

Criteria to choose fungicides to control potato foliar diseases

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CRITERIA TO CHOOSE FUNGICIDES TO CONTROL POTATO FOLIAR DISEASES

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CONTEXT & OBJECTIVES

Context: Potato foliar diseases are very important, particularly the light blight which is more and more aggressive and the early blight which is spreading widely. Fungicides are essential tools to control those diseases. To build up the Decision Support System (DSS) it is necessary to choose the best fungicide at the best moment. Moreover, the grower and the seller of phytosanitary products need to dispose immediately these fungicides.

Objective: A decision scale to choose fungicides is useful and can be used as a training tool. It could be a little DSS.

CRITERIA OF CHOICE

Criteria of choice are very numerous: what diseases to control, growth stages of the crop, disease pressure (plant and pathogene action, effectiveness), rainfall, fungicides resistance risks, regulation rules, quality/price balance, using easiness

How to choose the criteria:

1. The diseases: In France, the potato area in North West are concerned essentially by late blight, but in the central and East part the early blight is important and it is spreading also in the North West. So criteria 1 is *Phytophthora infestans*, and the second is *Alternaria sp*

2. The stages:



3. Priority of criteria by stage:

- Crop emergence:** to avoid early contaminations, it is necessary to spray according to the pressure disease, but there only few leaves
 → criteria 1: **cost** of the product, criteria 2: disease pressure given by the DSS, BSV in France (sanitary bulletin), dumps observations.
- Stem growth:** the target is no stem blight
 → **systemic, retroactive, and very effective** fungicide.
- Foliage growth:** We have to protect all the growing leaves and particularly the « top bud or bunch »
 → criteria 1: **diffusant** fungicide, criteria 2: **efficacy** according to pressure disease, criteria 3: rainfall.
- Foliage stabilisation:** The targets are to protect the leaves during rain or irrigation period and also the tubers
 → in a first period: criteria 1: **efficacy/pression, rainfall**, criteria 2: **alternaria risk** (alternaria efficacy) criteria 3: efficacy against tuber blight (number of spores).
 → in a second part: criteria 1: efficacy against foliar and **tuber blight** (mobility and survival of the spores), rainfall, criteria 2: alternaria.
- Senescence:** the most important point is the quality of the tuber
 → criteria 1: **tuber blight efficacy** (survival, mobility), criteria 2: **cost/risk** (rains on foliar symptoms)
- Emergency treatment however the stage:** retroactive and antispurulant fungicide

EVALUATION OF FUNGICIDES ACCORDING TO GROWTH STAGES

How to obtain the fungicides informations: the EUROBLIGHT TABLE: fungicides comparison, Arvalis Institut du Végétal leaflet: « traitement en végétation contre le mildiou et l'alternariose », regional trials, price scales.

Examples of analyses on two stages (tab.1, tab.2):

Table 1: leaves growth stage

Fungicide	Late blight			
	Diffusant	Low pressure	High pressure	Rainfastness
Diméthomorphe	XXX	XXX	XX (X)	XXX
Benthiavaliacarbe	XXX	XXX	XX (X)	XXXX
Mandipropamid	XXX	XXX	XXX	XXX (X)
Fluopicolide	XXX	XXX	XXX	XXX (X)
Dithiocarbamate	X	XXX	X	X
Fluazinam	X	XXX	X	XX
Cyazofamide	XXX	XXX	XXX	XXX (X)
Cymoxanil	X	XXX	XX	XX

Table 2: Stage: foliage stabilisation part 2

Fungicide	Late blight				Early blight	Cost
	Low pressure	High pressure	Rainfastness	Tuber blight		
Diméthomorphe	XXX	XX (X)	XXX	XX	0	XX (X)
Benthiavaliacarbe	XXX	XX (X)	XX (X)	X (X)	0	XXX
Mandipropamid	XXX	XXX	XXX (X)	XXX	0	XX
Fluopicolide	XXX	XXX	XXX (X)	XXX	0	XXX
Dithiocarbamate	XX	X	X	X	XX	X
Fluazinam	XXX	XX	XX	XXX	0	XX
Cyazofamide	XXX	XXX	XXX	XXX	0	XX
Zoxamide	XXX	XX	XXX	XXX	XX	XX (X)
X (not registered)	0	0	0	0	XX (X)	XX

LIST OF NECESSARY FUNGICIDES

Examples of decision:

- Production with good benefit in aera with high late blight risk: emergence: fluazinam, stem growth: fluopicolide, foliar growth: mandipropamid, stabilisation 1: mandipropamid, zoxamide, stabilisation 2 and senescence: cyazofamide and fluazinam
 → list: fluazinam, fluopicolide, mandipropamide, zoxamide, cyazofamide, and cymoxanil for emergency spray
- Production with intermediat benefit: dithiocarbamate, fluopicolide or mandipropamide or dimetomorphe, fluazinam, and cymoxanil
- Production with low benefit: dithiocarbamate, fluazinam, cymoxanil

NB: for each stage we have a table with regulation rules (number of sprays...), for some stages we have the risk of resistance of the two diseases