

ESTONIAN POPULATIONS OF *PHYTOPHTHORA* *INFESTANS* FROM DIFFERENT MANAGEMENT PRACTICES

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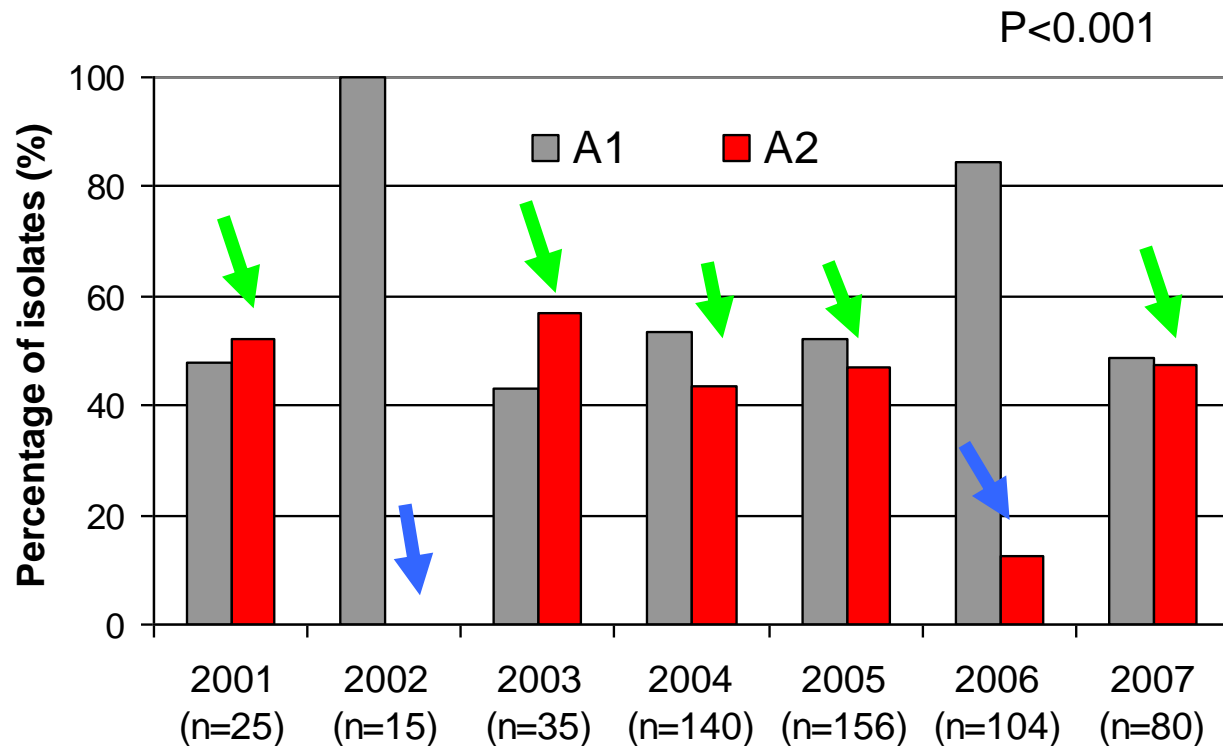
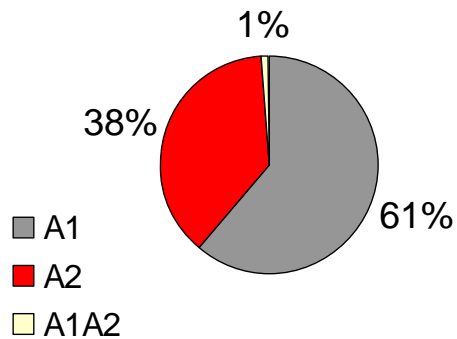


JÕGEVA PLANT BREEDING INSTITUTE

4 MAY 2010, ARRAS

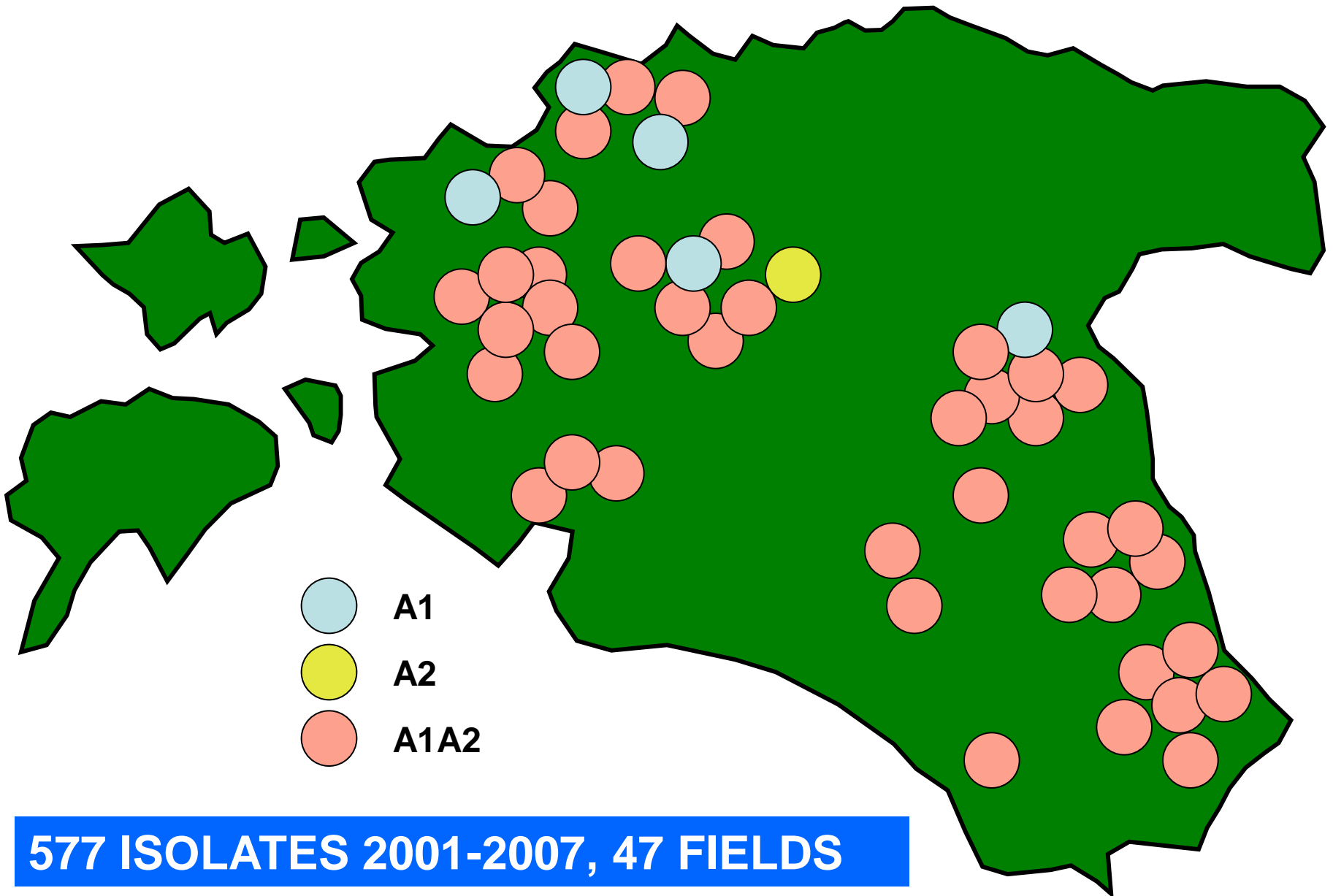
INTRODUCTION: MATING TYPE

Estonia 2001-2007 (N=577)

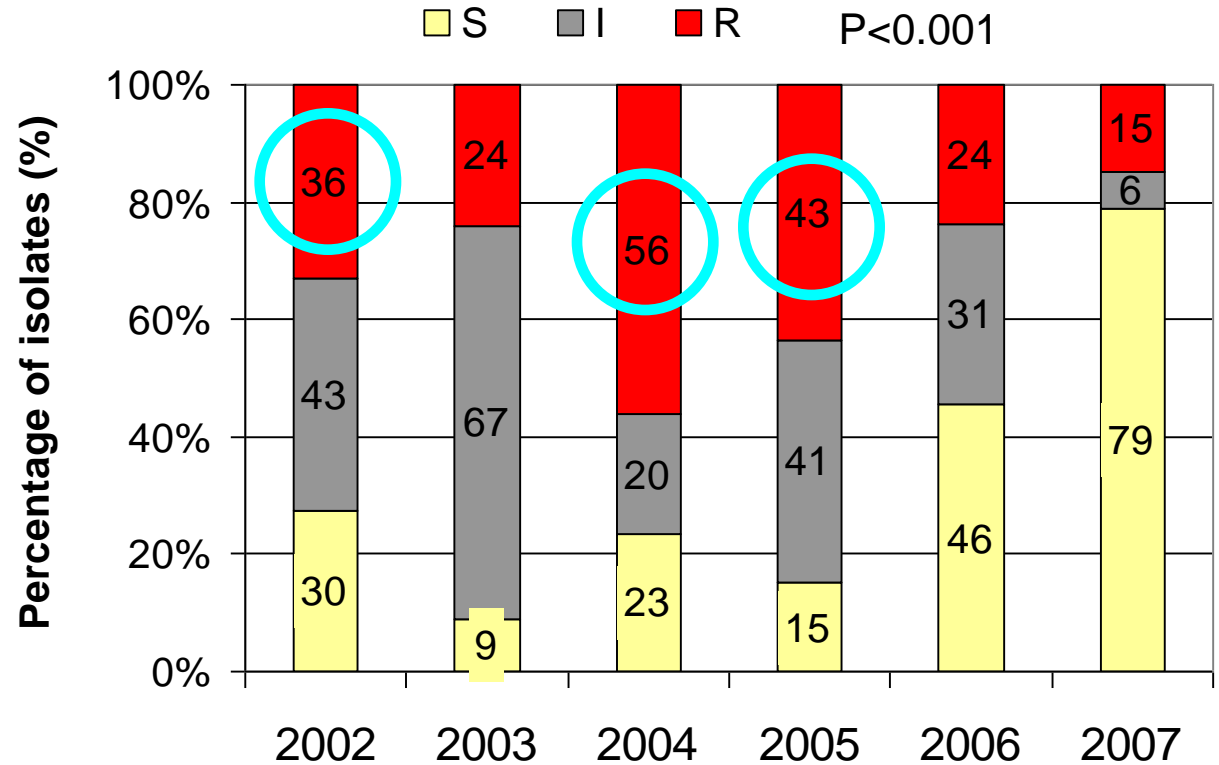
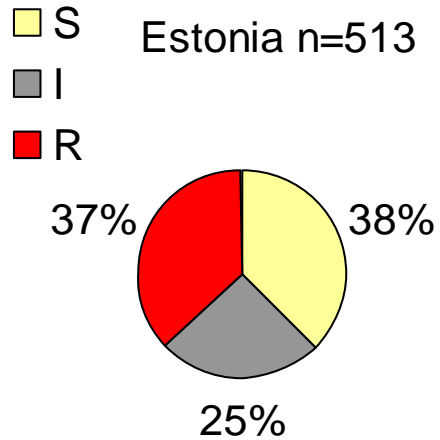


- A2 mating type proportion is high and
- mating types ratio is suitable for sexual reproduction

BOTH MATING TYPES COEXISTED ALMOST AT ALL STUDIED FIELDS

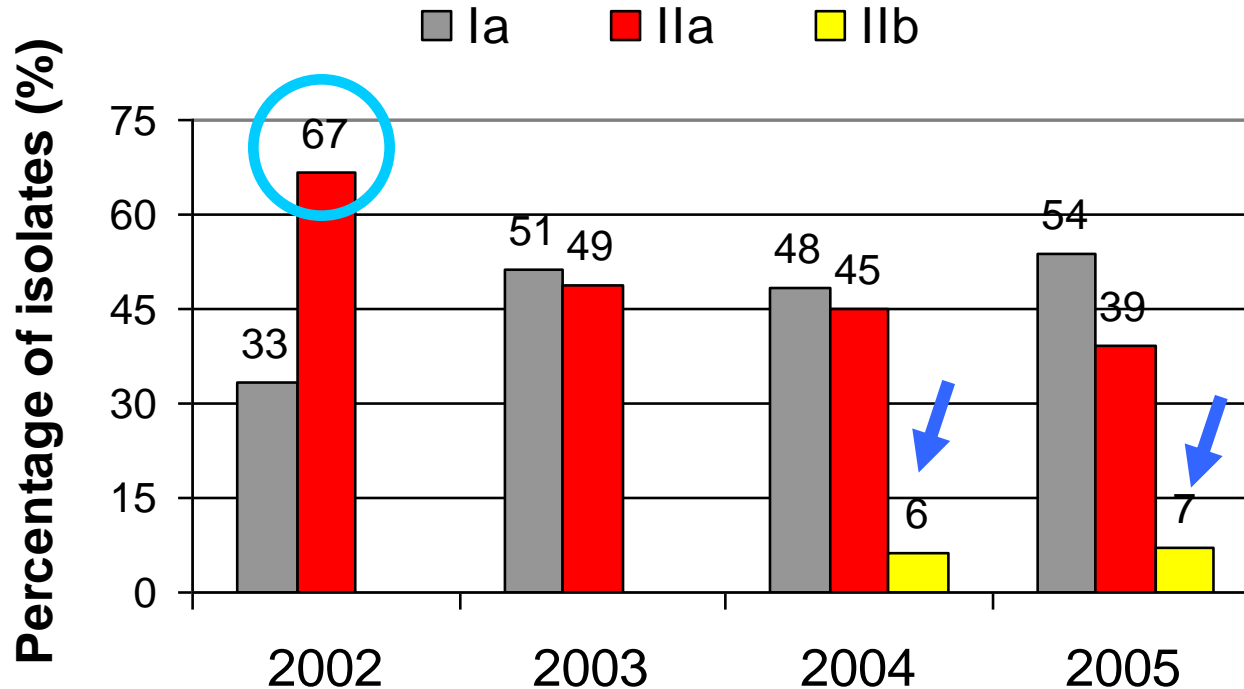


INTRODUCTION: RESPONSE TO METALAXYL



The proportion of metalaxyl-resistant isolates fluctuates from year to year, still proportion has remained substantially high

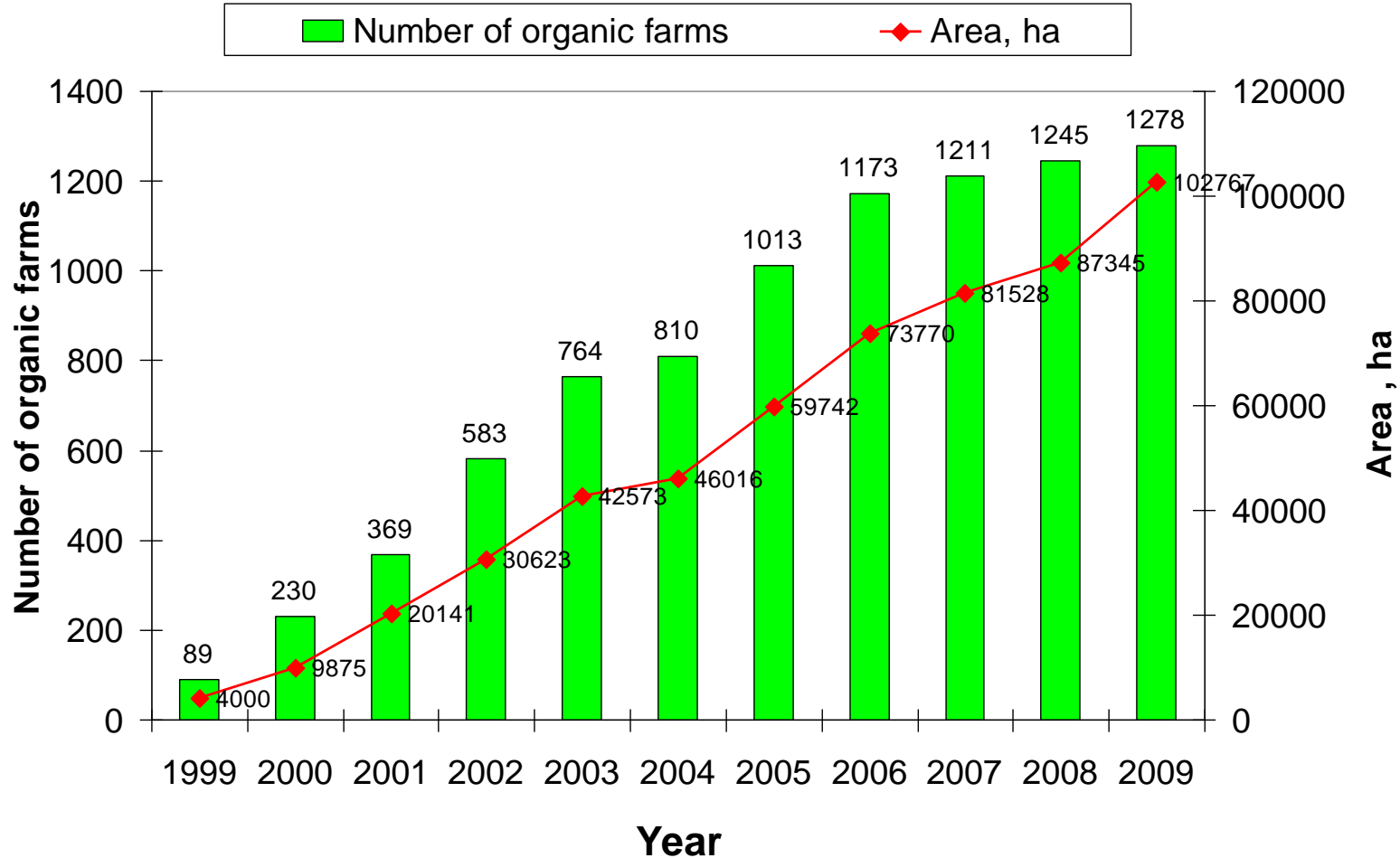
INTRODUCTION: mtDNA HAPLOTYPE



- The rare haplotype IIb was found for the first time in Estonia in 2004
- The Ia haplotype, associated with the old clonal *P. infestans* populations, was not found

STUDY OBJECT

Area of organic land 1999-2009



- The number of organic farms has increased since early 1990s and risen notably since 2002.

AIMS OF STUDY

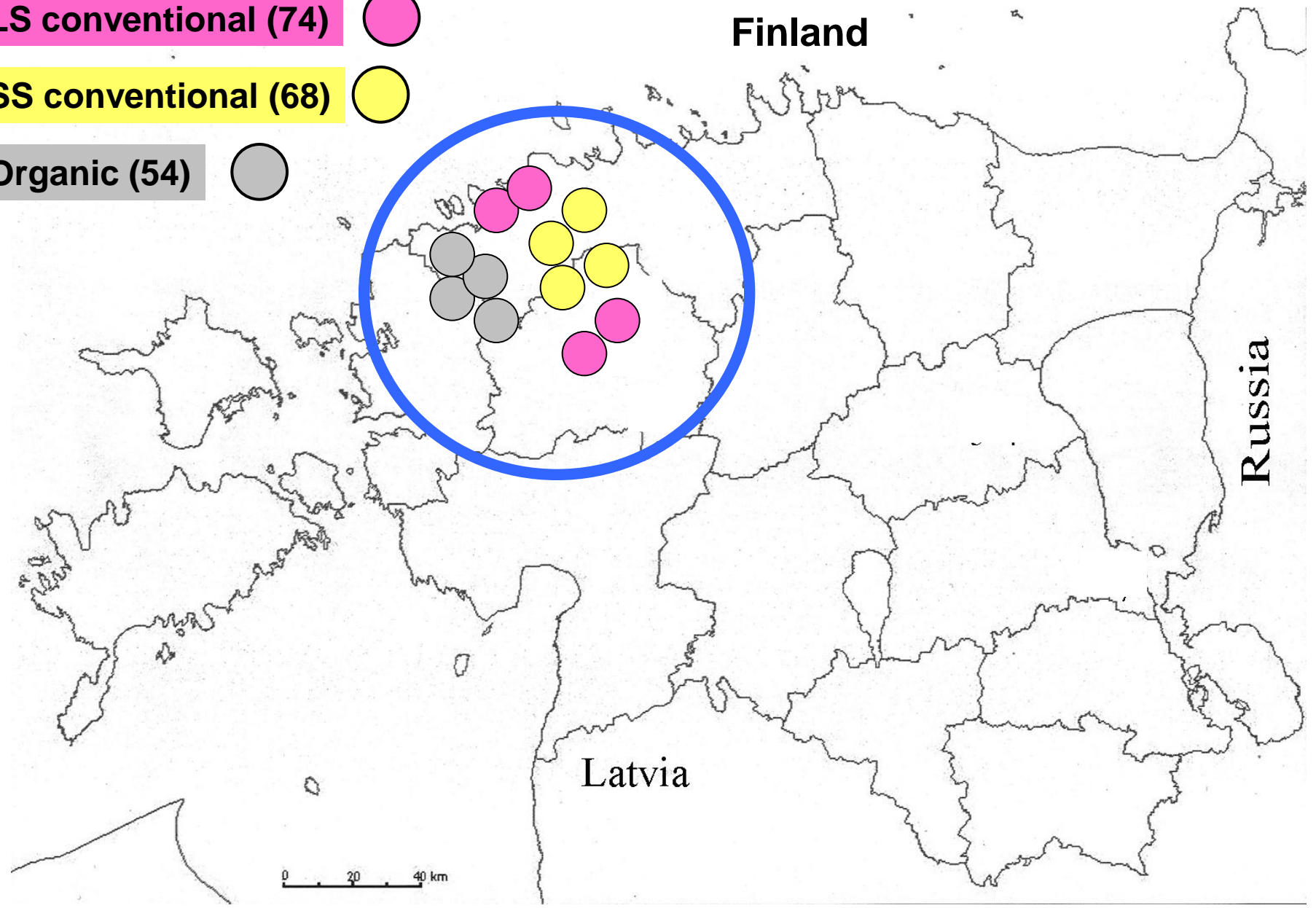
- Does the mating type ratio suggest an occurrence of sexual reproduction of *P. infestans* in different management practices?
- Do organic productions have more diverse and/or more resistant populations than conventional fields?

STUDY SITES (12) 2004-2005

LS conventional (74) 

SS conventional (68) 

Organic (54) 



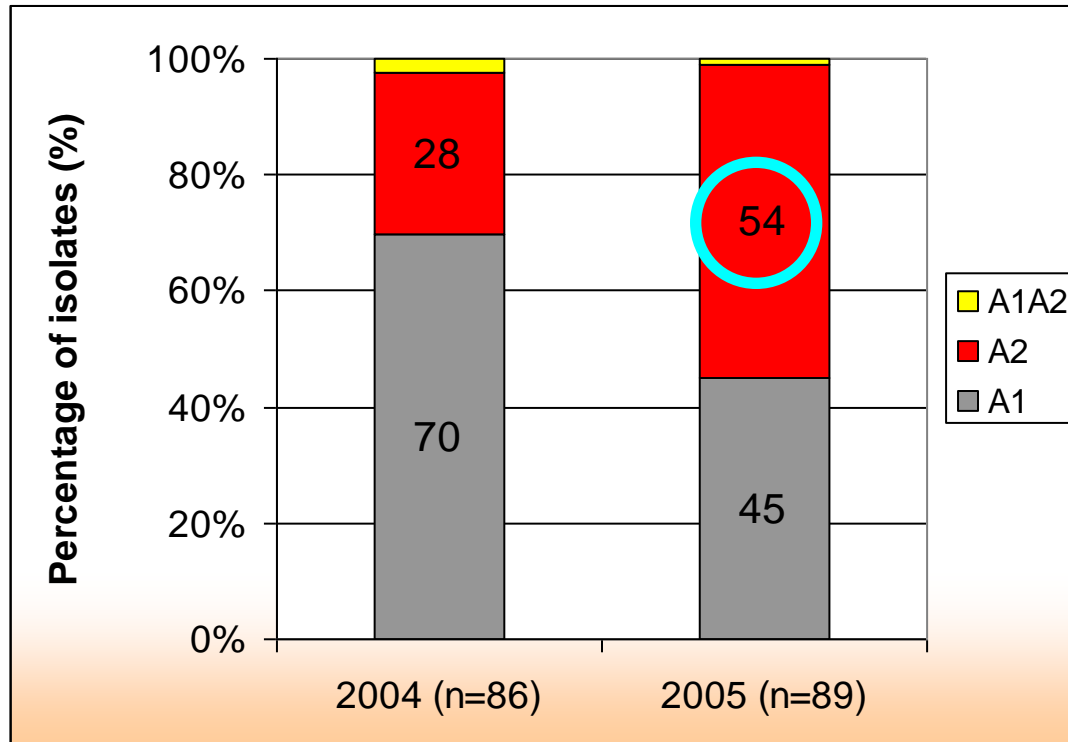
Used markers

- Mating type determination (174)
- Response to metalaxyl (70)
- Virulence tests (196)
- mtDNA haplotype determination (66)

MATING TYPE

A1 and A2 mating type ratio 58:41

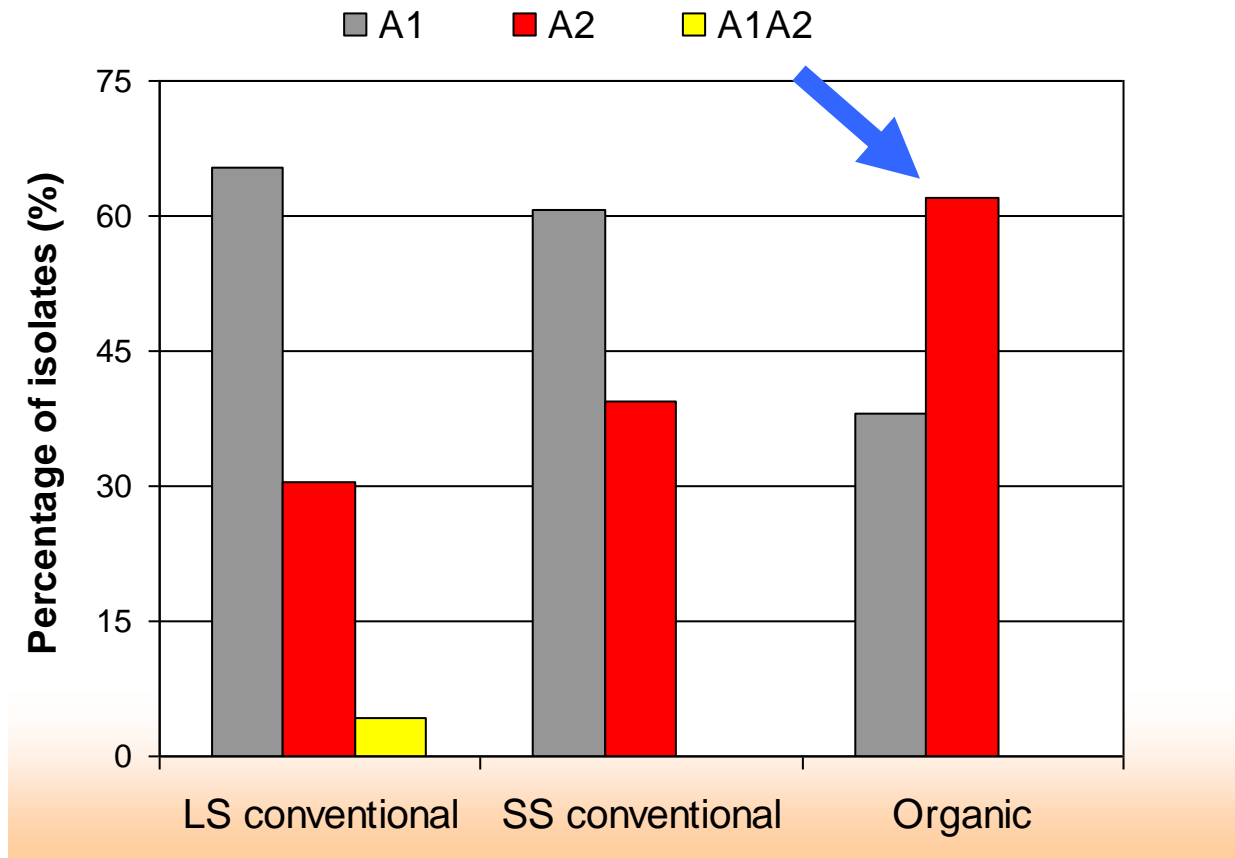
P=0.0006₂



The proportion of the A2 mating type increased abruptly from 28% in 2004 to 54% in 2005

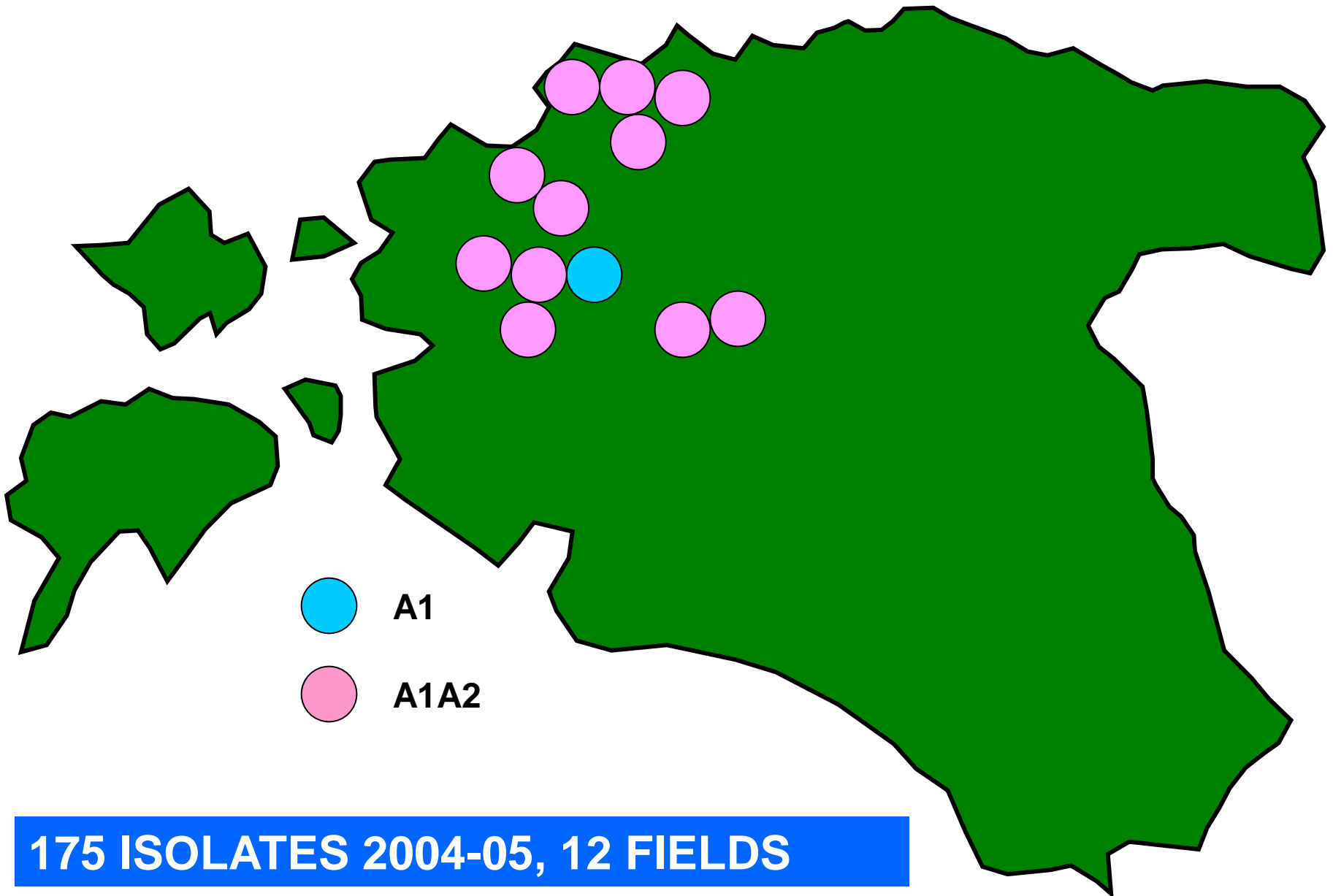
MATING TYPE

P=0.0082



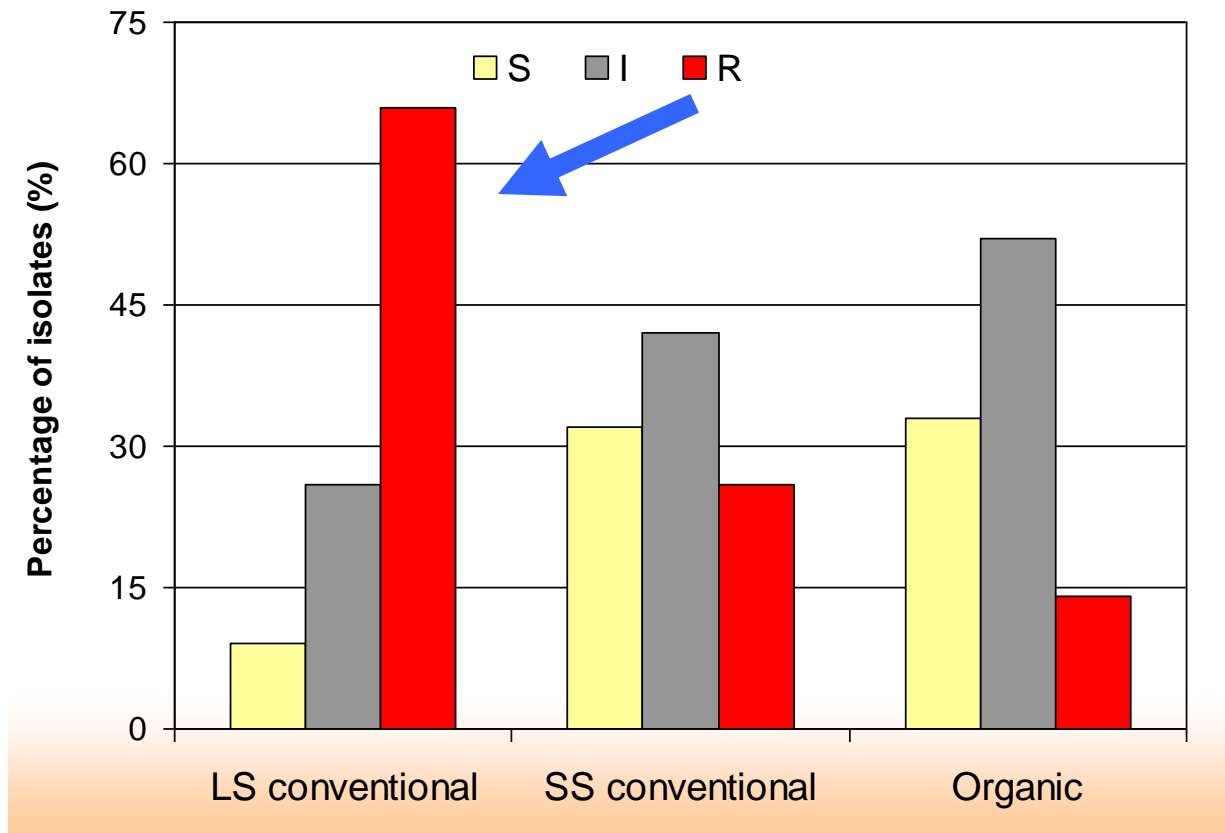
Organic fields: the possible higher prevalence of the A2 mating

BOTH MATING TYPES COEXISTED ALMOST AT ALL STUDIED FIELDS



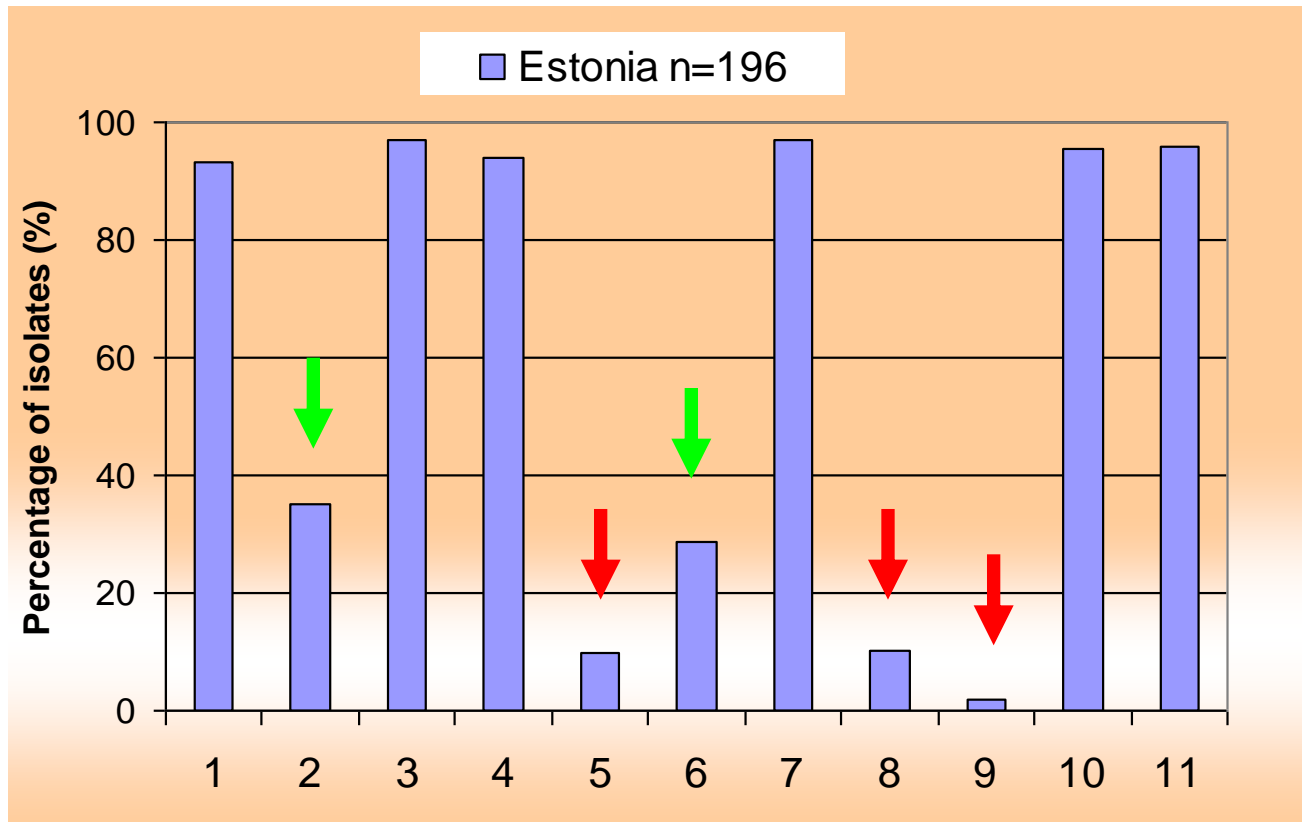
RESPONSE TO METALAXYL

P<0.001



Metalaxyl resistant isolates were found four times more frequently from large scale conventional fields than from organic fields.

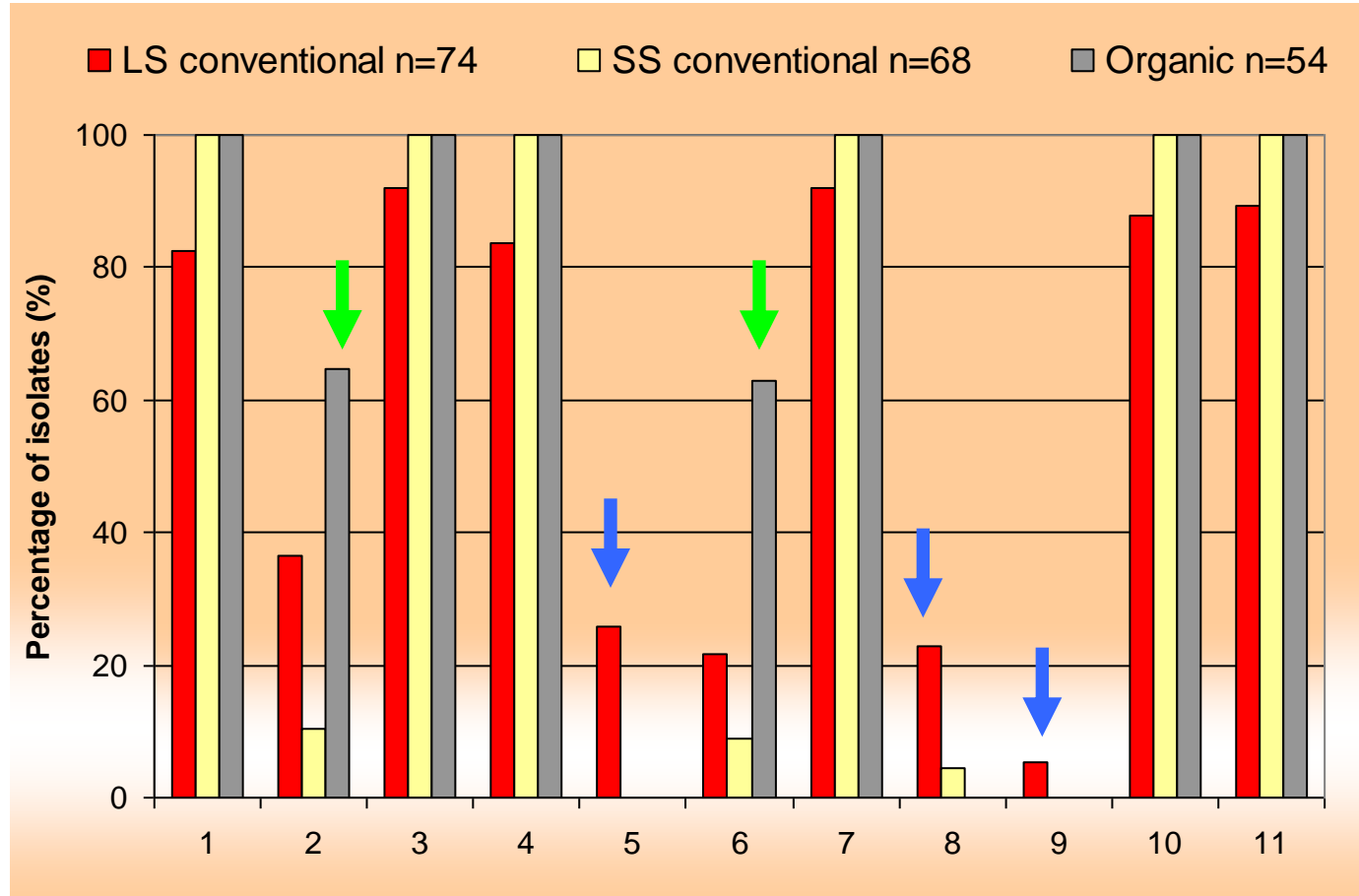
PATHOYPES BASED ON BLACK's R-gene DIFFERENTIALS



- Most isolates were able to break resistance to R1,3,4,7,10 and 11.
- Very low frequency of virulence against R5, R8, R9 and low frequency to R2 and R6 differential factors.

PATHOYPES BASED ON BLACK'S R-gene DIFFERENTIALS

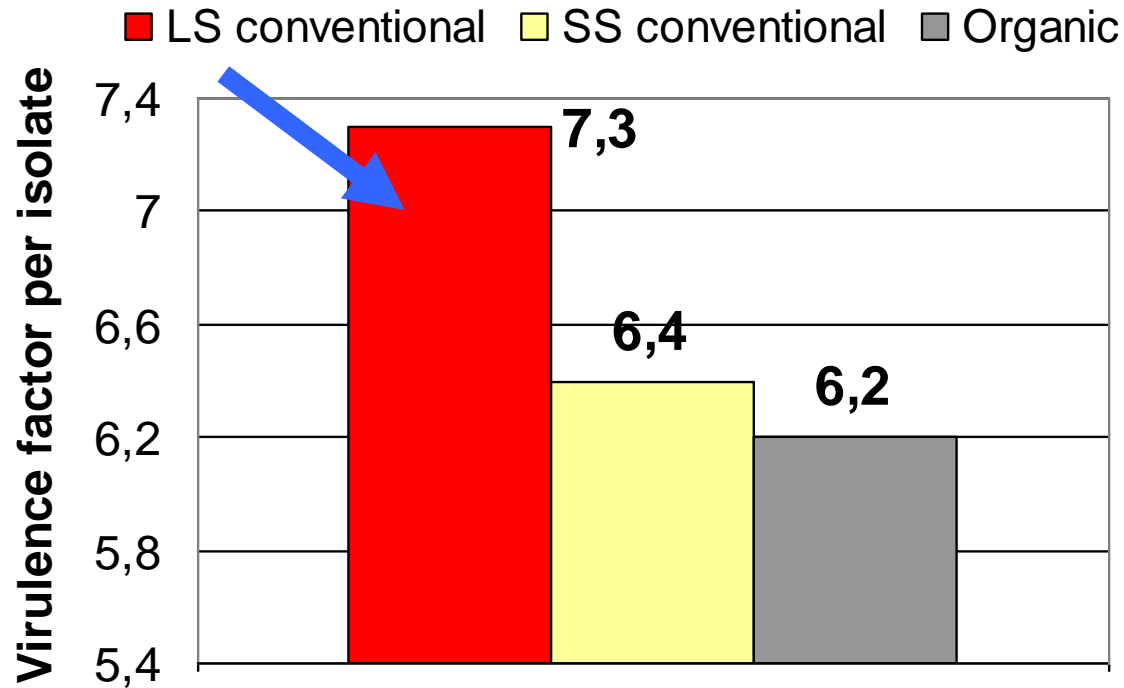
P<0.001



Rare virulences R5, R8, R9 were more common in large scale conventional fields

PATHOYPES BASED ON BLACK's R-gene DIFFERENTIALS

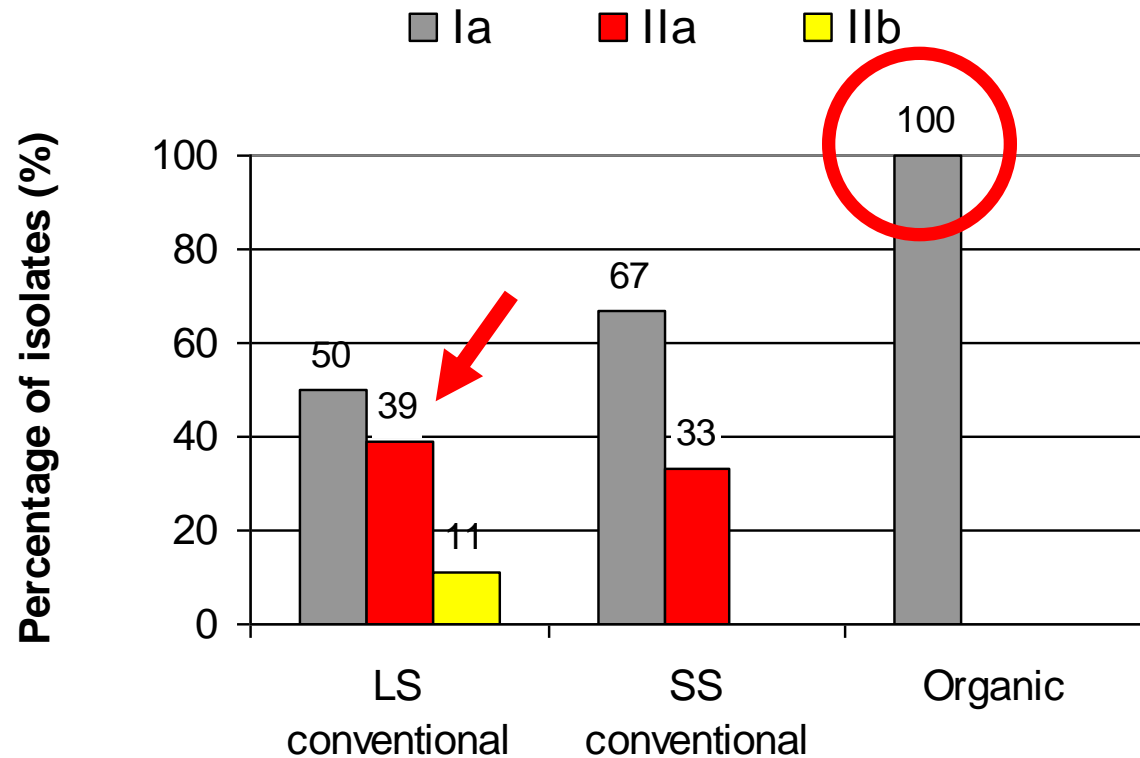
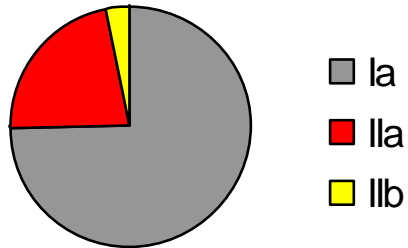
- In 2004 in the average **6.1** virulences per isolate and in 2005 **7.1** were present.



mtDNA HAPLOTYPE

Estonia (n=66)

P=0.015



- The highest proportion of IIa in large scale conventional fields and lowest in organic fields.
- Interestingly, in organic fields only one haplotype (Ia) was detected_



CONCLUSIONS

- There may be considerable differences between potato management practices in various aspects of the population structure of *P. infestans* inhabiting the fields.
- The higher prevalence of the A2 mating type, both mating types found from most fields, and lack of crop rotation may presume **higher risk** for sexual reproduction at organic fields compared to other cropping systems.
- Populations from organic fields are more resistant to metalaxyl than other management practices.
- More information is needed to clarify the **role of oospores** in the epidemiology of *P. infestans* in Estonia.



WHAT NEXT?

- Bigger dataset
- Including SSRs analysis

HOW SERIOUS PROBLEM ARE SOIL BORN INFECTIONS IN ESTONIA?

EARLY EPIDEMICS



Photo A. Hannukkala

THANK YOU FOR LISTENING!



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