

DISTRIBUTION OF MATING TYPES AND RESISTANCE TO METALAXYL OF *PHYTOPHTHORA INFESTANS* IN SOUTHERN ESTONIA

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INTRODUCTION:

- *Phytophthora infestans* is one of the most serious and economically important pathogens in potato fields worldwide, including Estonia.
- Under favourable conditions it can destroy the whole potato haulm and cause a considerable yield loss.
- In Estonia, the average yield loss due to late blight can reach 20-25% and in untreated fields even more.
- Without control of potato late blight it is not possible to achieve high-quality crop yield.
- *P. infestans* isolated from potato leaves were collected from a region of Southern Estonia during 2010 and 2011.
- In total, 128 isolates were assessed for mating type and 71 isolates were analyzed for resistance to metalaxyl.

MAIN AIM OF THE RESEARCH:

- Survey the population structure of *P. infestans* in Estonia and characterise isolates by mating type and their resistance to metalaxyl

MATERIALS AND METHODS:

- In total, 128 isolates of *Phytophthora infestans* were collected from Estonia during 2010-2011.
- The isolates were sampled randomly from southern Estonia and the procedure was repeated two years.
- Blighted leaves (one per plant) were collected in the period from the emergence of disease until the end of the growing season in both years.
- Leaflets with single lesions, were collected from individual plants. Isolations were carried out as described in Runno-Paurson *et al.* (2009).
- For mating type determination was used a method as described by Lehtinen *et al.* (2007).
- The resistance to metalaxyl of 71 isolates was tested using a modification of the floating-leaflet method described by Hermansen *et al.* (2000).
- Leaflets of susceptible cultivar Berber were obtained from five week-old greenhouse-grown plants.
- The metalaxyl concentrations were 0.0, 10.0 or 100.0 mg l⁻¹ prepared from Analytical Master Standard, CGA 329351A
- Statistical analyses were performed with the programm Statistica 11 (StatSoft, Inc., Tulsa, Oklahoma)

Table 1. Metalaxyl resistance among isolates of *Phytophthora infestans* in Estonia 2010 and 2011

Year	Percentage of isolates			Isolates tested (n)
	S (%)	I (%)	R (%)	
2010	76,2	14,3	9,5	21
2011	94	6	0	50
Total	88,7	8,5	2,8	71

S metalaxyl-sensitive; I, intermediate metalaxyl-sensitive; R, metalaxyl-resistant

CONCLUSION:

- The proportion of metalaxyl-resistant isolates in the Estonian population in 2010-2011 were quite low.
- Results showed that the use of metalaxyl-containing fungicides is still effective in Estonia.
- In Estonia the ratio of *P. infestans* A1:A2 (which is close to 1:1) mating types is suitable for sexual reproduction.
- During 2010-2011 13 fields had both mating types in the same potato fields.



Photo: Eve Runno-Paurson



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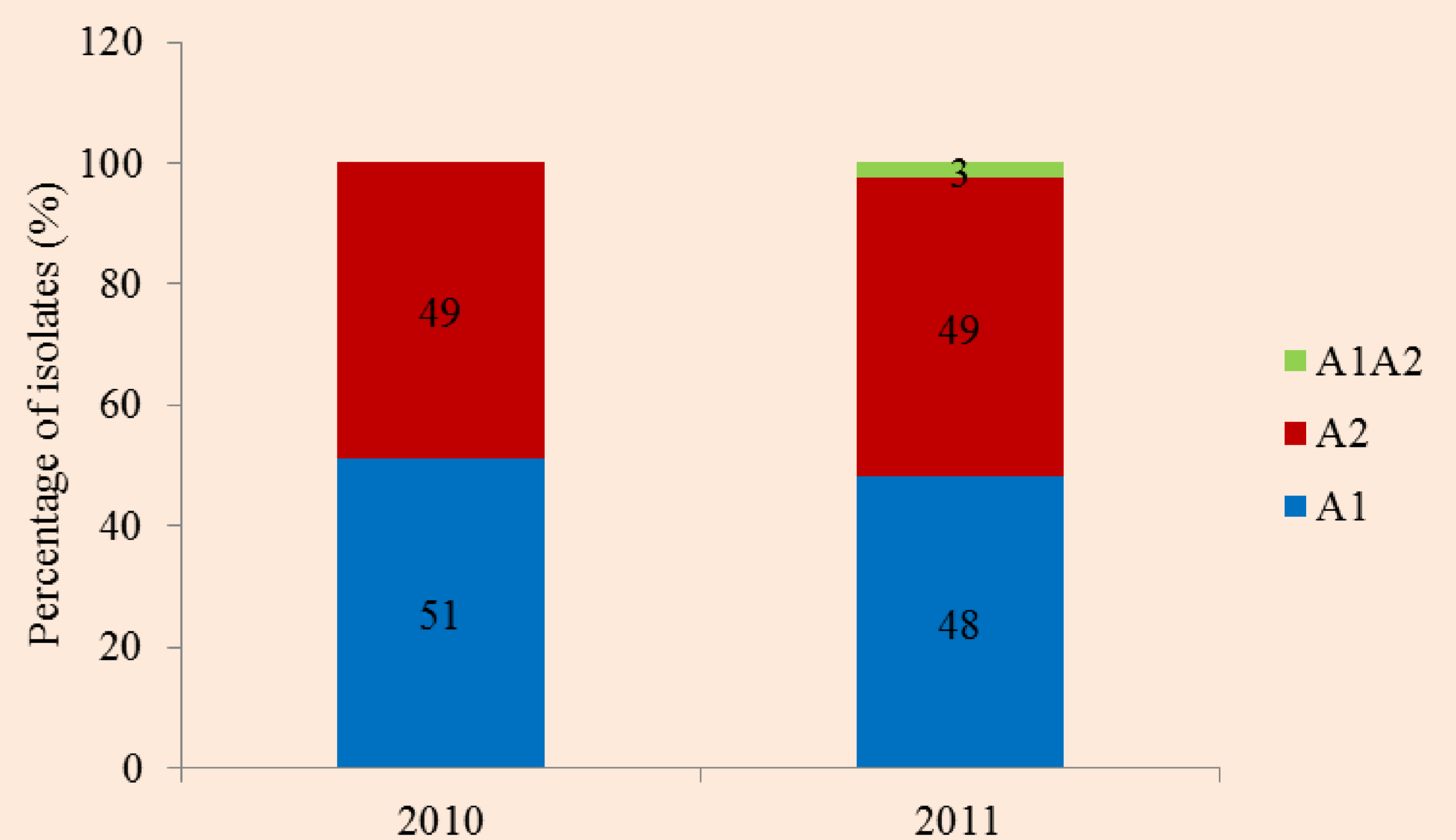


Figure 1. Percentages of mating types among isolates of *Phytophthora infestans* from southern Estonia (2010–2011)

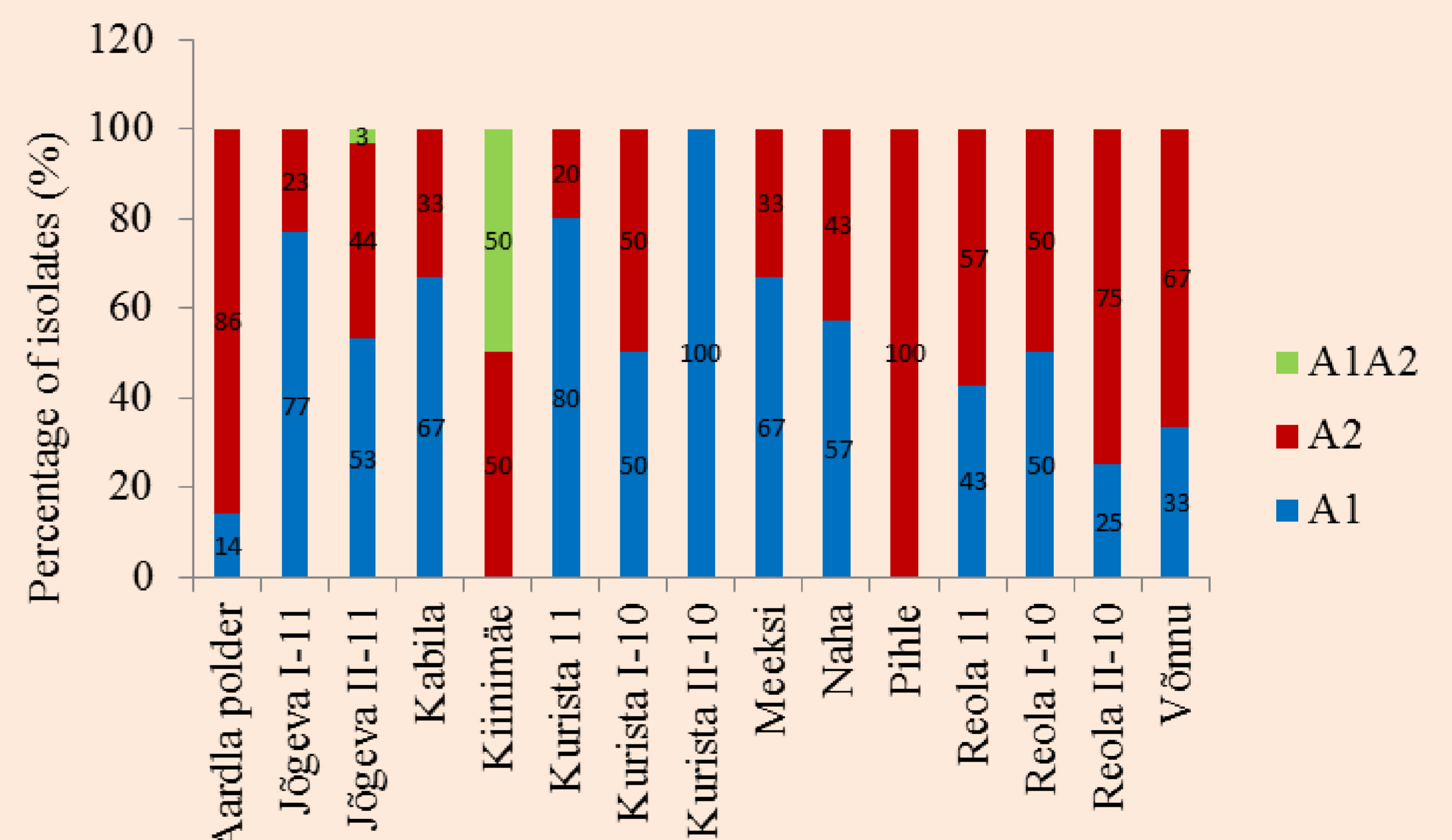


Figure 2. Percentages of mating types among isolates of *Phytophthora infestans* from southern Estonia potato fields

RESULTS:

- Among the 71 isolates, 9,5% were resistant, 8,5% intermediate and 88,7% sensitive to metalaxyl. In 2010 the percentage of resistant isolates was 9.5 % and in 2011 it was 0 %.
- In 2010 were 51 % of the isolates A1 and 49 % were A2 mating type. In 2011 were 48 % of the isolates A1, 49 % were A2 and 3 % were self-fertile A1A2 mating type.
- There were thirteen fields that contained both A1 and A2 mating types.
- A1 mating type individuals were detected in one of the fifteenth fields, and A2 mating type individuals were also identified in one field.



Photo: Eve Runno-Paurson



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REFERENCES LIST:

- Hermansen, A., Hannukkala, A., Hafskjold Naerstad, R., & Brurberg, M. B. (2000). Variation in populations of *Phytophthora infestans* in Finland and Norway: mating type, metalaxyl resistance and virulence phenotype. *Plant Pathology*, 49, 11–22.
- Lehtinen, A., Hannukkala, A., Rantanen, T. & Jauhiainen, L. (2007). Phenotypic and genetic variation in Finnish potato-late blight populations, 1997-2000. *Plant Pathology* 56, 480-491
- Runno-Paurson E., Fry W.E., Myers K.L., Koppel M., Mänd M., 2009. Characterization of *Phytophthora infestans* isolates collected from potato in Estonia during 2002-2003. *European Journal of Plant Pathology* 124: 565-575.