



## Fungicides for Tackling Late Blight

### Résumé

Les fongicides jouent un rôle central dans la lutte intégrée du mildiou de la pomme de terre. Les stratégies de lutte intégrée prennent en compte différents paramètres, notamment l'efficacité et les effets non intentionnels des traitements sur l'environnement et la santé, mais aussi des facteurs économiques et sociaux, parallèlement à la réglementation.

Les stratégies sont avant tout préventives, mais quand le mildiou est présent, il faut stopper ou réduire l'épidémie. Les cultivateurs et les conseillers ont alors besoin de toute l'information et d'outils efficaces.

Une stratégie de lutte peut suivre un calendrier avec des cadences de traitement plus ou moins fixes, ou être fondée sur des recommandations provenant d'outils d'aide à la décision (OAD). La date du premier traitement, le choix du produit, les doses, les cadences et la décision de fin de traitement sont des éléments importants qui diffèrent de pays à pays en fonction des conditions de cultures, des variétés, des fongicides autorisés et des conditions climatiques.

Les différentes phases de la croissance de la culture sont également importantes : de la levée au début de la croissance rapide des fanes ; la croissance rapide des fanes ; de la fin de la croissance rapide des fanes au début de la sénescence ; du début de la sénescence jusqu'au défanage complet. Il est primordial que l'information prenant ces éléments en compte soit accessible pour que les cultivateurs et leurs conseillers puissent prendre les décisions adéquates.

Ce guide identifie les sources d'information et les fongicides autorisés dans cinq pays européens.

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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)

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## Fungicides for Tackling Late Blight

A wide range of factors need to be considered when choosing the appropriate fungicides for an IPM strategy aimed at controlling late blight

Fungicides play a crucial role in the integrated control of late blight. The threshold for late blight is zero; growers do not tolerate blight. The efficacy and side-effects (both environmental and toxicity) but also economic, social factors and legislation will influence the Integrated Pest Management strategies used to control late blight.

The control strategy is primarily preventive but when blight enters the crop the strategy will have to focus on trying to stop or reduce the epidemic. It is important that growers and advisers have 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 can be based on the recommendations derived from a Decision Support System (DSS). In a strategy, the first spray, product choice, dose rates, timing and last sprays are important elements. These elements can differ from country to country depending on growing conditions, varieties, registered fungicides and weather conditions.

The following phases can be distinguished:

- Emergence to start of rapid haulm growth
- Rapid haulm growth
- End of rapid haulm growth to start of senescence
- Start of senescence to complete haulm destruction.

It is important that information on these elements is available and that the adviser and/or farmer make his own decisions accordingly, depending on his own perspectives. It is important to clarify the relative effect of each of these elements on late blight control.

### The role of EuroBlight

EuroBlight is a European network of scientists and other specialists working on potato late blight. The EuroBlight network can play a role in making this data readily available ([www.euroblight.net](http://www.euroblight.net)). EuroBlight is also a platform for weather-based DSS. This platform can be used to calculate blight risk for each country using country-specific DSS, thus providing information on number of sprays and justification that can be used to compare and discuss with farmers and advisers.

### Product choice and timing

The first priority of farmers and advisers is efficacy. The European network EuroBlight publishes a fungicide table with all-important characteristics of fungicides. The characteristics of the fungicides can be used to optimise their efficacy by combining their strong points with specific situations in the growing season concerning infection pressure and plant growth.

### Environmental impact, residues and toxicity

In Denmark the treatment index (number of sprays multiplied by the dose rate) is used as a yard stick to measure the input of agrochemicals. In the Netherlands each agrochemical is rated for its environmental side-effects for leaching into ground water, soil and water organisms. These pollution points, calculated by CLM based on data from the registration dossier of the agrochemical company, are used as a yard stick to measure the input of agrochemicals ([www.milieumeetlat.nl](http://www.milieumeetlat.nl)).

For late blight the pollution points have decreased >97% in 2006 compared to the reference period 1996 to 1998. It is recommended that the systems used in the countries involved be compared and the for and against factors be formulated

Fungicides registered for control of late blight in five European countries at October 2007  
(dose rates are highest label dose rate. (NR = not registered, RNM = registered but not on market)

Products	Netherlands	Denmark	Italy	Poland	France
Benthiavdicarb and Mancozeb	Valbon 2.0kg/ha	NR	NR	Valbon 72 WG 1.6kg/ha	NR
Chlorothalonil	Daconil 3.5l/ha	NR	NR	Bravo 500 SC, Clortosp 500 SC 3.0l/ha	Daconil Fix 2.0l/ha Dorimat 3.0l/ha
Chlorothalonil + Zn	NR	NR	NR	Bravo Plus 500 SC, Gwarant 500 SC 3.0l/ha	NR
Copper	NR	NR	FLOWBRIX 2.5-3.0l/ha	Mag 50 WP 2.5kg/ha, Cuproxtat 345 SC 5.0l/ha, Champion 50 WP 3.0kg/ha, Cuproflow 375 SC 3.5l/ha, Nordox 75 WG 1.0kg/ha	Copper 5.0kg/ha
Cyazofamid	Ranman 0.2l/ha	Ranman 0.2l/ha	Ranman 0.2l/ha	NR	Ranman 0.2l/ha
Maneb	Maneb 2.0kg/ha		NR	NR	Maneb 2.0kg/ha
Mancozeb	Mancozeb 2.25kg/ha	Dithane NT, Tridex 2.0kg/ha	NR	Dithane Neo Tec 75 WG, Manconex 80 WP, Sancozeb 80 WP, Pennfluid 420 SC 3.0kg or 1/ha, Indoil 80 WP 2.0kg/ha	Mancozeb 1.6kg ai/ha
Metiram	Aviso DF 3.0kg/ha	NR	NR	Polyram 70 WG 1.8kg/ha	NR
Propineb	NR	NR	NR	Antraacol 70 WG 1.8kg/ha	NR
Captan	NR	NR	NR	Merpan 50 WP 3.5kg/ha	NR
Folpet - N	NR	NR	NR	Folpan 80 WG 2.0kg/ha	NR
Famoxadone + cymoxani	Tanos 0.6kg/ha	NR	NR	Tanos 50 WG 0.7kg/ha	Equation Pro 0.4kg/ha
Fluazinam	Shirlan 0.4l/ha	Shirlan 0.4l/ha	Shirlan 0.3-0.4/ha	Altima 500 SC 0.4l/ha	Shirlan 0.4l/ha
Zoxamide + mancozeb	Unikat 1.8kg/ha	Electis 1.8kg/ha	NR	Unikat 75 WG 2.0kg/ha	Adério 1.8kg/ha
Cymoxanil solo	Curzate 60 DF 0.2kg/ha	NR	Curzate 400g/ha	NR	NR
Cymoxanil + mancozeb, metiram or copper	Curzate M 2.5kg/ha Aviso DF 3.0kg/ha	NR	NR	Curzate M 72,5 WP, WG, Ekonom MC 72,5 WP Helm Cymi 72,5 WP, Toska 72,5 WP 2.0kg/ha, Curzate Cu 49,5 WP 3.0kg/ha	Rémiltine pépite 2.5kg/ha
Dimethomorph + mancozeb	Acrobat 2.0kg/ha	Acrobat 2.0kg/ha	NR	Acrobat MZ 69 WG 2.0kg/ha	Acrobat M DG 2.0kg/ha
Fenamidone + mancozeb	Sereno 1.5kg/ha	Sereno 1.5kg/ha	Sereno 1.5kg/ha	Pyton 60 WG 1.25kg/ha	Séréno 1.25kg/ha
Benalaxyl + mancozeb	NR	NR	Galben 2.5kg/ha	Galben M 73 WG 2.0kg/ha	Treecatol 2.5kg/ha
Metalaxyl-M + mancozeb or fluazinam	Fubol Gold 2.5kg/ha	Ridomil Gold 68 MZ 2.0kg/ha (only one application after G.S. 60)	Ridomil Gold 2.5kg/ha	Ridomil Gold MZ 68 WG 2.5kg/ha	Eperon pépite 2.5kg/ha Epok 0.4l/ha
Propamocarb HCl solo	NR	NR	NR	Spinaker 607 SL 3.0l/ha	NR
Propamocarb-HCl + fluopicolide	Infinito 1.6l/ha	NR	NR	Infinito 687, 5 SC 1.6l/ha	NR
Propamocarb-HCl + mancozeb or + chlorothalonil	Tattoo C 2.7l/ha	Tattoo M (with mancozeb) 4.0l/ha	NR	Tattoo C 750 SC 2.5l/ha	Tattoo C 2.7l/ha
Propamocarb-HCl + fenamidone	RNM	Tyfon 2.0l/ha	NR	Pyton Consento 450 SC 2.0 l/ha	NR