessarily mean that it is not approved for use within one or more EU countries.

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Potato Case Study: Guide No. 4

From Science to Field
Potato Case Study – Guide Number 4

Using Cultivar Resistance to Reduce Inputs Against Late Blight

Summary

The late blight resistance of a cultivar offers significant potential in reducing fungicide inputs as part of an integrated control strategy. Both partial resistance (lower susceptibility) and fungicides can slow the development of late blight and many reports show that partial resistance in the foliage can be used to complement fungicide applications, cutting fungicide use through reduced application rates or extended intervals between sprays.

The use of resistant cultivars varies across Europe. In Western Europe, resistant cultivars are not grown on a large scale because commercially important characteristics such as quality, yield and earliness are usually not combined with late blight resistance in the same cultivar. However, in countries where fungicides are not available or very expensive, the use of resistant cultivars is one of the most important ways to reduce blight damage.

Breeders are constantly trying to produce cultivars that combine commercially important characteristics with late blight resistance, either by conventional breeding or using GMO techniques. Using cisgenesis - genetic modification using a natural gene from a crossable plant - may prove more publicly acceptable. However, a major barrier remains the durability of resistance, testing for which should be conducted according to EUCABLIGHT's harmonised protocols.

This Guide examines the current situation in Europe, the prospects for further progress and sources of information for advisers and growers.

For further information please contact:
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Website and ENDURE Information Centre

www.endure-network.eu

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From Science to Field
Potato Case Study – Guide Number 4

Using Cultivar Resistance to Reduce Inputs Against Late Blight

Didier Andrivon, INRA, France; Bert Evenhuis and Huub Schepers, WUR, Netherlands;
Denis Gaucher, ACTA, France; Jozefa Kapsa and Renata Lebecka, IHAR, Poland;
Bent Nielsen, AU, Denmark; Michelina Ruocco, CNR, Italy

Photo © INRA, France

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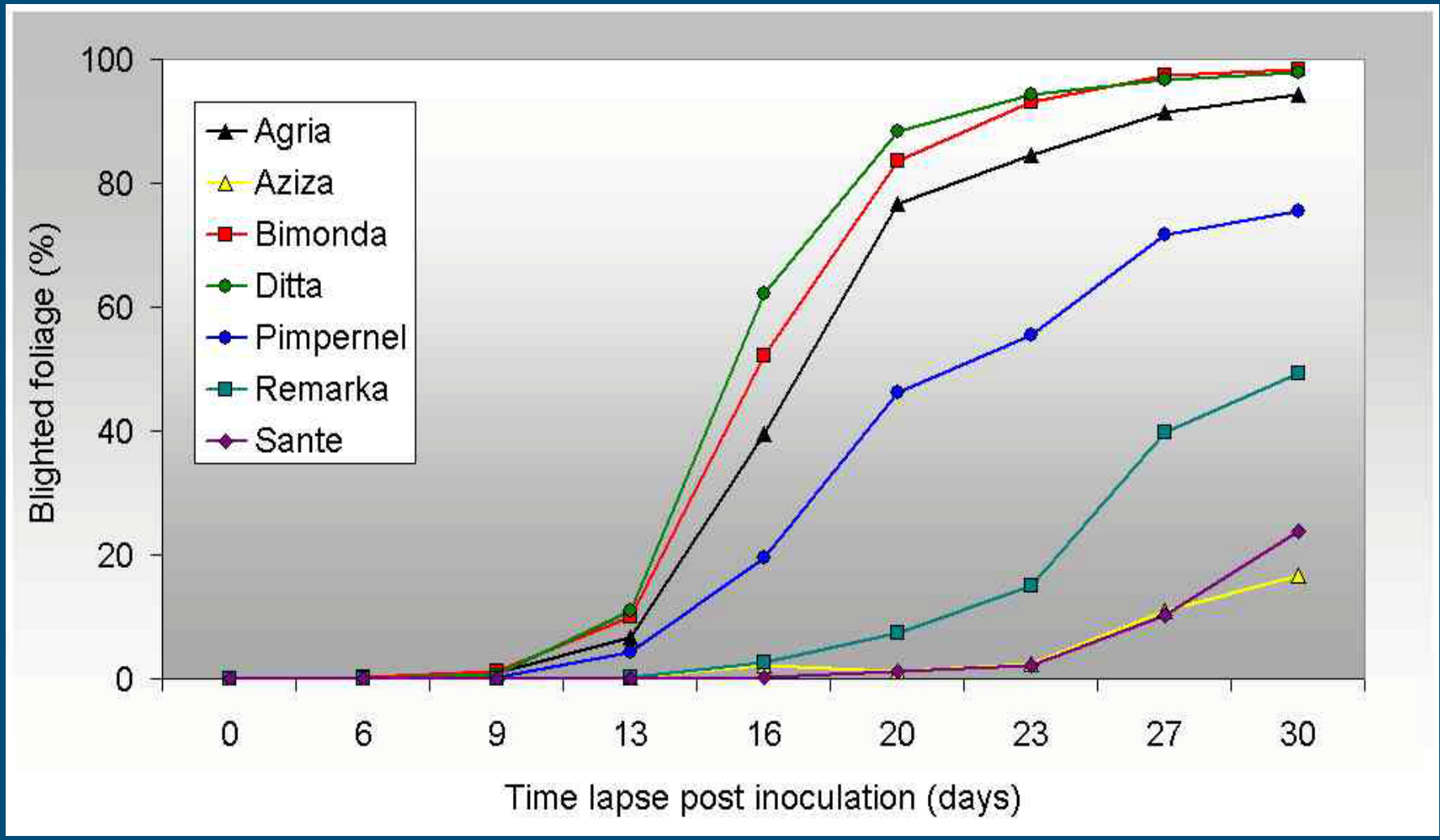
Resistant varieties



Welcome
Huub Schepers

EUCABLIGHT
Potato Late Blight Network For Europe

27 October 2008

Trial overview | Trial manager | 1-9 scores for all trials | Cultivars

Select plot for trial: 2008_NO_08_01

X axis: rAUDPC
Y axis: rAUDPC

- [x] Show cultivar names
- [ ] Show regression information

Plot
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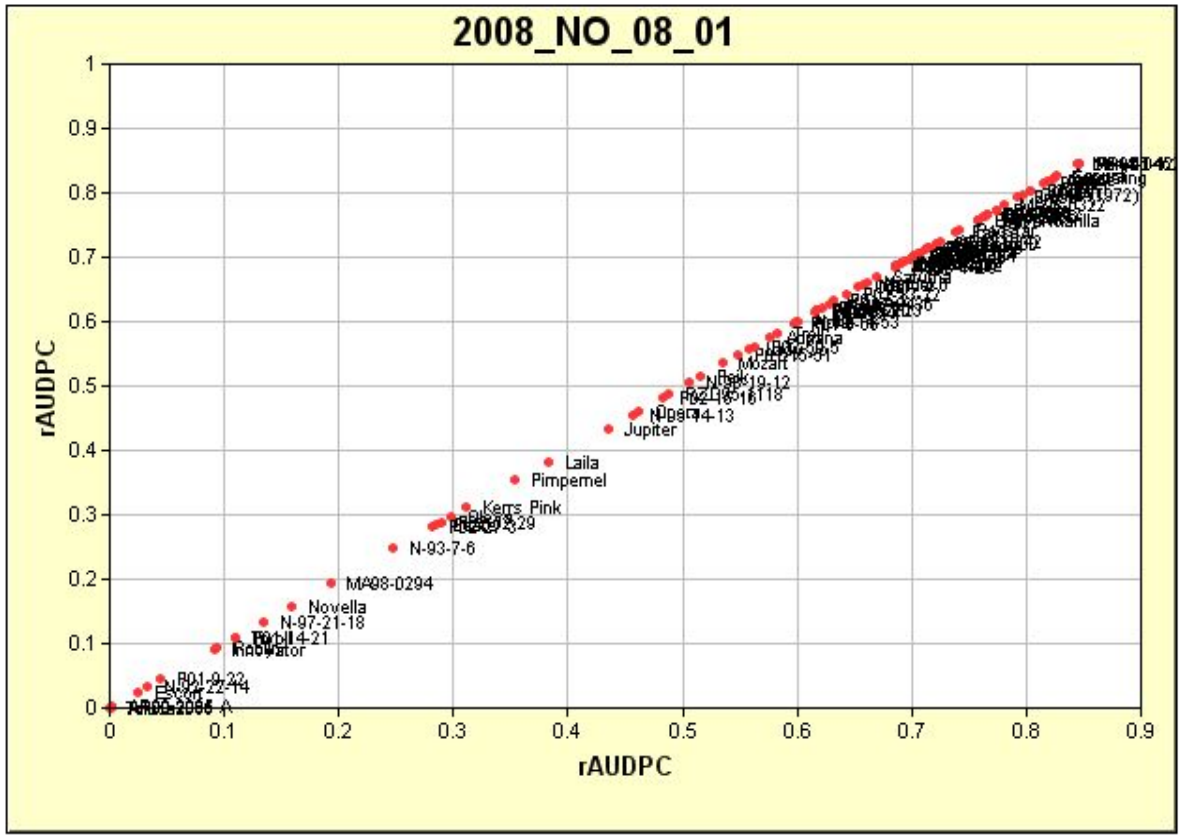
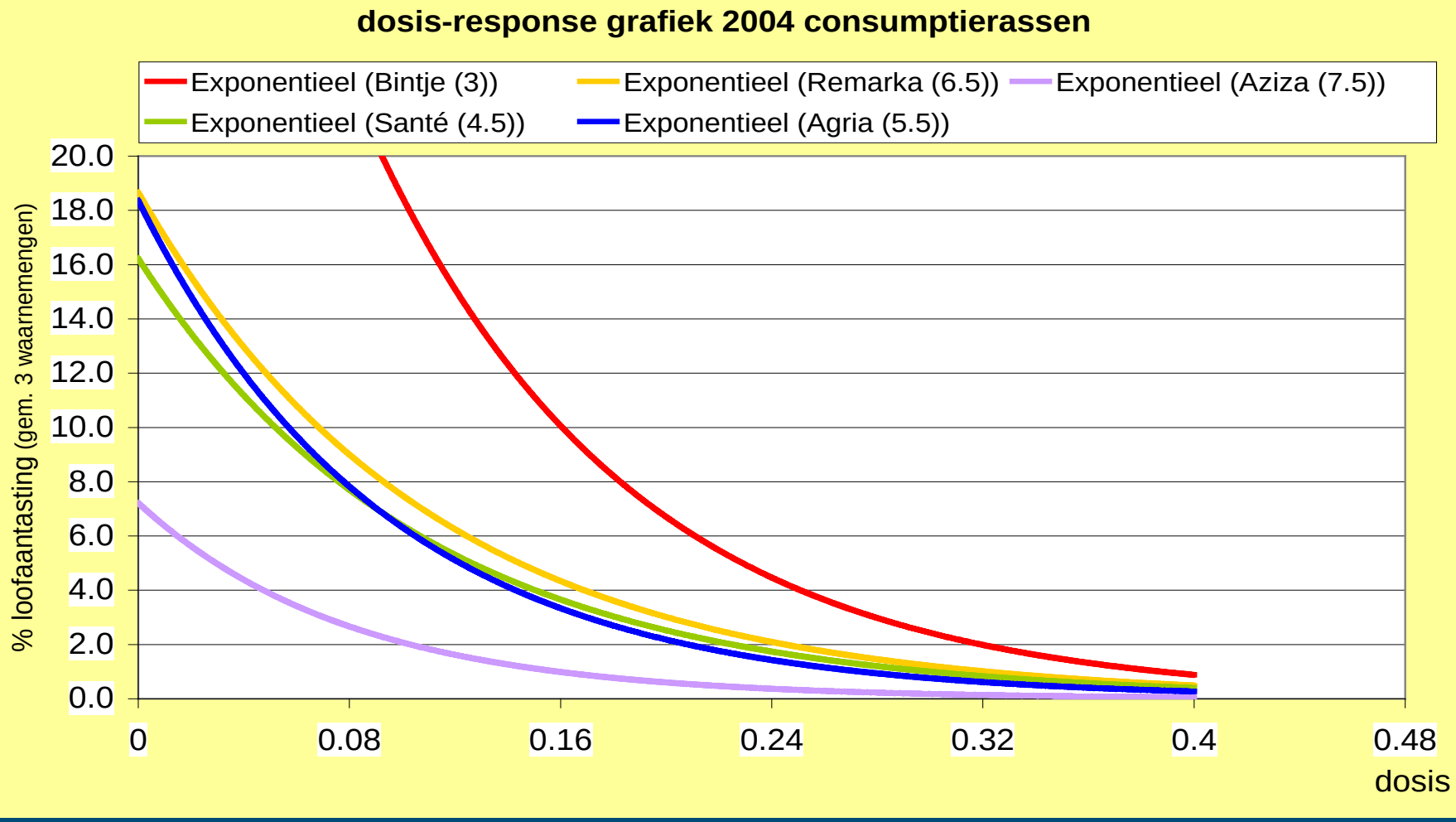


Foliar resistance & fungicide dose rate



Conclusions

- Fungicide input is substantial
  - Costs
  - Environmental side-effects
- Experience and know-how in Europe can be shared and coordinated
  - ENDURE & EuroBlight
  - Effective disease control
  - Extend to all crop protection issues in arable rotations including potato

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Thank you for your attention





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