Using Cultivar Resistance to Reduce Inputs Against Late Blight

Résumé

Les variétés résistantes au mildiou permettent de réduire significativement le nombre de traitements fongicides et sont donc un élément important dans la lutte intégrée. L'utilisation simultanée de variétés à résistance partielle (faible sensibilité) et de fongicides peut ralentir le développement du mildiou, et de nombreuses études montrent que des résistances partielles du feuillage, en complément d'applications fongicides, permettent de réduire les traitements par une diminution des doses ou par une augmentation des intervalles entre deux traitements.

L'utilisation de variétés résistantes varie en Europe. En Europe de l'Ouest, ces variétés ne sont pas très utilisées car des critères essentiels tels que la qualité, le rendement et la précocité ne sont généralement pas obtenus. Par contre, dans des pays où les fongicides sont indisponibles ou très coûteux, l'emploi des variétés résistantes est un des principaux moyens de réduire les dommages dus au mildiou.

Les semenciers essayent constamment de produire des variétés qui combinent les critères commerciaux et la résistance au mildiou, soit par sélection conventionnelle soit par les techniques OGM. Le choix de gènes provenant de plantes pouvant être croisées avec la pomme de terre est plus acceptable par le public.

En revanche, la durabilité de la résistance constitue une barrière majeure et doit être testée selon les protocoles harmonisés d'EUCABLIGHT.

Ce guide étudie la situation actuelle en Europe, les perspectives de progrès et les sources d'information pour les conseillers et les producteurs.

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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

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From Science to Field
Potato Case Study – Guide Number 4

Using Cultivar Resistance to Reduce Inputs Against Late Blight

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endure
diversifying crop protection

Food Quality and Safety
SIXTH FRAMEWORK PROGRAMME

Using Cultivar Resistance to Reduce Fungicide Inputs Against Late Blight

The late blight resistance of a cultivar offers the greatest potential for reducing fungicide use in integrated control strategies

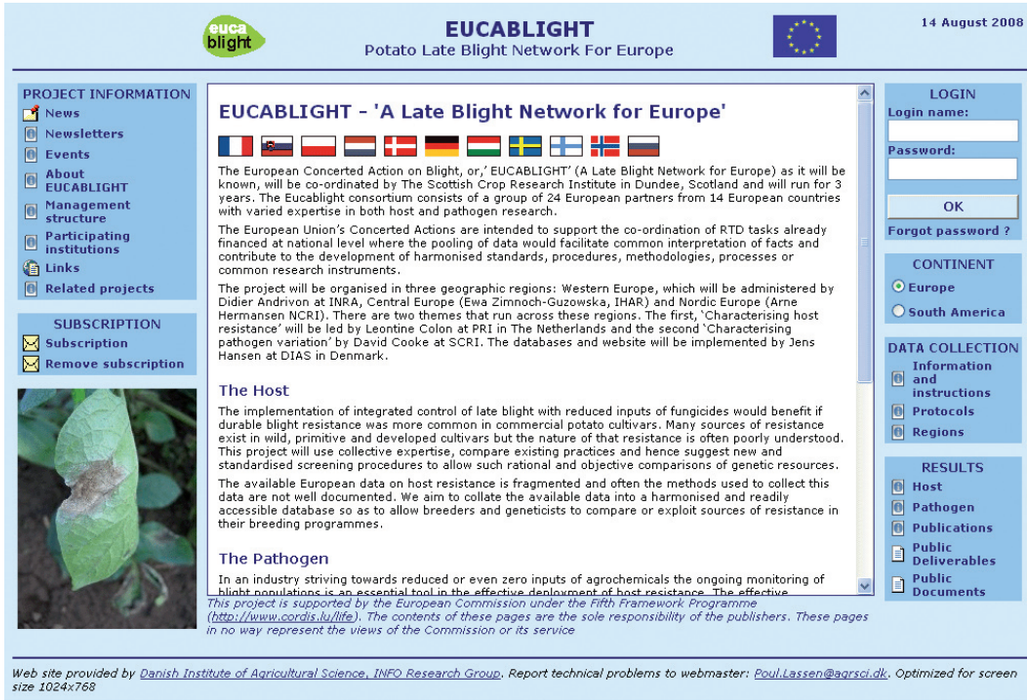
Where there is strong demand from consumers, retailers or governments for less fungicide input or even no input at all (organic agriculture), the late blight resistance of a cultivar provides an important tool to achieving it. Indeed, this element of the integrated control strategy offers the largest potential for reducing fungicide input.
Both partial resistance (lower susceptibility) and fungicides can slow down 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.

Resistance for widely grown varieties

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. From the grower's perspective, savings in fungicide input using resistant cultivars are no compensation for the higher (perceived) risk from blight.
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. In Poland, resistance to viruses is being utilised, though resistance to late blight is not sufficient in the widely grown potato cultivars.

Modern breeding offers potential

Breeders are constantly trying to produce cultivars that combine commercially important characteristics with late blight resistance: either by conventional breeding using crossing and selection or using GMO techniques.



EUCABLIGHT website contains lots of information on resistant cultivars and the pathogen population (harmonised protocols and results)

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Areas and blight resistance of the most grown ware potato cultivars

	Netherlands (2006)	France (2006)	Denmark (2007)	Poland (2004)	Italy
1	Bintje (3, 4.5) >7000 ha	Bintje (3, 3)	Sava (4.5, 8) 4500 ha	Vineta (2, 4)	Junior, Konsul, Carrera, Imola, Kuroda, Cosmos, Escort - Region: Emilia Romagna, 7018 ha
2	Agria (5.5, 7.5) 5000-6000 ha	Charlotte (6, 6)	Saturna (4.5, 6.5) 3000 ha	Satina (3, 5)	Alcmaria, Arielle, Berber, Inova, Konsul Region: Campania
3	Fontane (4.5, 6.5) 4000-5000 ha	Monalisa (6, 5)	Ditta (5.5, 7) 1500 ha	Denar (3, 4)	
4	Innovator (8,7) 3500 ha	Agata (4, 8)	Folva (3.5, 4) 1500 ha	Lord (3, 4)	
5	Lady Olympia (3, 5) 3000-3750 ha	Amandine (4, 4)	Bintje (2.5, 2.5) 1000 ha	Irga (2, 4)	
6	Premiere (2.5, 5) 2500-3000 ha	Caesar (5, 8)		Velox (2, 3)	
7	Ramos (3.5, 7) 2900 ha	Marabel		Bryza (4, 4)	
8	Asterix (5, 8.5) 2300 ha	Nicola (4, 6)		Sante (4, 4)	
9		Saturna (5, 7)			

Note: The first number between brackets refers to the foliar resistance level to late blight according to the National Variety List, the second number to the level of tuber resistance.

Using cisgenesis to introduce high resistance to 'market selected' potato cultivars offers the best potential, as it is a method that may be more acceptable to the public than transgenesis. Cisgenesis is the genetic modification of a recipient plant with a natural gene from a crossable - sexually compatible - plant. Besides the technique of inserting the desired gene, it does not contain antibiotic resistance marker genes or strong promotors originating from unrelated organisms.

Testing for resistance

Another barrier to the use of resistant cultivars is the risk that resistance is not durable. Especially with the sexually reproducing population of P. infestans, the risk for breaking the resistance could be increased.
The stability of resistance is very important. In many European countries cultivars are tested for resistance to late blight and it is important to know how frequently these tests are updated. It is recommended that the harmonised protocols developed in EUCABLIGHT are used to test resistance and stability of resistance. The resistance genes used in cultivars are not known. It is also difficult to find information on the use and distribution of resistant cultivars.

Sources of information

Information regarding the late blight population, the present status of cultivar resistance and the fungicide strategies to make optimal use of the already existing resistance in commercially interesting cultivars can be transferred to other European potato growing areas. The EUCABLIGHT (www.eucablight.org) website already contains a lot of this information.
In France resistance is monitored during the season so that information can be applied in Integrated Pest Management (IPM) control strategies during the same season. In most Decision Support Systems, resistance is taken into account. To make better use of resistance it is recommended that the influence of resistance on the epidemic is described in a better way, so that the IPM control can be adapted accordingly.

Transgene or cisgene technology can improve cultivar resistance. Photo © B. Hommel, JKI