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Monitoring of early attacks of late blight in Lithuania

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Abstract. Late blight monitoring means continual observations of late blight development during potato vegetation period. The aim of potato late blight monitoring is to establish the first appearance of late blight symptoms and to observe the development of potato late blight in different regions of Lithuania. The Lithuanian Institute of Agriculture (LIA), the Lithuanian Agricultural Advisory Service (LAAS) and the State Plant Protection Service (SPPS) implement monitoring of late blight in Lithuania and have been taking part in the program of late blight monitoring in the Nordic and Baltic countries since 1999 (http://www.web-blight.net).

In 2001 potato late blight monitoring was carried out in 20 districts of Lithuania. Observations were made in 53 fields and 23 potato varieties of different maturity and susceptibility. First symptoms of late blight in Lithuania in 2001 were established on 15 June in Varėna district. During the season, the development of late blight had an epiphytotic character.

Key words: potato, late blight, monitoring, Internet

INTRODUCTION

Potato late blight (Phytophthora infestans (Mont.) de Bary - hereinafter referred to as *Ph.infestans*) is one of the most harmful potato diseases that decreases the assimilation area of the foliage during tuberisation and causes tuber rots during storage (Schepers, 2000). Agrometeorological conditions for the spread of potato late blight are favourable almost every year in our country. During last years, independently of potato variety, first symptoms of the disease were observed during the period from potato emergence to budding (Schepers et al., 1997). The fungus infects leaves, stems and the top of the plant. In addition, the existence of oospores, which results from sexual reproduction, was established in many countries. Oospores can survive in the soil about ten years. It shows that the local populations of the fungus have become more aggressive, virulent and the disease become more dangerous (Bouma & Hansen, 1999; Schepers, 1999). The most effective way to prevent the spread of the disease is

to use fungicides. It is very important to make the first treatment with fungicides preventively, before the appearance of the disease.

In order to establish the first appearance of late blight symptoms, the LIA, the LAAS and the SPPS have been implementing monitoring of late blight in Lithuania and taken part in the program of late blight monitoring in the Nordic and Baltic countries (website: http://www.web-blight.net; http://www.ipm-baltic.dk) since 1999 (Hansen et al., 1999; Hansen et al., 2001).

Late blight monitoring means continual observations of late blight development during potato vegetation period. The aim of the potato late blight monitoring is to establish the first appearance of late blight symptoms and observe the development of potato late blight in different districts of Lithuania.

Monitoring data are used for late blight prognoses and investigations (investigations of pathogen biology and epidemiology, substantiation and improvement of present prognosis systems, an analysis of reasons for early disease attacks).

MATERIALS AND METHODS

From the time of its emergence, the monitoring of *Ph. infestans* was carried out in fields. During potato vegetation, the dynamics of late blight development was registered and the infection level calculated. During vegetation, phenological phases (BBCH) of potato development were also observed.

The dynamics of late blight spread was assessed 5 times, every 7–10 days from the occurrence of first disease symptoms to top killing. From every plot, 25 plants were examined. The potato vine infection level was scored according to the following scale (EPPO standards, 1999):

- 0 = no disease observed.
- 0.01 = primary attack, few plants in mother focus with lesions; rest of field without lesions.
- 0.1 = only a few plants with lesions, 1–2 lesions in a 10 m radius.
- 0.5 = 1–5 spots per plant.
- 1 = 5–10 spots per plant.
- 5 = around 50 spots per plant or up to 1 in 10 leaflets with lesions.
- 10 = about 10% of leaf area destroyed; up to 4 in 10 leaflets with lesions, plants still retain normal form.
- 25 = about 25% of leaf area destroyed; nearly all leaflets with lesions; plants retain normal form; the field still looks green.
- 50 = about 50% of leaf area destroyed; every plant with lesions; field still green but with brown spots.
- 75 = about 75% of leaf area destroyed; field colour between green and brown.
- 95 = only a few leaves left, but stems are still green.
- 100 = all leaves dead; stems are dead or dying.

RESULTS AND DISCUSSION

Reporters from the LAAS (11 locations), the SPPS (10 locations) and the LIA (2 locations) located in all the districts of Lithuania have made observations of potato late blight. They were looking for blight in gardens and large farmers' fields, both sprayed and unsprayed. When reporters observed late blight and were not sure about identification they were sending samples to Voke branch of the LIA for confirmation. When late blight was confirmed, reporters were sending data by PI-monitoring to the server www.web-blight.net. A hard copy of the observations data filled in the special form was sent also to the country administrator. If reporters had difficulties in sending data via Internet, they were calling the country administrator and asking him to transfer data from Dotnuva (the LIA).

All reporters were instructed to carry out observation in at least 2 fields. Late blight monitoring observations were carried out in the fields of two different types. The first type - places with exceptional microclimate, where conditions for the appearance of late blight first symptoms are very favourable (gardens, small kitchen-gardens, subcultured fields as well as places close to water reservoirs, edges of forest, etc.). The second type - production fields. Potatoes were started to be observed after they had fully emerged. Only plots of known potato varieties were observed.

All reporters started observations from 5 June. During the observations, assessments were made in 4 places of the field, and 25 plants were observed in each place (100 plants all together in the field). Until first blight symptoms were found, observations were made every day in a particular field. When blight was found in that field, the following observations were made once a week. It was suggested to carry out observations 5–7 weeks from the date when the first symptoms of blight had been found in that field.

In 2001 potato late blight monitoring was carried out in 20 districts of Lithuania: Akmenė, Anykščiai, Molėtai, Prienai, Raseiniai, Rokiškis, Šakiai, Šiauliai, Varėna, Vilkaviškis, Zarasai, Alytus, Kaunas, Kėdainiai, Klaipėda, Panevėžys, Tauragė, Utena, Telšiai, Vilnius.

Meteorological conditions are very important factors both for the growth of potatoes and spreading of late blight.

Last season's conditions were favourable for the spreading and development of the pathogen agent of potato late blight *Ph.infestans*. Wet and warm weather during potato vegetative growth period in 2001 was favourable for the spread of the late blight pathogen. The latter year was the year of potato late blight epiphytoty.

While performing the monitoring of pathogen agent of late blight in the environs of Varėna, the first symptoms of potato late blight were observed on 15 June in the variety 'Zukovskij Rannij' (BBCH-35). This early potato variety is susceptible to late blight. The disease was found in house gardens and was displayed on the foliage (top and middle leaves) and stems. Potatoes were resown in the field for several years. The site is at 10-m distance from a streamlet.

Continual observations of selected potato plots were started from the beginning of potato emergence. Data about the first appearance of late blight symptoms and further development of the disease were regularly transmitted to the website http://www.web-blight.net (Fig. 1) of the Nordic Information System Pl@nteInfo. Here the users of the

Internet can find information about the appearance of the first symptoms of late blight and the spread of the disease during the season.

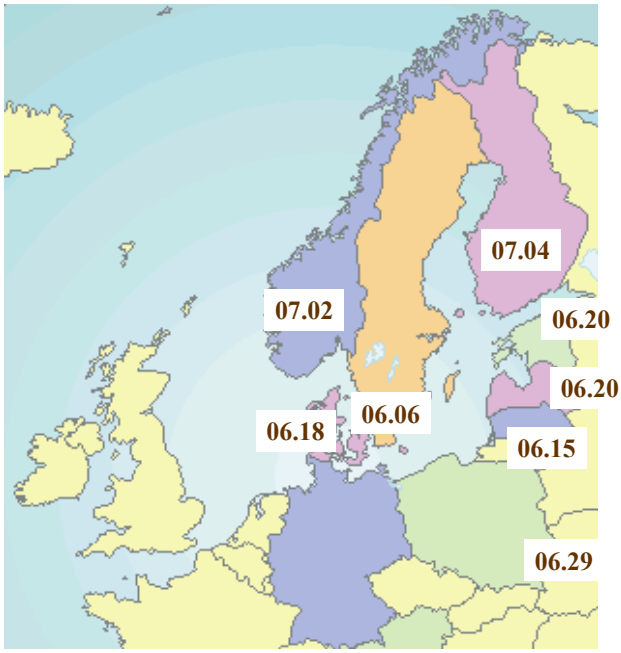

Fig. 1. Time of late blight appearance in the Nordic and Baltic countries, 2001, (http://www.web-blight.net).

Observations were made in 53 fields of two types: 34 production fields and 19 kitchen gardens and garden plots (Table 1). 23 potato varieties of different maturity and susceptibility to late blight were observed: Cinija, Vokė, Glorija, Latona, Eskort, Rosara, Vilija, Vineta, Aistes, Ukama, Zukovskij Rannij, Mirta, Rasant, Nida, Helena, Dietskoselskij, Rossella, Karatop Goda, Saturna, Venta, Karlena, Ausonia. Most of the varieties are medium susceptible to late blight.

The first appearance of late blight varies every year depending on meteorological conditions, seed quality, microclimatic conditions and phytosanitary measures (Table 2).

Table 1. Data about the observed fields (fields, units).

Field type		Seed		Susceptibility of the variety to the late blight		
Production	Home garden	Own	Certificated	High susceptibility	Medium susceptibility	Medium resistance
34	19	36	14	2	34	6

Table 2. Development of late blight in Lithuania during 1992–2000 (SPPS data).

Indicator	Years								
	1992	1993	1994	1995	1996	1997	1998	1999	2000
First outbreak	09 01	07 06	07 11	06 20	06 10	06 22	06 18	07 27	06 26
Disease incidence, %	0	100	3.1	85.4	93.8	71.2	93.4	3.58	100
Disease severity, %	0	88.0	0.04	52.4	54.1	74.8	22.8	0.11	40.0

The first symptoms of late blight in Lithuania in 2001 were established on 15 June in Varėna district. One week later the disease appeared in Vilnius, Kaunas and Kėdainiai districts. In the majority of the fields observed, the first symptoms of late blight were noticed during the first ten-day period of July (in 25 fields).

It is very important to know the time of late blight appearance and the size of the plants at that time because the smaller are the plants at the time of infection the greater are the losses. In addition, younger plants are more susceptible to the disease. Data about the potato growth stages (BBCH) at the time of late blight appearance in the Nordic-Baltic countries are presented in Fig. 2.

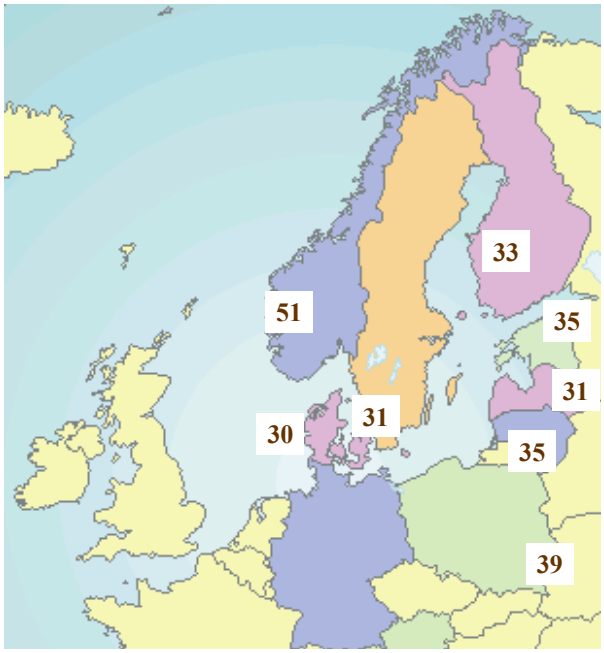

Fig. 2. Potato growth stage (BBCH) when first symptoms of late blight were observed, 2001 (http://www.web-blight.net).

Table 3. Potato growth stage when first symptoms of late blight were observed.

Field type	Growth stage (BBCH)			
	≤ 35	51–55	61–65	67–69
Production fields	0	5 units	8 units	19 units
Home garden	1 unit	3 units	5 units	8 units
All observed fields	1 unit	8 units	13 units	27 units
	2.1%	16.3%	26.5%	55.1%

In 4 fields stages were not established.

According to the data presented in Table 3, in one field potatoes covered only 40–50% of the space between rows when late blight appeared. Potatoes in 8 fields were at the stage of budding at that time, in 40 fields potatoes were flowering.

During the season, the development of late blight had an epiphytotic character (see Fig. - maps 3–5).

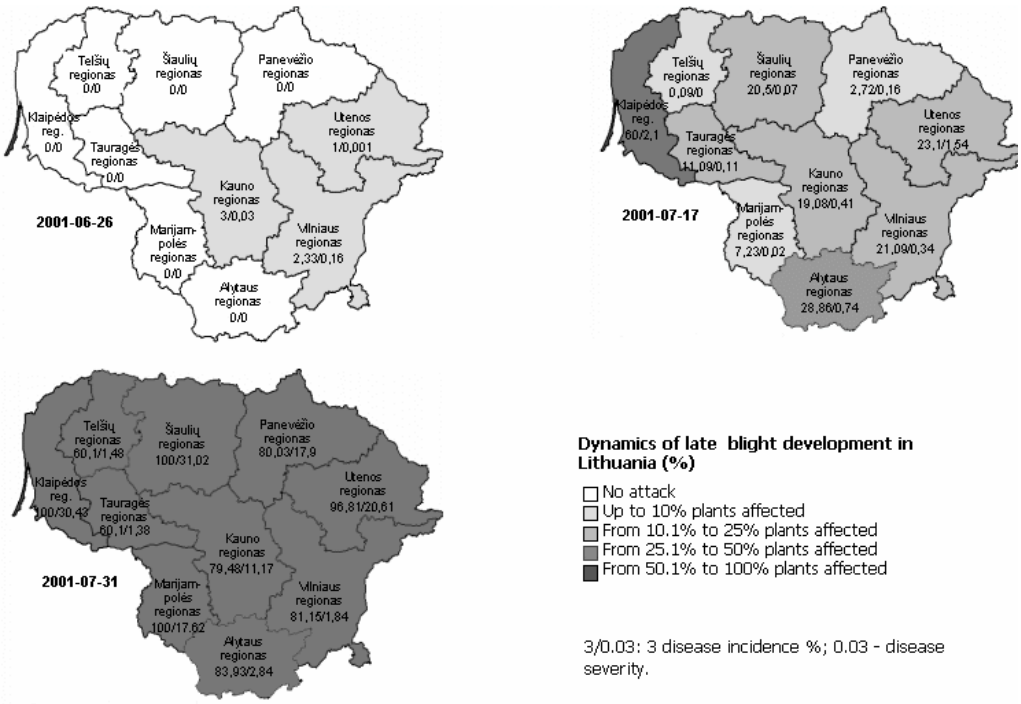

Fig. 3. Dynamics of late blight development in Lithuania in 2001.

CONCLUSIONS

1. In 2001 potato late blight monitoring was carried out in 20 regions of Lithuania. Observations were made in 53 fields and 23 potato varieties of different maturity and susceptibility.
2. First symptoms of late blight in Lithuania in 2001 were established on 15 June in Varėna district.
3. During the season, the development of late blight had an epiphytotic character.
4. Information about late blight observations during 2001 can be found on the websites http://www.web-blight.net; http://www.ipm-baltic.dk.

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REFERENCES

Bouma, E., Hansen, J.G. 1999. Overview of standard descriptions of Phytophthora DSS. In *PAV-Special Report*, **5**, 48–51.

EPPO standards. 1999. Guidelines for the efficacy evaluation of plant protection products. In *EU.NET.ICP., Volume **2**: fungicides, bactericides*, 4–6.

Hansen, J.G., Lassen, P., Jensen, A.L., Thysen, I. 1999. Information and decision support for the control of potato late blight based on integrated PC and Internet applications. In *PAV-Special Report*, **5**, 68–80.

Hansen, J.G., Lassen, P., Rohgrig, M. 2001. Monitoring of potato late blight based on collaborative PC- and Internet applications. In *PAV-Special Report*, **7**, 39–54.

Schepers, H.T.A.M. Bouma, E., Bus, C.B. 1997. State of the art of *Phytophthora infestans* control in Europe. In *PAV-Special Report*,.**1,** 7–11.

Schepers, H.T.A.M. 1999. The development and control of *Phytophthora infestans in Europe* in 1998. In *PAV-Special Report*, **5,** 10–16.

Schepers, H.T.A.M. 2000. The development and control of *Phytophthora infestans in Europe* in 1999. In *PAV-Special Report*, **6**,10–18.