



# MODERN FUNGICIDES IN CONTROL OF EARLY AND LATE BLIGHT IN POLISH EXPERIMENTS



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## INTRODUCTION

Late blight caused by *Phytophthora infestans* is a very serious economic threat in the vast majority of potato production systems. Two recent studies put the total loss (direct and through fungicides) at between \$3 and \$5 billion per year (Judelson and Blanco, 2005; Haldar et al, 2006). After *P. infestans*, fungus *Alternaria* is the second most important foliar fungal pathogen of potato crops world-wide. Early blight occurs in many parts of the world but is a problem mainly in the warmer potato growing areas.

## MATERIAL & METHODS

In the years 2005, 2007-2009 studies were conducted in Poland, at the Plant Breeding and Acclimatization Institute of Bonin with the emphasis on:

- ◆ Comparison of time of the occurrence and severity level of the early and late blight of potato in two different locations
- ◆ Estimation of the efficiency of selected fungicides (including newly registered in potato) in limiting the development of the early and late blight (tab.1).

Table 1. Fungicides used in the field trials

Fungicide	Active ingredient	Dose rate /ha	late blight		early blight
			7-10 d.	10-14 d.	
Amistar 250 SC <sup>1)</sup>	azoxystrobina	0,5 l			
Infinito 687,5 SC	fluopicolide + propamocarb-HCL	1,2-1,6 l			
Tattoo C 750 SC	propamocarb-HCL + mzb	2,0 l			
Ridomil Gold MZ 68 WG	mefenoxam + mzb	2,0 kg			
Acrobat MZ 69 WG	dimethomorph + mzb	2,0 kg			
Revus 250 SC	mandipropamid	0,6 l			
Dithane Neo Tec 75 WG	mancozeb	2,0 kg			
Altima 500 SC	fluazinam	0,4 l			
Ranman 400 SC TwinPack	cyjazofamid + (adjuwant)	0,2 + 0,15 l			
Tanos 50 WG	cymoxanil + famoxate	0,5 kg			
Antracol 70 WG	propineb	1,8 kg			
Bravo 500 SC	chlorothalonil	2,0 kg			
Unikat 75 WG	zoxamide + mzb	2,0 kg			

<sup>1)</sup> fungicide not registered for potato in Poland

used in trials

Field trials for control of early blight (EB) were carried out in 3 localities (Bonin, Mierzym & Stare Olesno) and for late blight (LB) in 2 localities (Bonin & Mierzym). Estimation of fungicide efficiency to control the early blight was performed on cv. Bard and control of the potato late blight on cv. Irga (very susceptible to the disease). Two to three sprayings were performed throughout the growing season against EB, beginning with the occurrence of the very first symptoms of the disease on the experimental plots. Control of the LB began based on DSS NegFry system. Six to seven sprayings were applied throughout the growing season, with intervals 7-10 and 10-14 days.

The criteria for pathogen infection pressure assessment were evaluated on untreated plots (control) and assumed to be the percentage of haulm destruction at the end of growing season and relative area under the disease progress curve (rAUDPC), the diseases development rate defining the increase of destruction of above ground plant parts in unit time.

The criteria for fungicide effectiveness assessment on protected plots was assumed to be the percentage of disease severity at the end of growing season, efficacy of tested fungicides compared to untreated control. relative area under the diseases progress curve (rAUDPC) and EB and LB development rate defining an increase of destruction of haulm in unit and also tuber yield and its healthiness.

The results were analyzed in a 2-factorial ANOVA, the factors being years of experiments and the fungicides applied.

## RESULTS

The observations carried out at Bonin, Mierzym & Stare Olesno revealed that both time of occurrence and severity of EB and LB differed and were dependent upon meteorological conditions and upon the year (tab.2).

Table 2. Time of occurrence of EB and LB in the years 2005, 2007-2008

Years	EARLY BLIGHT						LATE BLIGHT			
	Bonin		Mierzym		St.Olesno		Bonin		Mierzym	
	Data of disease appearance	Infected leaf area - %	Data of disease appearance	Infected leaf area - %	Data of disease appearance	Infected leaf area - %	Data of disease appearance	Infected leaf area - %	Data of disease appearance	Infected leaf area - %
2005	27.06.	50,0	29.06.	33,1	24.06.	57,9	25.07.	97,1	29.07.	98,9
2007	19.06.	95,3	18.06.	98,2	24.06.	99,5	29.06.	99,5	25.06.	73,8
2008	20.06.	91,7	26.06.	95,3	24.06.	98,0	17.07.	93,9	03.07.	99,8
2009	19.06.	95,3	04.07.	71,4	10.06.	98,6	20.06.	81,7	25.06.	98,6

LB occurred the earliest at Bonin in 2009 (at 20th June) and EB at Stare Olesno also in 2009 (at 10th June). Generally speaking meteorological elements and their course during a growing season are the basic elements affecting occurrence of the diseases in the field and variability of infection pressure of *P. infestans* and *Alternaria* spp. The conducted trials showed that all fungicides, applied each 7-10 days, limited the LB development compared to the untreated control (Fig.1).

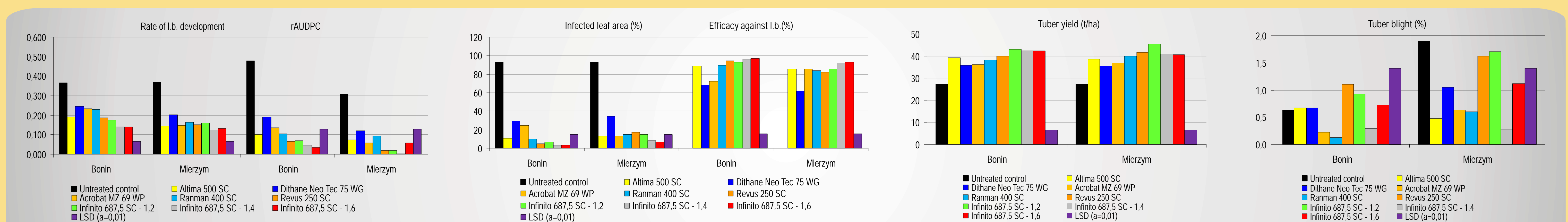


Fig. 1. Efficiency of selected fungicides, applied each 7-10 days, in potato protection against LB (8 field trials)

In Mierzym climatic conditions, all tested fungicides revealed similar efficiency in inhibition of the disease development, without any significant statistic differences. In Bonin the less effective in inhibition of LB development were Dithane Neo Tec 75 WG and Ranman 400 SC. Nevertheless, there were not observed any influence on tuber yield. Similar good control of LB was observed when fungicides were applied each 10-14 days (Fig.2). Efficacy of all tested fungicides were assessed above 80% (except for Acrobat MZ 69 WP in Bonin).

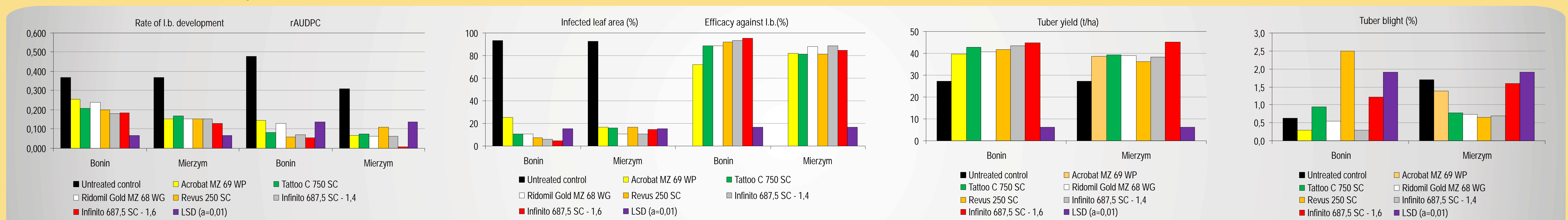


Fig.2. Efficiency of selected fungicides, applied each 10-14 days, in potato protection against LB (8 field trials)

The carried out trials showed also, that all fungicides limited the EB development compared to the untreated control but at different level (Fig.3). The best results were obtained for Infinito 687,5 SC (dose rate 1,2 l/ha) and the old fungicides Altima 500 SC, Antracol 70 WG, Bravo 500 SC. In Polish experiences (12 trials in 3 places), Amistar 250 SC and Revus 250 SC were the less effective in control of EB.

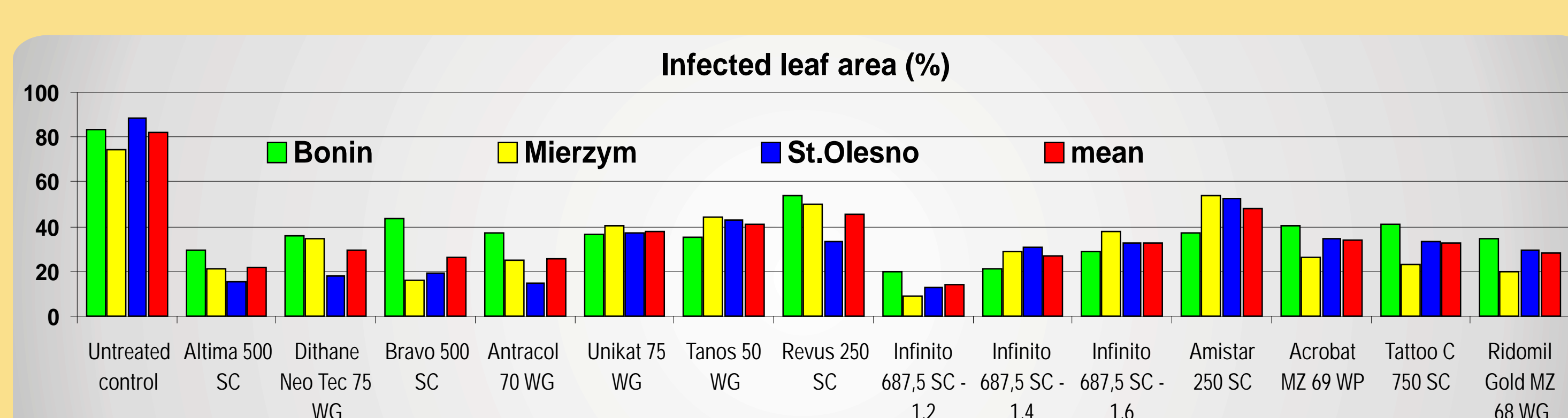


Fig.3. Efficiency of selected fungicides in potato protection against early blight (12 field trials)



## LITERATURE CITED

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