

## **Evaluation of foliar resistance to *Phytophthora infestans* in potato varieties in Estonia**

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# EVALUATION OF FOLIAR RESISTANCE TO *PHYTOPHTHORA INFESTANS* IN POTATO VARIETIES GROWN IN ESTONIA

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Photo: Eve Runno-Paurson

Variety	Estimated scale values		
	2010	2011	Mean and SD
Arielle	2,1	2,6	2,3 ± 0,3
Ambition	4,6	4,2	4,4 ± 0,2
Evolution	3,6	3,7	3,6 ± 0,1
Fortane	5,1	3,2	4,2 ± 0,9
JP02-0053	4,8	3,9	4,3 ± 0,5
Madeleine	2,8	3,3	3,0 ± 0,3
Manitou	5,1	3,6	4,3 ± 0,7
Monaco	2,3	4,5	3,4 ± 1,1
OS01-1001	4,1	3,6	3,9 ± 0,2
Red Baron	5,1	4	4,5 ± 0,5
Rosagold	4,1	3,9	4,0 ± 0,1
Toluca	4,6	7,2	5,9 ± 1,3

Table 1. Estimated scale values and mean RAUDPC of potato cultivars evaluated for foliar resistance to *Phytophthora infestans* in the field in Estonia, 2010-2011

## INTRODUCTION:

- Potato late blight, caused by the oomycete pathogen *Phytophthora infestans*, is one of the most important diseases affecting potato production worldwide.
- In northern areas, under favourable cool (15-20°C) and moist (leaves wet for at least three hours) conditions, the pathogen can cause considerable yield loss.
- Data from Finland and Estonia show that the first findings of blight now occur one month earlier than 20 years ago and blight infections are more severe.
- Potato growers are interested in growing new Western European potato varieties with good tuber quality, yield and earliness. Information about resistance to late blight in variety descriptions is not always appropriate for local conditions.
- The breeding company Agricola has been working on combining different blight resistance levels for a durable potato future and 'Toluca' is the best variety they have at present.

## MAIN AIM OF THE RESEARCH:

- Evaluate foliar resistance of the Dutch breeding company Agricola potato varieties to find those most resistant to late blight and thereby diminish the number of fungicide sprays required while giving high yields in North-Eastern European conditions.
- Of special interest was the variety Toluca which is immune to foliar late blight and especially bred for the organic farming system.
- Based on trial information, more resistant and suitable potato varieties could be recommended directly to potato growers.



Photo: Eve Runno-Paurson



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## MATERIALS AND METHODS:

- Field trials were carried out at Einola Farm, Reola Tartumaa county, Estonia.
- In 2010 and 2011, ten potato varieties and two breeding lines of the Agricola breeding company were cultivated.
- In 2010, whole seed tubers were planted on 8 May, and in 2011, on 20 May.
- Potatoes were harvested on 10 September 2010 and on 9 September 2011.
- Trials were laid out according to a randomized block design with four replications.
- No fungicides, herbicides or insecticides were used in either year.
- Foliar disease was evaluated as a percentage of total foliage twice each week, every three or four days.
- Disease assessments were made after inoculation from 28 July to 30 August in 2010 (11 observations), and from 1 August to 8 September in 2011 (12 observations).
- Late blight infection was assessed according to the 0-100 % scale.
- Estimated scale values for varieties tested in both years were compared with scale values for the same cultivars from the European Cultivated Potato Database and breeding company Agricola website, where the scale for resistance against foliar blight is defined as: 1 (very low); 2 (very low to low); 3 (low); 4 (low to medium); 5 (medium); 6 (medium to high); 7 (high); 8 (high to very high); 9 (very high).



Photo: Eve Runno-Paurson



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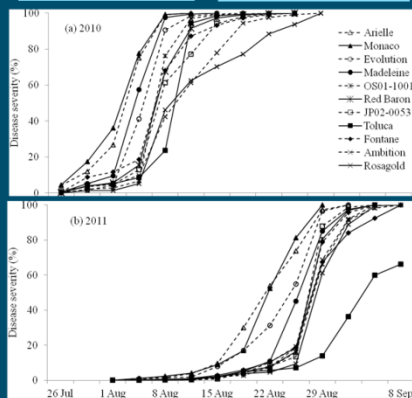


Figure 1. Development of foliar blight in tested potato varieties in 2010 (a) and 2011 (b)

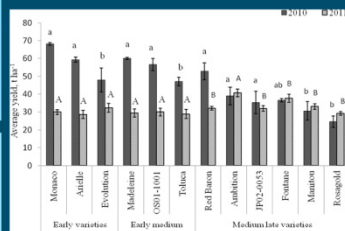


Figure 2. Average tuber yield (± SE) of potato varieties in 2010 and 2011. Different letters upon boxes indicate statistically significant differences (ANOVA, Tukey HSD test α=0.05)

## RESULTS:

- In 2010, the first late blight symptoms were recorded on 26 July, when most of the potato varieties in the trial were infected, except the early medium breeding line OS01-1001 and the medium late variety Rosagold (Figure 1a).
- Late blight destroyed most of the foliage by 27 August and the growing period was short.
- In 2010, based on crop yields, we recommend the early varieties Monaco and Arielle, the early medium variety Madeleine and breeding line OS01-100 and the medium late variety Red Baron.

## RESULTS:

- In 2011, the first late blight symptoms were found on the early variety Monaco on 1 August (Figure 1b). Most varieties were infected by 5 August, except medium late variety Manitou and the breeding line JP02-053.
- However, infection rate remained very low until mid-August with more intensive development after heavy rainfall on 12 and 13 August.
- With cooler and wetter weather conditions after 22 August, blight developed quite rapidly and most of foliage on early medium varieties, except Toluca, was destroyed by 2 September (Figure 1b).
- Toluca differed significantly from all other varieties with slower blight development, although infected at the same time as other early and early medium varieties its disease progressive curve area remained smaller (Table 1).

## DISCUSSION & CONCLUSION:

- Based on two years observation data we can conclude that most of the Agricola potato varieties we tested in our trials were susceptible or very susceptible to late blight.
- The only exception was the variety Toluca. In both years, this variety had the slowest late blight development at the beginning of the disease outbreak.
- According to this practical output, we can suggest from our trial results that potato growers shorten the spraying interval on the early variety Arielle and the early medium variety Madeleine.
- Other varieties were susceptible to late blight and should be controlled for late blight as recommended by pesticide producers (Table 1).
- The early medium variety Toluca gave contradictory results in the two years being susceptible in 2010 (4.6 points) and quite resistant in 2011 (7.2 points).
- Crop yield in 2011 was on average 1/3 lower than in 2010 mainly because of late planting of tubers considering the conditions of that particular growing season (Figure 2).
- Further experiments are needed to find potato varieties more resistant to late blight in order to minimise the need for fungicide spraying.

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