

Efficacy evaluation of different fungicides for the control of potato late blight in Italy

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AIMS

Two new fungicides (dimethomorph+pyraclostrobin and fluopicolide+propamocarb) were recently authorized in Italy for the control of late blight on solanaceous crops. Their toxicological properties and environmental impact make them suitable to be introduced in the list of fungicides allowed in the Integrated Production Guidelines for the disease control in Italy. Therefore, two field trials were setup over the years 2007-2008 with the aim to evaluate and compare the efficacy of new formulations introduced in the Italian market for the control of *Phytophthora infestans* (Mont.) de Bary, the causal agent of potato late blight.

MATERIALS AND METHODS

Materials and methods of the field trials and features of the tested formulations are summarized in tables 1 & 2. Times of the applications and fungicide dosage are indicated in the result tables. Fungicides were applied respecting the safety period. Disease incidence and severity on the potato canopy were assessed on the central part of the plots, calculating the percentage of infected leaves and the percentage of infected leaf area by observing 200 leaves per plot. In 2008, potato was sown very late in the season (August) to benefit for the wet climate in autumn and higher disease pressure. To avoid early blight infections, 4 sprays with mancozeb at 6-7 days interval were applied on all the experimental plots.

Table 1 – field trial methods

	Trial 1	Trial 2
Year	2007	2008
Locality	Imola (Bologna)	Sala di Cesenatico (Forlì)
Variety	Primura	Bologna
Sowing date	27/3	26/8
Experimental design	Complete randomized block design (4 replicates)	
Plot dimension (sqm)	24,0	21,0
Spray equipment	knapsack boom sprayer ECHO SHR 150 SI	

Table 2 – tested fungicides and dosage

Commercial name	Firm	Formulation	Safety period (days)	Active ingredient	A.i. in the formulated product (% or g/l)
Cabrio Duo	Basf	SC	3	dimethomorph + pyraclostrobin	72 + 40
Electis	Dow	WG	7	zoxamide + mancozeb	8,3 + 66,7
Forum R	Basf	WP	20	dimethomorph + copper oxychloride	6 + 40
Melody compact	Bayer	WP	20	iprovalicarb + copper oxychloride	4,2 + 20,3
Ridomil Gold R	Syngenta	WP	20	metalaxyl-m + copper oxychloride	2,5 + 40
Volare	Bayer	SC	7	fluopicolide+ propamocarb	62,5 + 625

RESULTS

Trial 1 (2007) – Disease occurred at the end of May and developed rapidly affecting more than 90% of the check plot. All the tested formulations effectively protected the crop. However, formulation containing metalaxyl-m + copper oxychloride (Ridomil Gold R), again, confirmed to be the best to contain the disease (table 3). No tuber blight was recorded.

Trial 2 (2008) – Disease symptoms occurred on 10 October. All the formulations showed a good efficacy. The efficacy on foliage of formulations recently introduced on the market fluopicolide+propamocarb (Volare) and dimethomorph+pyraclostrobin (Cabrio Duo), was similar to that provided by metalaxyl-m+copper oxychloride, still considered the best chemical reference. On the contrary, with high disease pressure (more than 87% of infected leaf area in the unsprayed check) the mixture zoxamide+mancozeb (Electis) and iprovalicarb+copper oxychloride (Melody compact) proved to be less effective (table 4). No tuber blight was recorded at harvest.

Table 3 - results of field trial n. 1 (2007)

Treatments a.i. and formulation dose (g or ml/ha)	% of infected leaves		
	18 June (T ₄ + 7)	26 June (T ₅ + 7)	3 July (T ₅ + 14)
1 Unsprayed check	61,3 a	80,0 a	91,0 a
2 zoxamide + mancozeb (1750)	3,38 b	2,61 c	2,36 bc
3 dimethomorph + copper oxychloride (3250)	4,06 b	3,94 bc	1,98 c
4 iprovalicarb + copper oxychloride (3500)	4,59 b	6,36 b	3,78 b
5 metalaxyl-m + copper oxychloride (4000)	0,23 c	0,82 d	1,31 c

Treatments with the same letter are not statistically different for $p \leq 0,05$ (Test LSD)

Time of chemical applications: 7-May (T1), 18-May (T2), 30-May (T3), 11-June (T4), 19-June (T5)

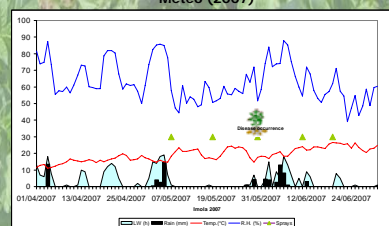
Table 4 - results of field trial n. 2 (2008)

Treatments a.i. and dosage (g or ml/ha)	% of infected leaf area		
	15 October (T ₄ + 5)	22 October (T ₅ + 5)	31 October (T ₅ + 14)
1 Unsprayed check	35,4 a	65,6 a	87,5 a
2 zoxamide + mancozeb (1750)	3,3 bcd	22,7 bc	38,0 b
3 Dimethomorph + copper oxychloride (3250)	1,9 cd	16,8 cd	28,8 bc
4 metalaxyl-m + copper oxychloride (4000)	0,2 d	11,5 cd	25,3 c
5 iprovalicarb + copper oxychloride (3500)	10,7 b	30,1 b	40,0 b
6 dimethomorph + pyraclostrobin (2500)	1,3 cd	9,6 d	23,8 c
7 fluopicolide + propamocarb (1600)	1,4 cd	13,3 cd	22,0 c

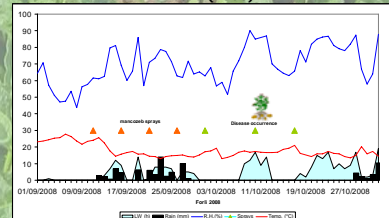
Treatments with the same letter are not statistically different for $p \leq 0,05$ (Test LSD)

Time of chemical applications: 1-October (T1), 10-October (T2), 17-October (T3)

Meteo (2007)



Meteo (2008)



CONCLUSIONS

Under medium and severe disease pressure in 2007 and 2008 respectively, metalaxyl-m+copper oxychloride (Ridomil Gold R) confirmed to be the best chemical reference in controlling late blight on foliage. New formulations, fluopicolide+propamocarb (Volare) and dimethomorph+pyraclostrobin (Cabrio Duo) showed, although in a single trial, an efficacy similar to that provided by the best chemical references, metalaxyl-m+copper oxychloride and dimethomorph+copper respectively. Iprovalicarb+copper oxychloride and zoxamide+mancozeb proved to be less effective.