

RESEARCH REGARDING THE BEHAVIOUR OF SOME POTATO CULTIVARS TO THE LATE BLIGHT ATTACK IN ECOSYSTEMS OF THE SOUTH MUNTENIA REGION

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Abstract

*The late blight, caused by *Phytophthora infestans*, is a very damaging disease of the potato crop, the loss of production reaching 90%. Potato leaves, stems and tubers can be attacked.*

It is important, for the distribution of different cultivars in the right areas, to know potato genotypes that have tolerance or resistance to the late blight.

Analyzes regarding the late blight attack were made during 3 years of experiments, each cultivar being assessed using the following indicators: the frequency of attack, the intensity of attack and the degree of attack. Phytosanitary treatments were not applied on the experimental plots.

From 10 potato cultivars, for which no phytosanitary treatments were applied, it was observed that the most resistant were: Luiza, Robusta and Harmonia, these having an average degree of attack of 0.5%, 3.66% and 3.75%, respectively. More sensitive were the Ruxandra and Rozal cultivars, which had average degrees of attack of 12.16%, and 14.33%. Under proper protection conditions with specific fungicides, this attack can be diminished or eradicated.

Key words: late blight, cultivar, resistance, degree of attack

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1. INTRODUCTION

Potato is an important crop, grown worldwide. It suffers from many pests and diseases among which late blight, caused by the oomycete *Phytophthora infestans*, is the worst. The disease is still causing major damage in many potato production areas and control is only possible by applying fungicides frequently (Haverkort et al., 2009).

In Romania it appears with a higher intensity and frequency in the mountain regions and the northern regions, in the rainy years, producing damages of up to 40% of the harvest (Severin et al., 2001). The damage can reach up to 90%. The use of partially resistant cultivars should become an essential component of a sustainable management strategy of potato late blight (Andrivon et al., 2007). Much research has been done in this regard and some of them show that the degree of resistance among resistant cultivars depended primarily on the rate of occurrence of hypersensitivity and the

associated accumulation of rishitin (Doke, 1982).

Colon et al., 1995, show that twenty-two R gene-free cultivars were field-tested for their level of partial resistance to a complex race of *Phytophthora infestans*. The most resistant cultivars were Robijn, Populair, Pimpernel, Libertas and Surprise.

It is important, for the distribution of different cultivars in the right areas, to know the potato genotypes that have tolerance or resistance to the late blight.

2. MATERIALS AND METHODS

The researches have been carried out during the period of the years 2015-2017, on 10 potato cultivars, and the attack of the late blight was assessed by estimating the frequency of attack (F%), the intensity of attack (I%) and the degree of attack (G.A%).

The frequency of attack (F%) was calculated using the formula:

$$F = \frac{N}{N_t} \times 100$$

where:

N - number of plants (organs) attacked;

N_t - total number of plants (organs) observed (controlled).

The intensity of attack (I%) was calculated using the formula:

$$I(\%) = \frac{\sum(i \times f)}{n}$$

where:

i - percentage of the mark awarded;

f - number of plants (organs) marked by the respective mark;

n - total number of plants (organs) attacked analyzed.

We used a grading scale from 0 to 6, as one can observe from Table 1.

The degree of attack was calculated according to the relation:

$$GA(\%) = \frac{F(\%) \times I(\%)}{100}$$

where:

F - frequency of attack;

I - intensity of attack

RESULTS AND DISCUSSION

The potato's late blight is produced by the *Phytophthora infestans* fungus. Leaves, stems and tubers are attacked.

On leaves, the disease manifests itself in the appearing of almost circular spots, of 10-15 mm, usually at the margins of leaflets. In a short time, the spots are getting larger, become brown, then blackish brown, surrounded by a yellowish green stripe. On the underside of the leaf, near the spots, in humid weather conditions, there is a fine - whitish fluff, consisting of conidiophores and conidia of the fungus. Later on, the leaves are completely attacked, blacken, dry and fall, the mulberries remaining leafy.

On stems, the attack results in elongated spots, brownish-black, which often cause their blackening and drying.

At first, the attacked tubers do not differ from the healthy ones, because at the beginning the periderm is intact. In a more advanced phase of the disease on the periderm of the tubers appear brown or blue spots, of different sizes, which usually occupy only part of the surface of the tuber.

In 2016, the attack of the late blight was stronger, and the most sensitive cultivars were Ruxandra, Rozal and Harmonia.

In 2017 there was an even stronger attack of *Phytophthora infestans* with values of the degree of attack between 0.5% and 18%. Cumidava and Ruxandra were the most affected cultivars in 2017, but also Ioana and Rozal.

The most resistant cultivar proved to be Luiza, both as the value of the degree of attack and as the constancy in time.

It should be mentioned that no phytosanitary treatments were applied on the analyzed plots.

Table 1: Scale marking the intensity of the attack

Attacked area (%)	Mark for the intensity of the attack
0	0
1 - 3	1
4 - 10	2
11 - 25	3
26 - 50	4
51 - 75	5
76 - 100	6

Table 2: Behaviour of some potato cultivars on the attack of *Phytophthora infestans*

Crt. no.	Cultivar name	2015			2016			2017			2015-2017
		F (%)	I (%)	GA (%)	F (%)	I (%)	GA (%)	F (%)	I (%)	GA (%)	GA (%)
1	ROBUSTA (MT)	50	20	10.00	15	5	0.50	10	5	0.50	3.66
2	CUMIDAVA (MT)	10	5	0.50	15	5	0.50	60	30	18.00	6.33
3	LUIZA (MT)	10	5	0.50	10	5	0.50	10	5	0.50	0.50
4	RUXANDRA (MT)	15	5	0.50	60	30	18.00	60	30	18.00	12.16
5	ARMONIA	15	5	0.75	50	20	10.00	10	5	0.50	3.75
6	IOANA	15	5	0.50	10	5	0.50	50	25	12.50	4.50
7	ROZAL	40	10	4.00	40	60	24.00	50	30	15.00	14.33
8	SPERANTA	30	15	4.50	10	5	0.50	60	30	18.00	7.66
9	PRODUCTIV	50	20	10.00	40	10	4.00	10	5	0.50	4.80
10	WHITE LADY	30	10	3.00	30	15	4.50	50	20	10.00	5.83

CONCLUSIONS

The late blight is a very damaging disease of the potato crop, the loss of production reaching 90%.

It is important, for the distribution of different cultivars in the right areas, to know the potato genotypes that have tolerance or resistance to the late blight.

From 10 potato cultivars, assessed during 3 years of experiments, it was noticed that the most resistant cultivars at the attack of *Phytophthora infestans* were Luiza, Robusta and Harmonia, with an average value for the degree of attack of 0.5%, 3.66% , and, 3.75%.

Less resistant were the Ruxandra and Rozal cultivars, with the average values of the degree of attack - 12.16%, and 14.33%.

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