

EFFICACY OF NEGFry DECISION SUPPORT SYSTEM IN CONTROL OF LATE BLIGHT IN POLAND

Andrzej Wójtowicz

Institute of Plant Protection
Miczurina 20,60-318 Poznań, Poland
e-mail: A.Wojtowicz@ior.poznan.pl

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Abstract: The field experiment carried out in Winna Góra compared the efficacy of fungicide programs applied in accordance with the NegFry and Routine systems. The results of 2002 validation achieved in Winna Góra showed that NegFry model forecasting the late blight occurrence is useful in Polish climatic conditions. Compared with routine treatment schemes, NegFry recommended fewer treatments without significant reduction of yield thus potato protection according to NegFry was more cost-effective than according to Routine system. Basing on these facts the NegFry decision support system can be recommended for Polish climatic conditions.

Key words: *Phytophthora infestans*, late blight, NegFry

INTRODUCTION

Late blight caused by *Phytophthora infestans* (Mont.) de Bary is one of the most destructive diseases of potatoes (Fry 1978). The average yield loss caused by that pathogen ranges between 8%–10% (Schlenzing et al. 1999) but under favourite conditions for late blight development yield losses could be greater than 75% (Fry 1975). In Poland the average yield loss is within a range of 20% to 25% (Kapsa 2001). The average number of infested plants over the period of last 35 years amounted to 40%. The highest infestation took place in 1997 when almost 86% of plants showed symptoms characteristic for late blight (Walczak et al. 1997). In 1988 it turned out that A2 mating type of *P. infestans* is present in Poland (Sujkowski et al. 1994). Probably because of this late blight is more dangerous now than before. In spite of this Polish farmers usually control late blight only twice during the season. However, the usage of fungicides against *P. infestans* on larger farms in Poland has been increasing each year. When weather conditions do not favour very much late blight development, two fungicide applications could be enough, but usually they do not provide successful late blight control. That explains why a reliable system supporting decision dealing with late blight control is very much

needed in Poland. NegFry is the example of DSS validated in many European countries. It seems that in Poland that system could also be very helpful in optimising late blight control.

METHODS

In 2002 the experiment was carried out at one location in Winna Góra 70 kilometers south of Poznań. The cultivars used in the experiment were Bekas and Mila. Each experiment plot was 22 m long and 3 m wide, and was planted on April 19, 2002. Plant spacing was 0.37 m within rows and 0.75 m between rows. The field trials were laid out according to randomised blocks method. Weed control consisted of Titus 25 WG (60g/ha) and Trend 90 EC (0.1%) applied after emergence. Insecticides Alphaquard 100 EC (0.15 l/ha), Nurelle D 550 (0.5 l/ha) and Fury 100 EC (0.1 l/ha) were applied against Colorado potato beetle. Details of fungicide treatments used in 2002 are given in table 1. The aim of the experiment was the validation of NegFry system in comparison with results obtained from plots treated routinely and according to local practice which consisted of application of systemic fungicide 60 days after planting and contact product 10 days later.

The meteorological data were recorded by Hardi Metpol station and the results of the experiment were analysed using analysis of variance procedures and differences between treatments were evaluated using the Tukey test.

Table 1. Fungicide treatment for late blight control in Winna Góra in 2002

Date	Systems					
	NegFry		Routine		Local	
	Bekas	Mila	Bekas	Mila	Bekas	Mila
13.06	Altima	Altima				
17.06			Altima	Altima	Ridomil Gold	Ridomil Gold
27.06			Altima	Altima	Dithane	Dithane
5.07	Altima	Altima				
8.07			Altima	Altima		
17.07			Altima	Altima		
23.07		Altima				
26.07			Altima	Altima		
30.07	Altima					
6.08			Altima	Altima		

RESULTS AND DISCUSSION

First symptoms of *P. infestans* on the trial site were recorded on 14 June. NegFry system recommended first spray on 13 June and that date was validated as correct. Quite early in the season appearance of the pathogen was a result of weather conditions prevailed in late spring. First decade of June was very favourable for development of the disease as during that period mean air humidity amounted to 75%, mean air temperature was 16°C, and rain precipitation amounted to 37mm. The second decade of June had similar weather pattern except little lower air humidity (72%) and little higher air temperature (19°C). Precipitation during that period

amounted to 28 mm. At the beginning of the third decade of June the weather changed and become less favourable for late blight development. The precipitation registered during that period amounted only to 4 mm of rain. The first half of July was similar to the third decade of June. In contrast, the beginning of the second half of July became more favourable for late blight development for short time and then the weather changed again and the third decade of July did not favour the disease development very much. This resulted in quite slowly development of late blight symptoms on plants throughout this period. At the beginning of August the weather changed again. During the first two decades of August the mean air humidity exceeded 75%, the mean temperature amounted to 21°C and precipitation was extremely high and amounted to 45 mm (I decade) and 77 mm (II decade). That resulted in rapid disease development on all trial plots (Figs. 1, 2). The fastest progress of the disease symptoms was observed on untreated plots. The routine system delayed progress of disease symptoms more than the NegFry and local systems.

Chemical control of *P. infestans* caused potato yield increment (Fig. 3). The yield achieved from untreated plots was significantly lower than yields from the other combinations. The highest tuber yield was collected from plots treated according to Routine recommendations but analysis of variance did not reveal significant differ-

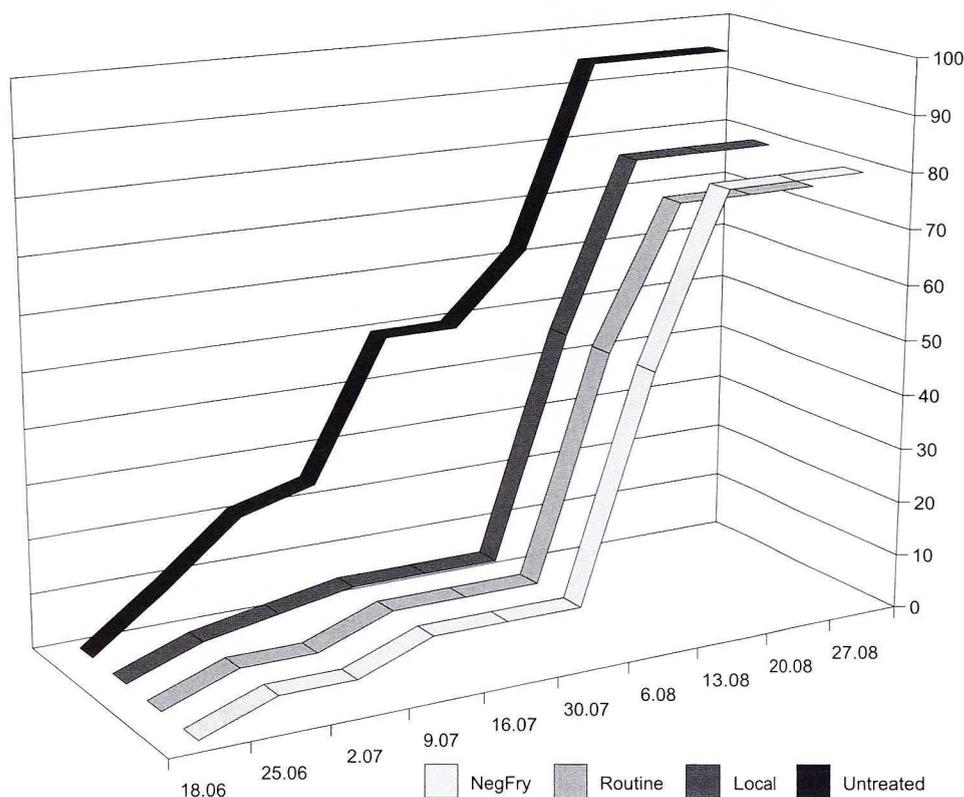


Fig. 1. Development of late blight symptoms on cultivar Bekas in Winna Góra in 2002

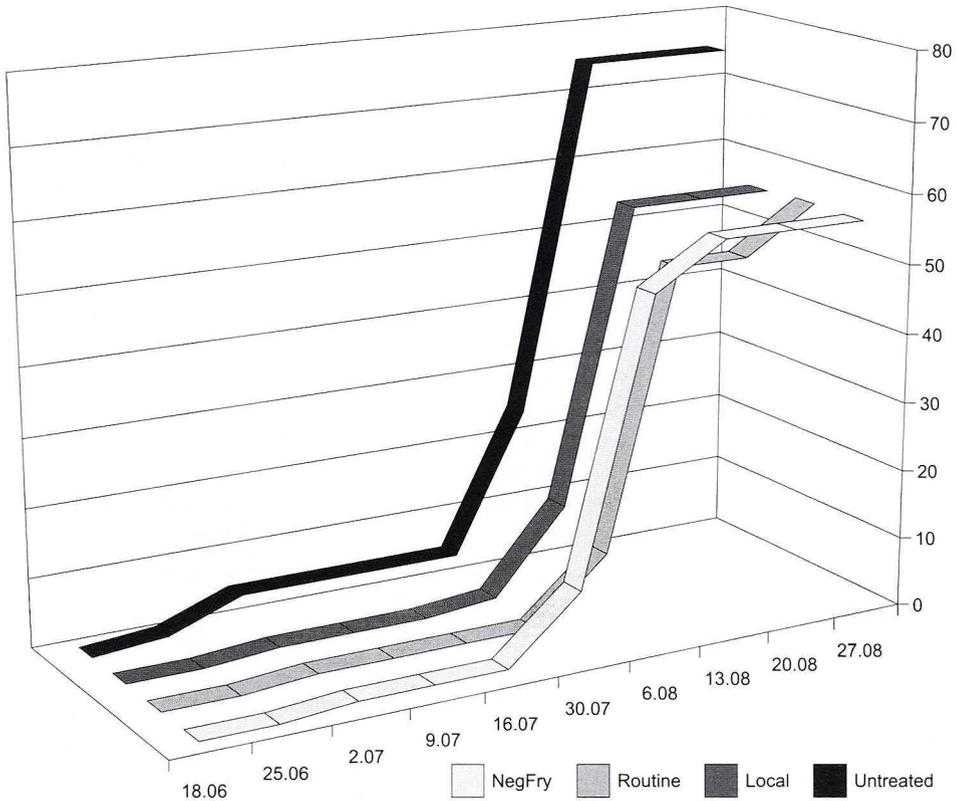


Fig. 2 Development of late blight symptoms on cultivar Mila in Winna Góra in 2002

ences between that yield and yields from plots treated according to other systems. The systems did not cause differences between quality of tuber coming from different experimental combinations.

The coefficient of defrayal, which characterises the profitability of chemical control ranged between 0.91 and 2.12. The highest profitability of late blight control on Mila variety was achieved when potatoes were protected according to NegFry system. In the case of cultivar Bekas the Local system was the most profitable. In both cases, routine fungicide applications resulted in the least profitability (Tab. 2). Compared with routine treatment schemes, NegFry recommended fewer treatments without significant reduction of yield. Because of this potato protection according to NegFry was more cost-effective than according to Routine system.

Table 2. Profitability of late blight control according to different systems

System	Coefficient of defrayal	
	Bekas	Mila
Routine	1.15	0.91
NegFry	1.62	2.12
Local	1.96	1.96

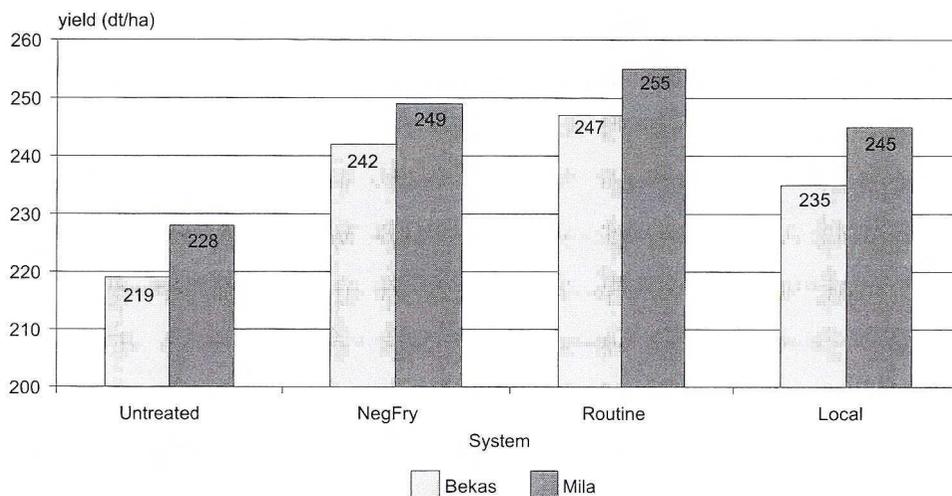


Fig. 3. Yield of potato tubers in Winna Góra in 2002

Basing on these facts the NegFry decision support system can be recommended for Polish climatic conditions.

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POLISH SUMMARY

OCHRONA ZIEMNIAKA W POLSCE WEDŁUG ZALECEŃ SYSTEMU NEGFYRY

Celem przeprowadzonego doświadczenia było porównanie skuteczności rutynowego zwalczania *Phytophthora infestans* do ochrony ziemniaka prowadzonej wg zaleceń systemu NegFry. Wyniki badań uzyskane w roku 2002 potwierdzają przydatność systemu NegFry do prognozowania terminu wystąpienia zarazy ziemniaka w polskich warunkach klimatycznych. W porównaniu z ochroną prowadzoną rutynowo, zastosowanie systemu NegFry umo-

zliwiło zmniejszenie liczby zabiegów przeciwko *P. infestans*, bez istotnej redukcji plonu ziemniaka. W związku z tym zwalczanie *P. infestans* wg zaleceń systemu NegFry okazało się bardziej opłacalne niż prowadzone rutynowo.