Role of seed potatoes in local migrations of *Phytophthora infestans*

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Research Centre for Cultivar Testing

- keeping of national list of varieties
- publication of variety descriptive lists
- development of methodological instruction for the value for cultivation and use assessment
- co-ordination and performance of post-registration variety testing
- publication of lists of varieties recommended for cultivation

Potato resistance tests to late blight

Cooperation in years 2016 - 2020:

- **8** locations
- unprotected fields
- **8** reference cultivars **5** leaflets

Aim of work

Is the structure of *P. infestans* population affected by:

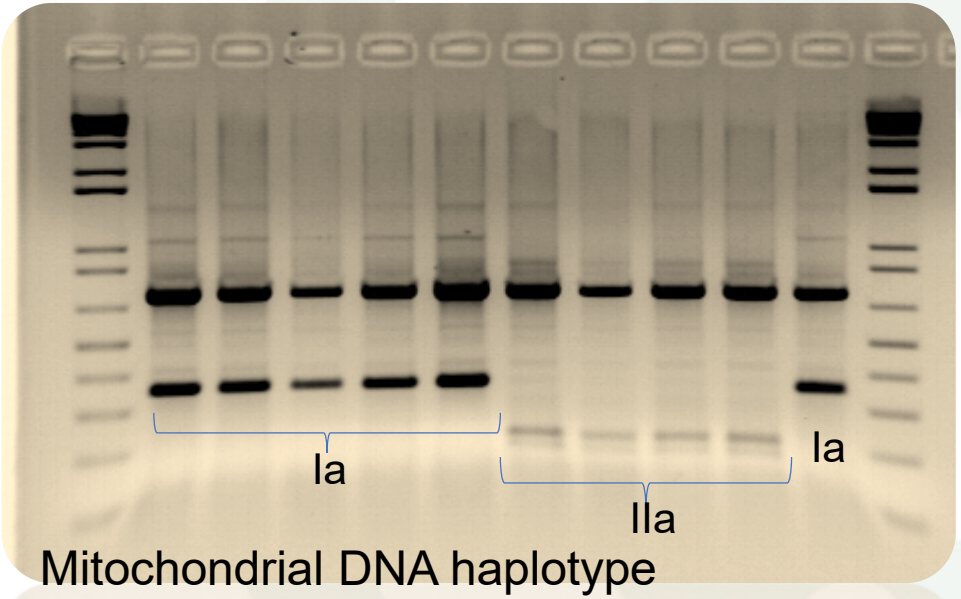
- geographic location
- time – four years of research
- host potato cultivar
- origin of the seed potatoes

Methods

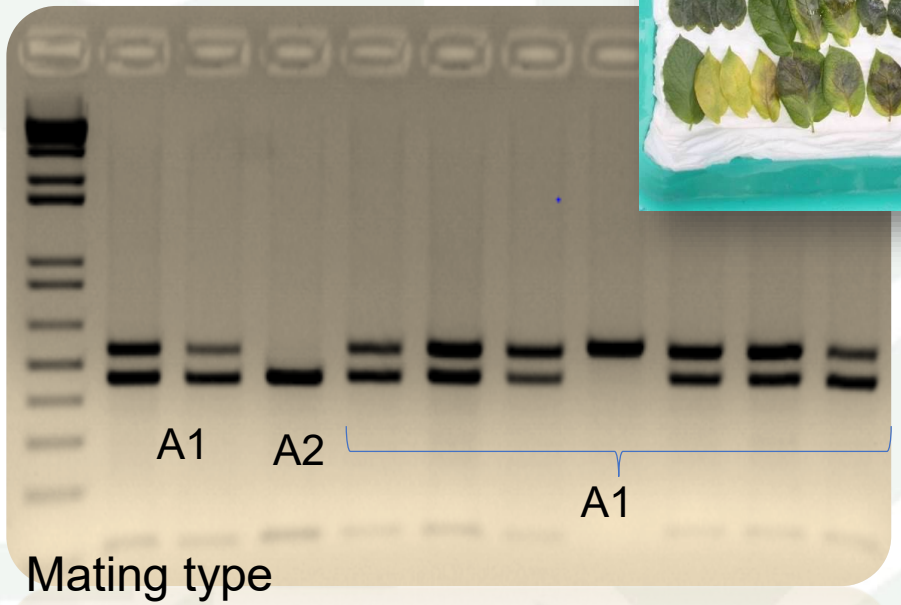
- Mating type
- Mitochondrial DNA haplotype
- Resistance to metalaxyl
- Virulence test
- 12 SSR markers

Isolation of pure *P. infestans* cultures

Virulence test

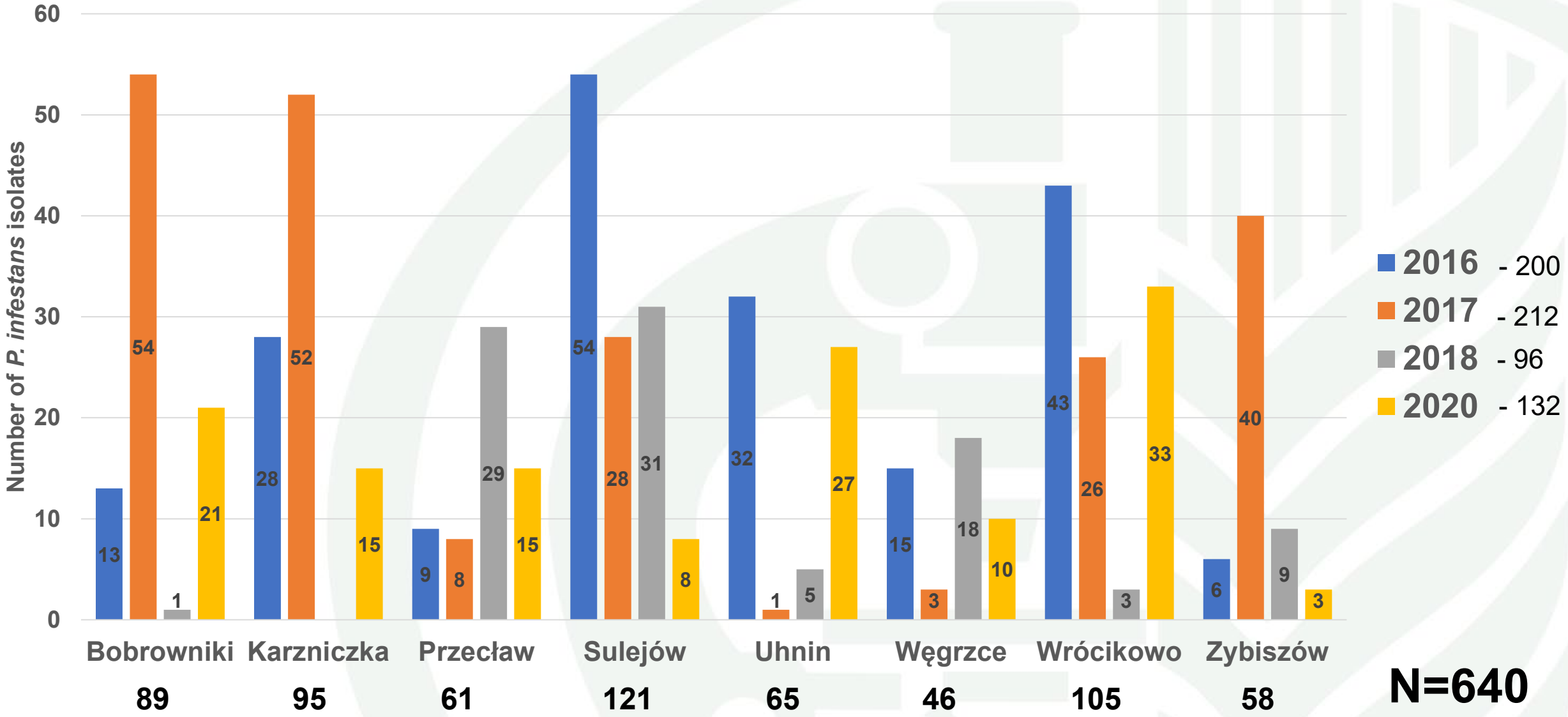


Mitochondrial DNA haplotype



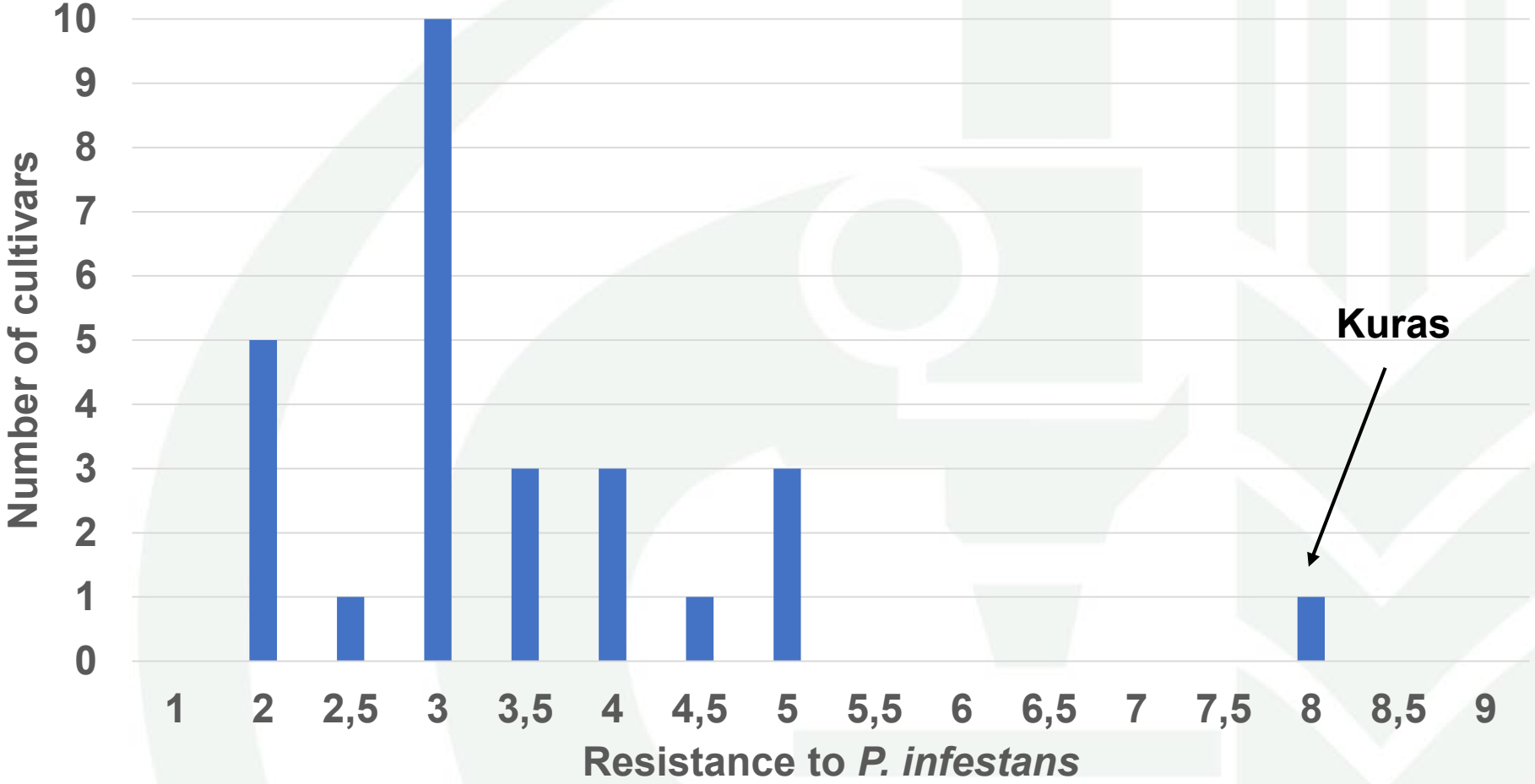
Mating type

Number of *P. infestans* isolates obtained



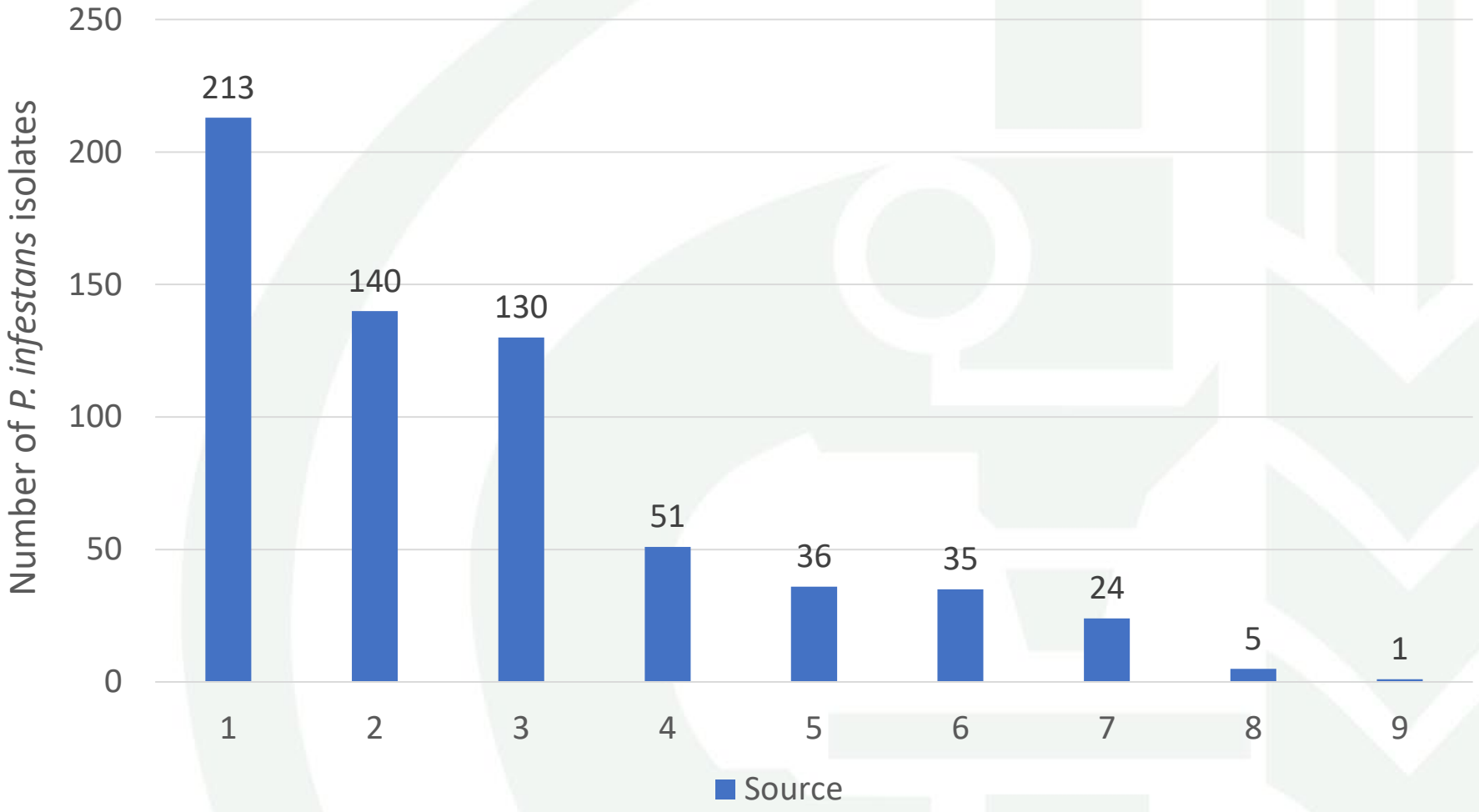
Cultivars from which *P. infestans* isolates were collected

27 cultivars and **5** breeding lines



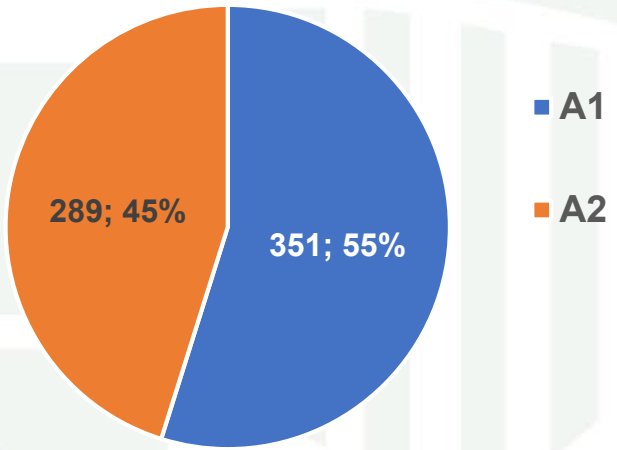
Seed potatoes came from **9** sources

Distribution of *P. infestans* isolates by origin of seed potatoes

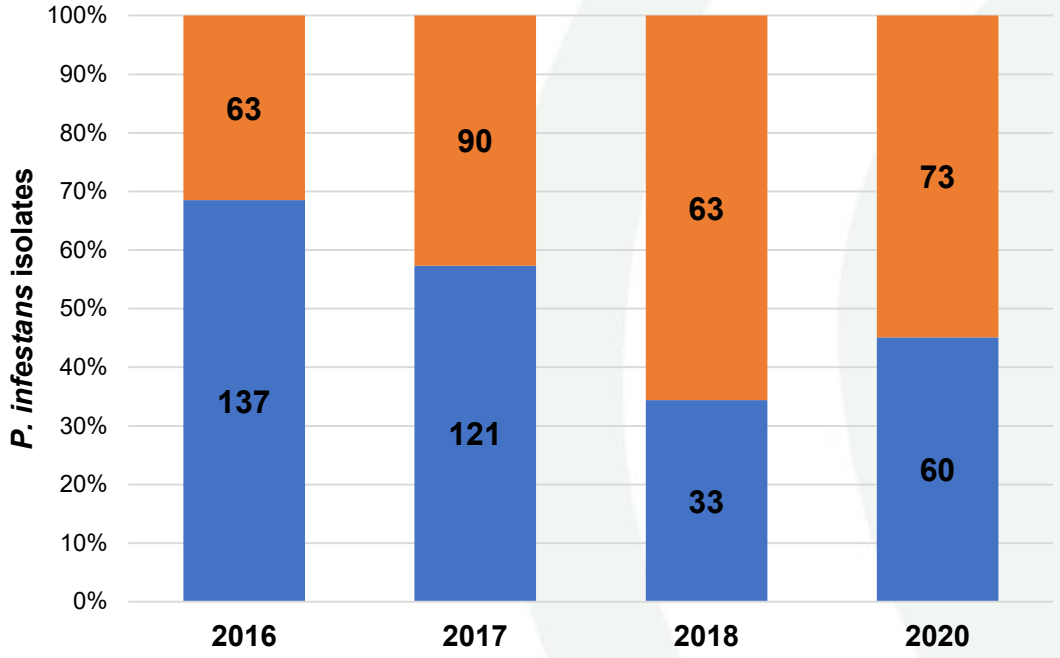


Mating type

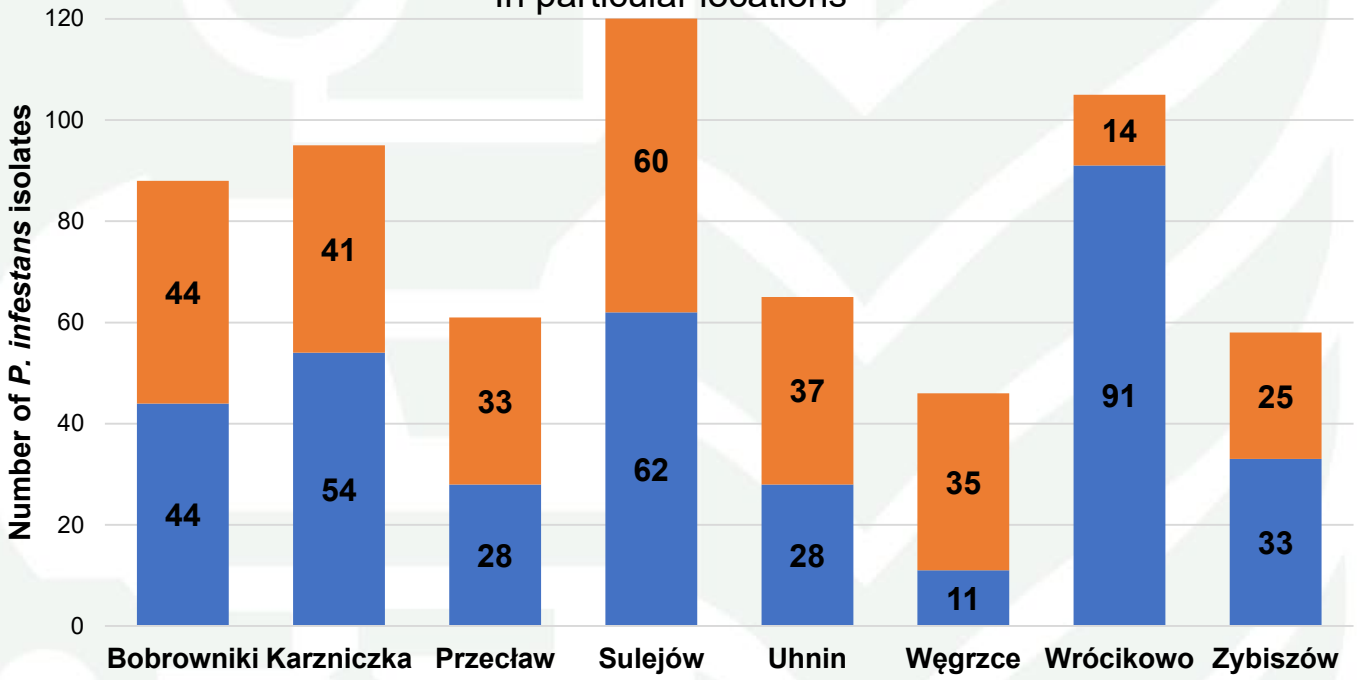
All isolates of *P. infestans* N=640



In particular years

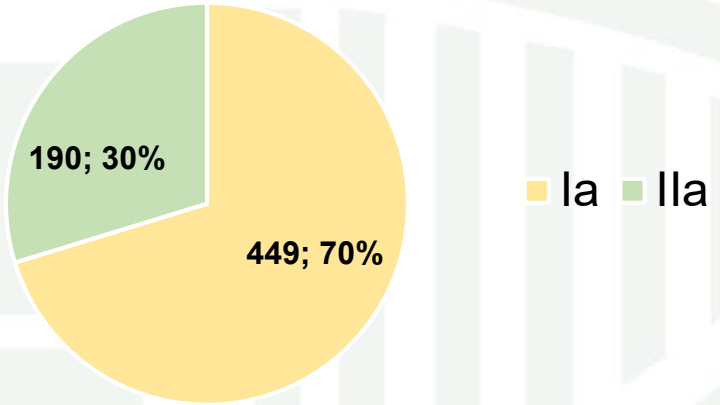


In particular locations

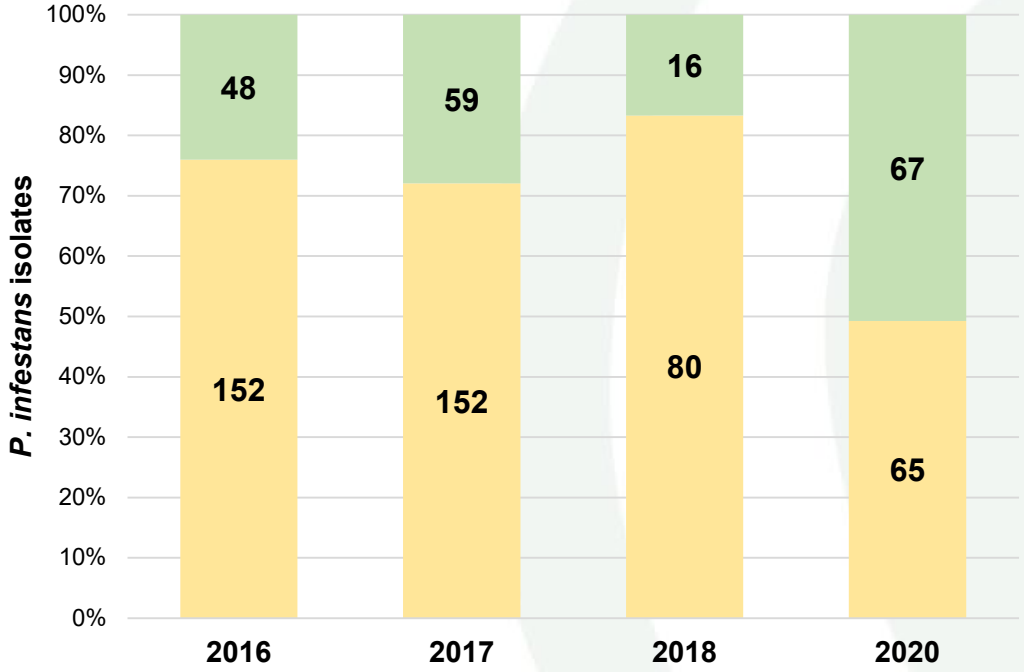


Mitochondrial DNA haplotype

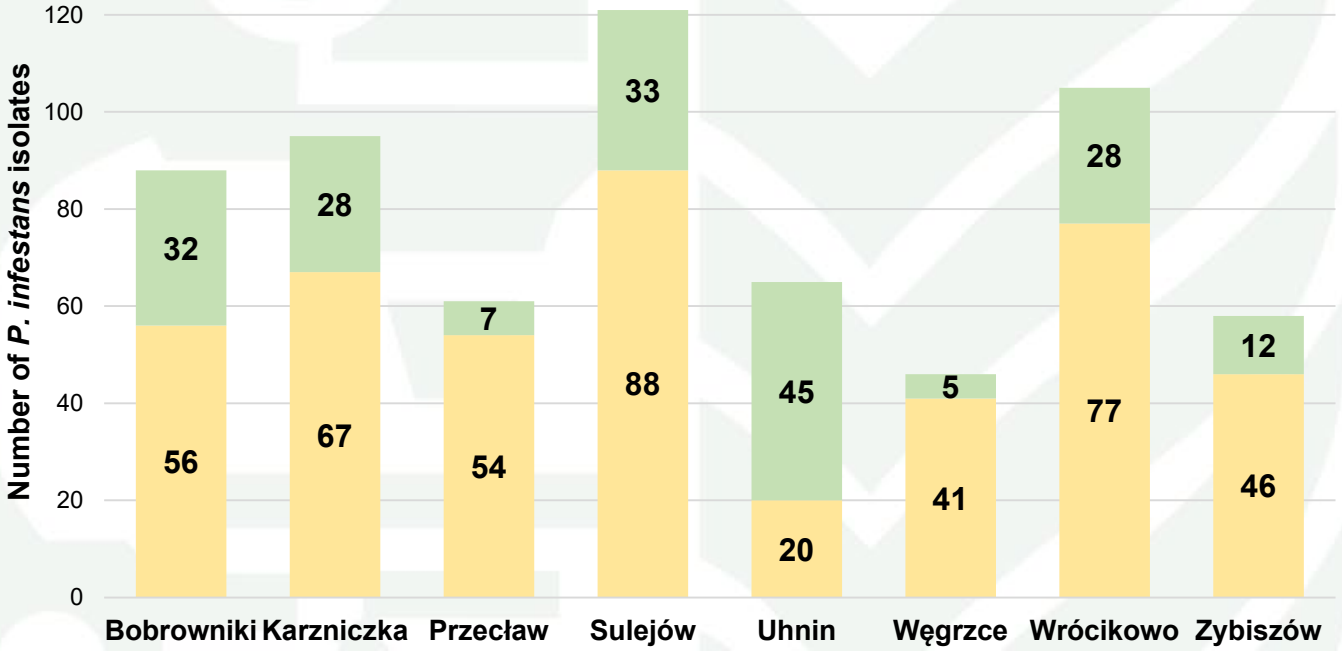
All isolates of *P. infestans* N=639



In particular years

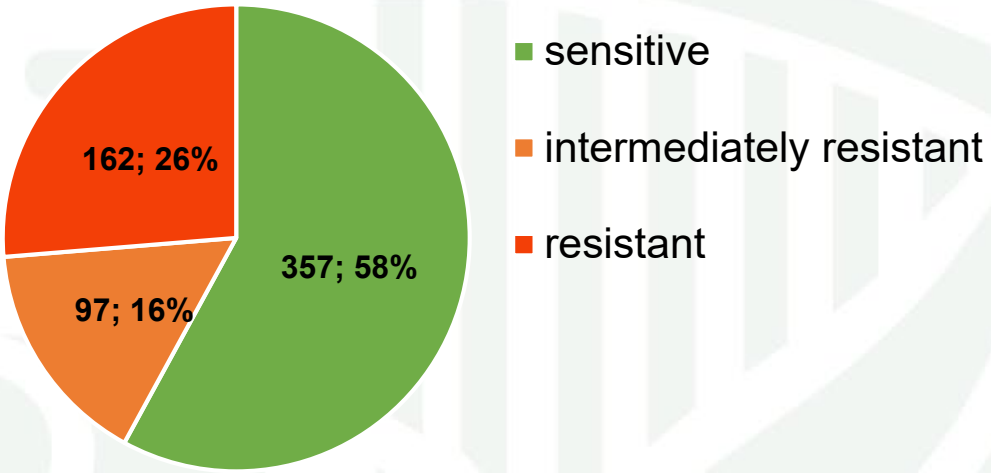


In particular locations

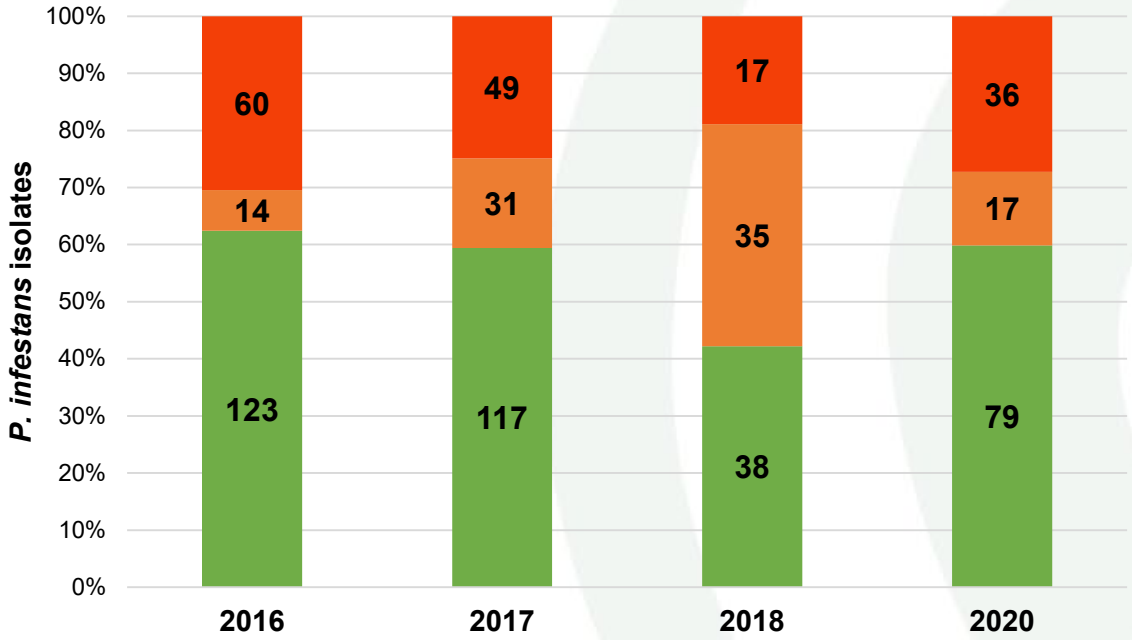


Resistance to metalaxyl

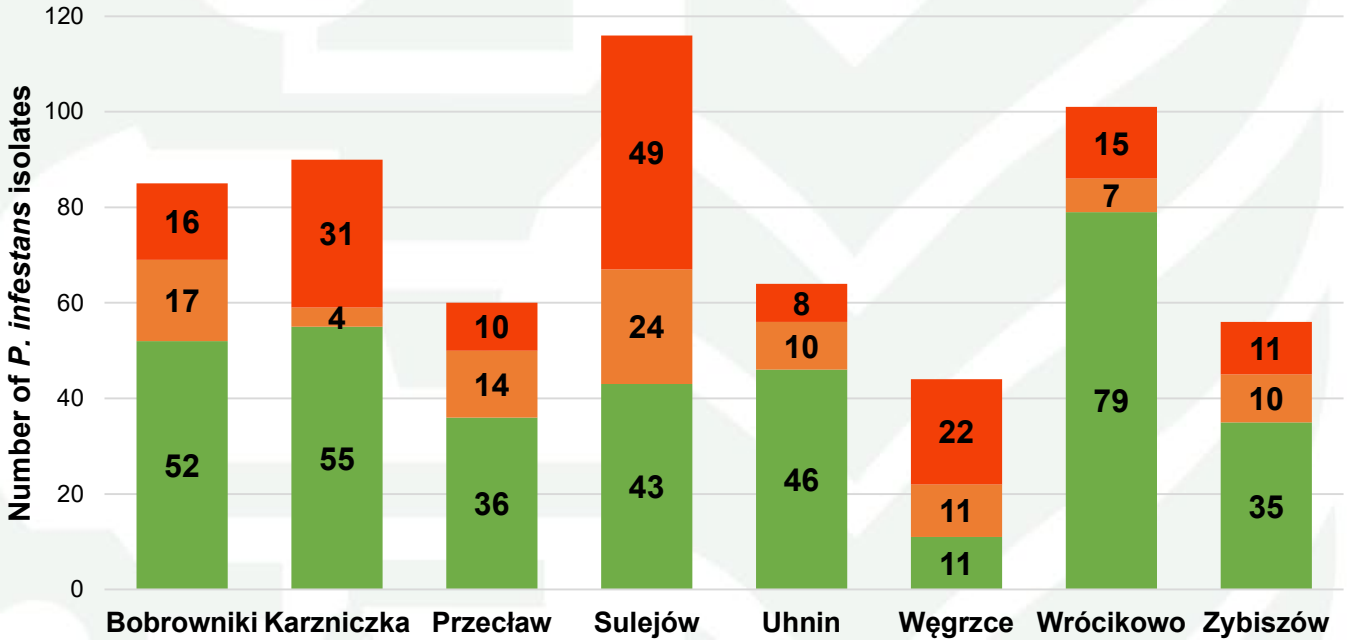
All isolates of *P. infestans* N=616



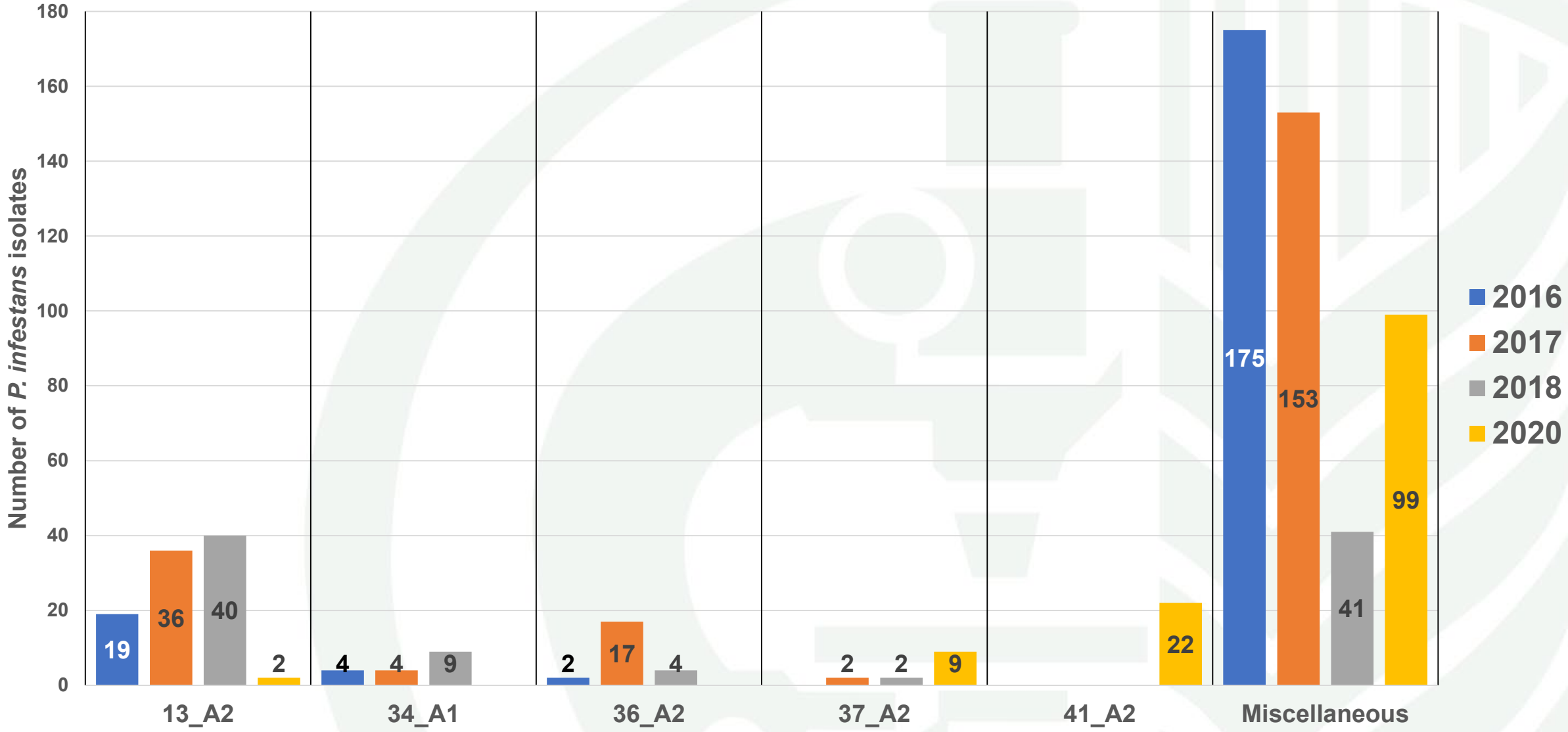
In particular years



In particular locations

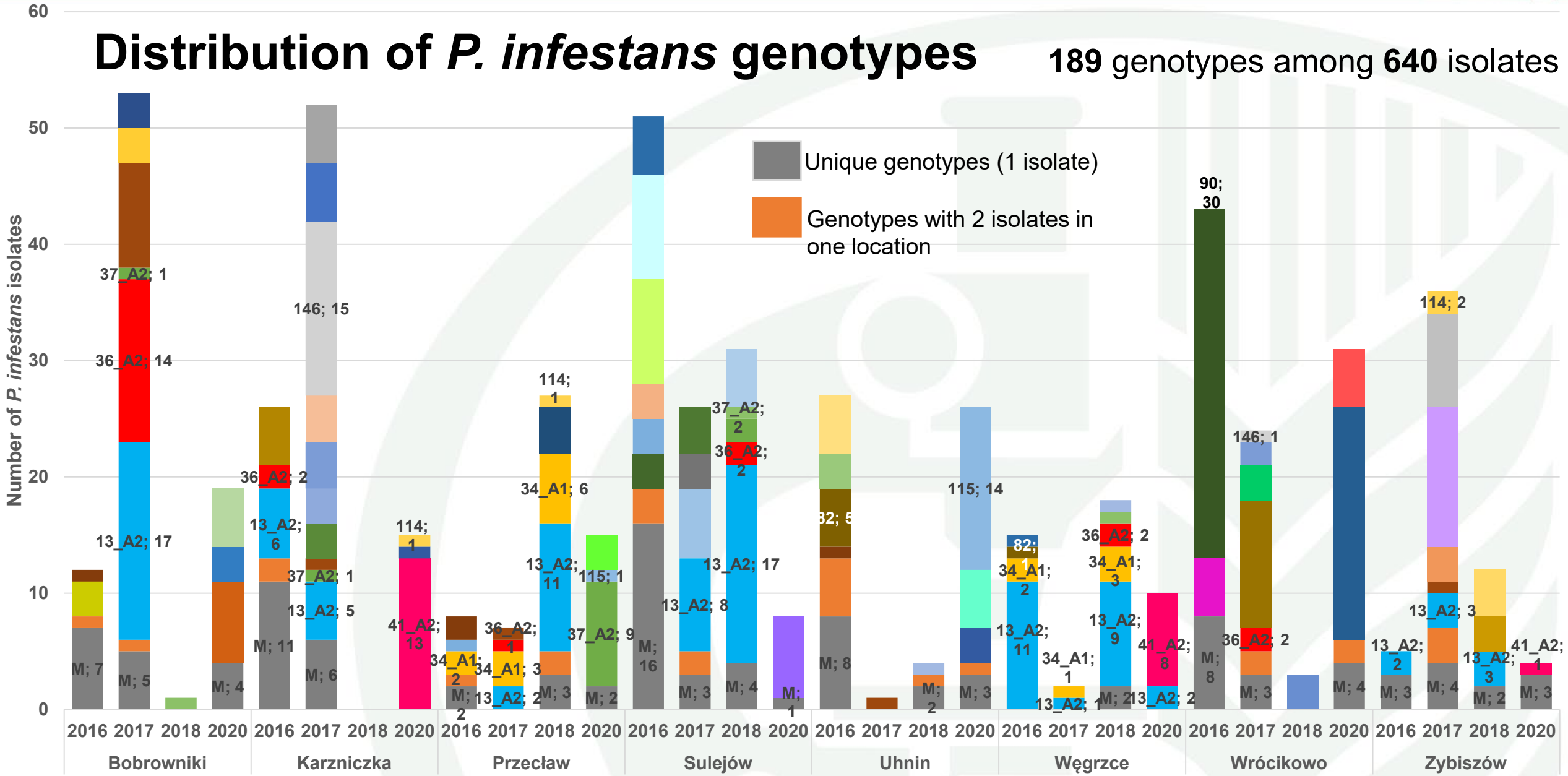


Known genotypes of *P. infestans*

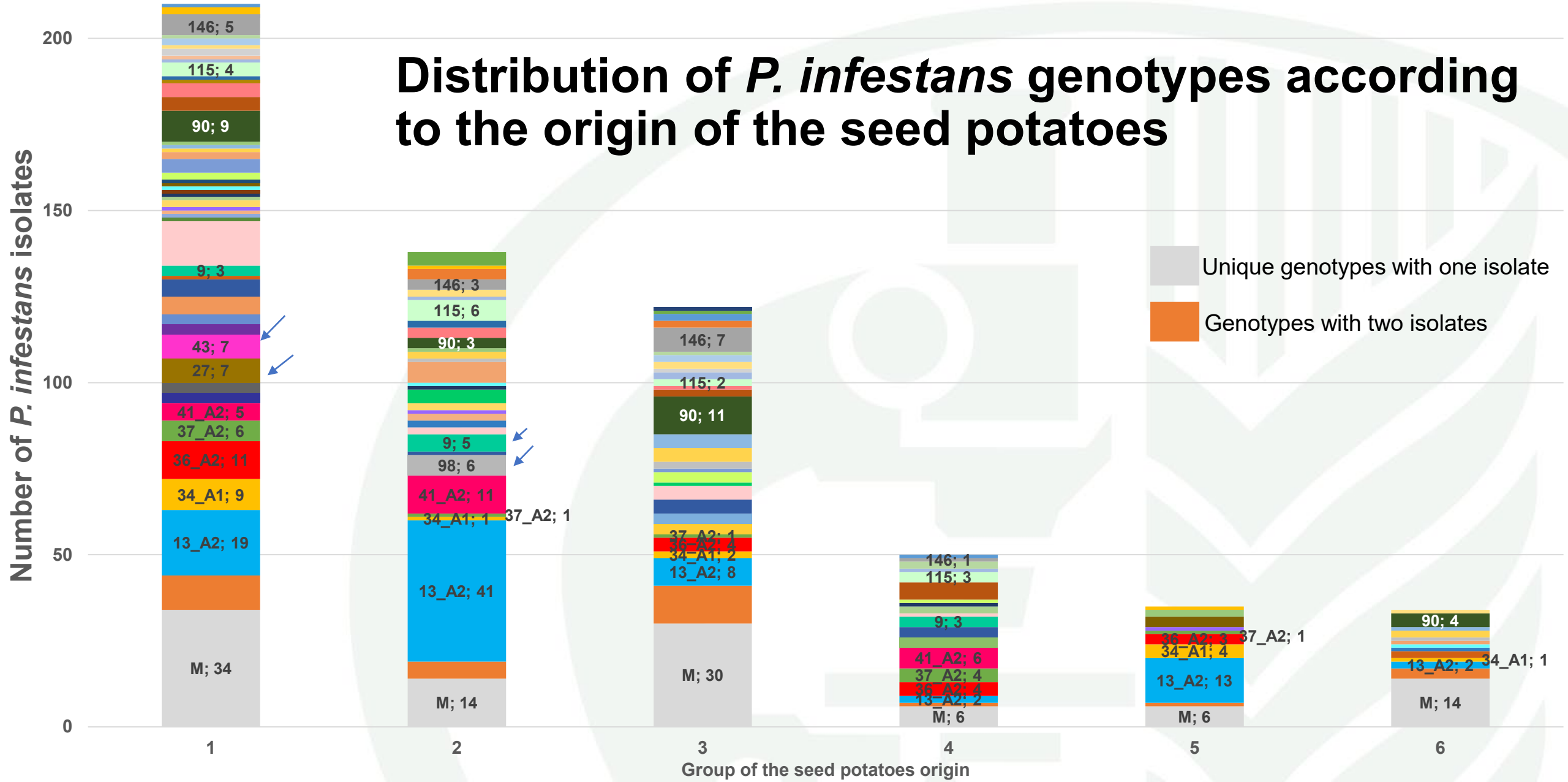


Distribution of *P. infestans* genotypes

189 genotypes among **640** isolates

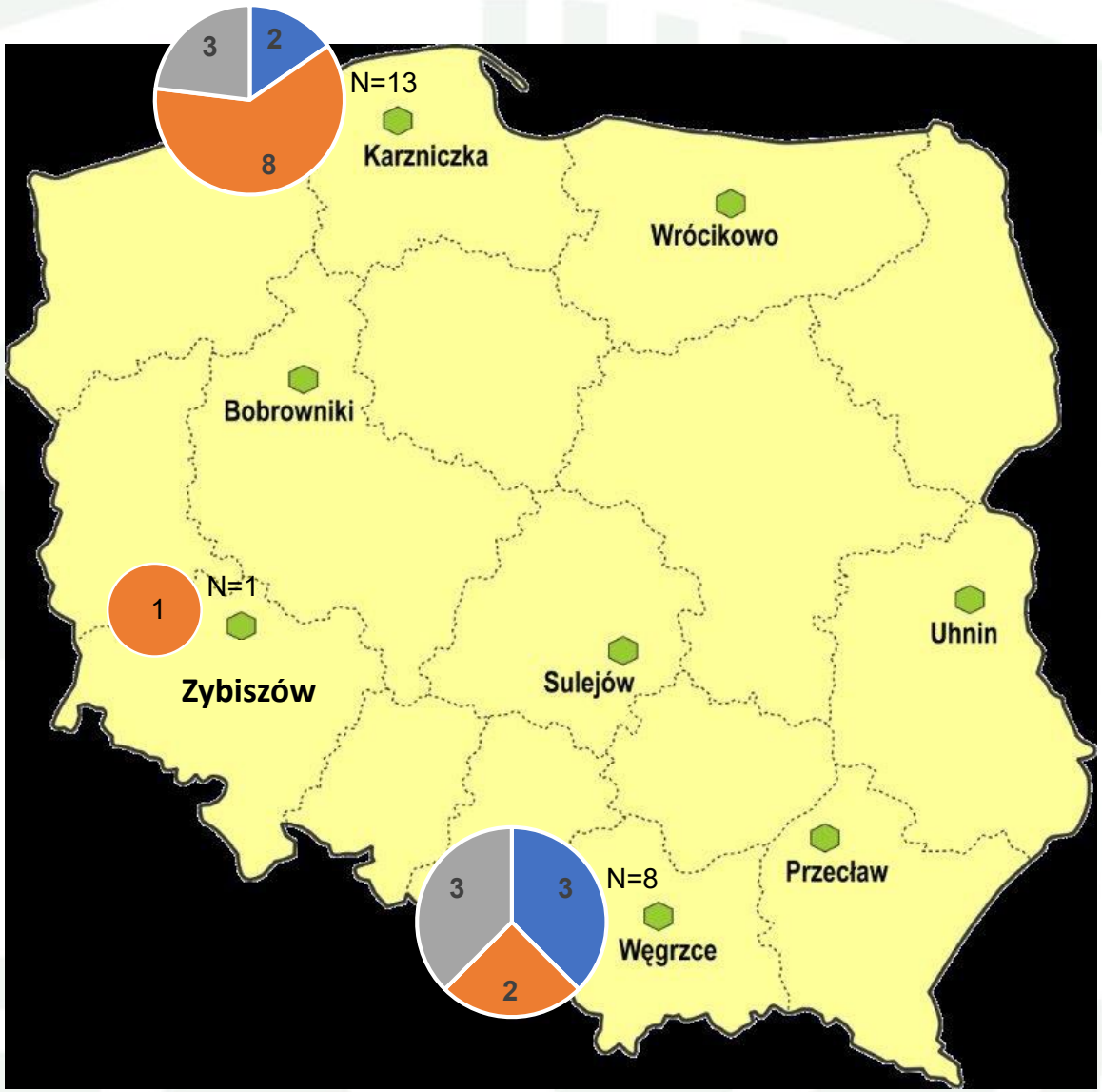


Distribution of *P. infestans* genotypes according to the origin of the seed potatoes



Genotype 41_A2

- **22** isolates from year 2020
- **3** locations
- **3** origins of seed potatoes:
  - – cultivar Michalina (Karzniczka, Węgrzce);
  - – cultivar Tajfun (Karzniczka) and 4 breeding lines (Karzniczka, Węgrzce, Zybiszów);
  - – cultivar Satina (Karzniczka, Węgrzce).



Miscellaneous genotypes named 27, 43, 98, 9

- Genotype **27**: **7** isolates from year 2020, **1** location Sulejów, **2** cultivars (Denar, Impresja) from **1** source of seed potatoes
- Genotype **43**: **7** isolates from year 2020, **1** location Bobrowniki, **2** cultivars (Denar, Michalina) from **1** source of seed potatoes
- Genotype **98**: **6** isolates from year 2017, **2** locations Karzniczka, Wrócikowo, **2** cultivars (Jubilat, Tajfun) from **1** source of seed potatoes
- Genotype **9**: **11** isolates from year 2017, **1** location Wrócikowo, **5** cultivars (Lord, Cedron, Tajfun, Jubilat, Satina) from **3** sources of seed potatoes

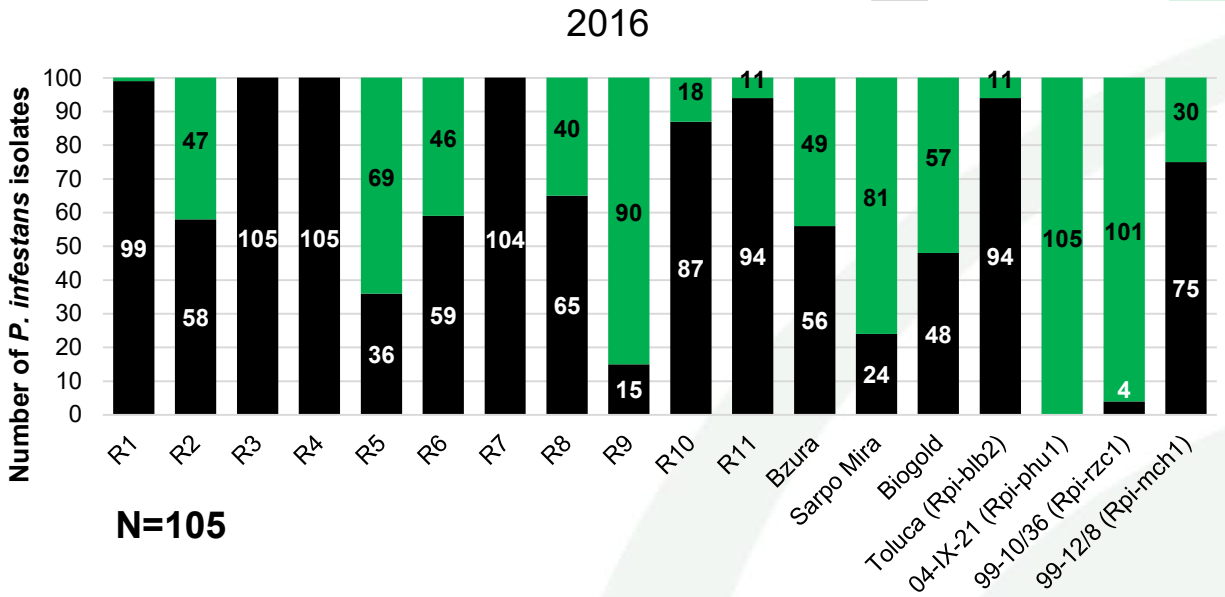
Virulence tests

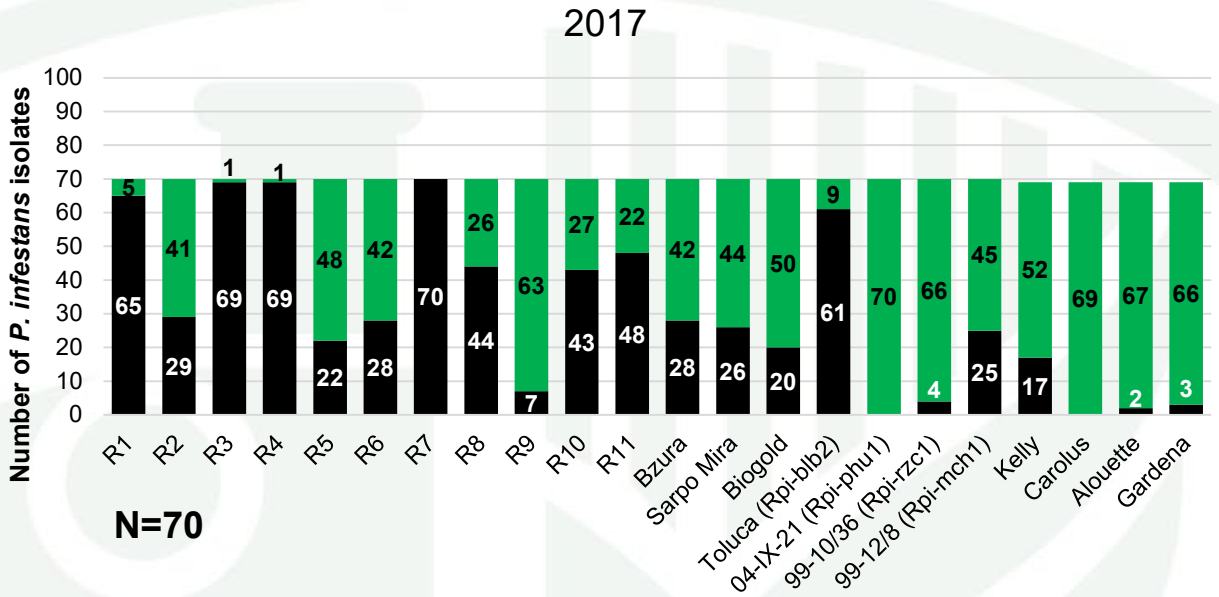
640 -> 306

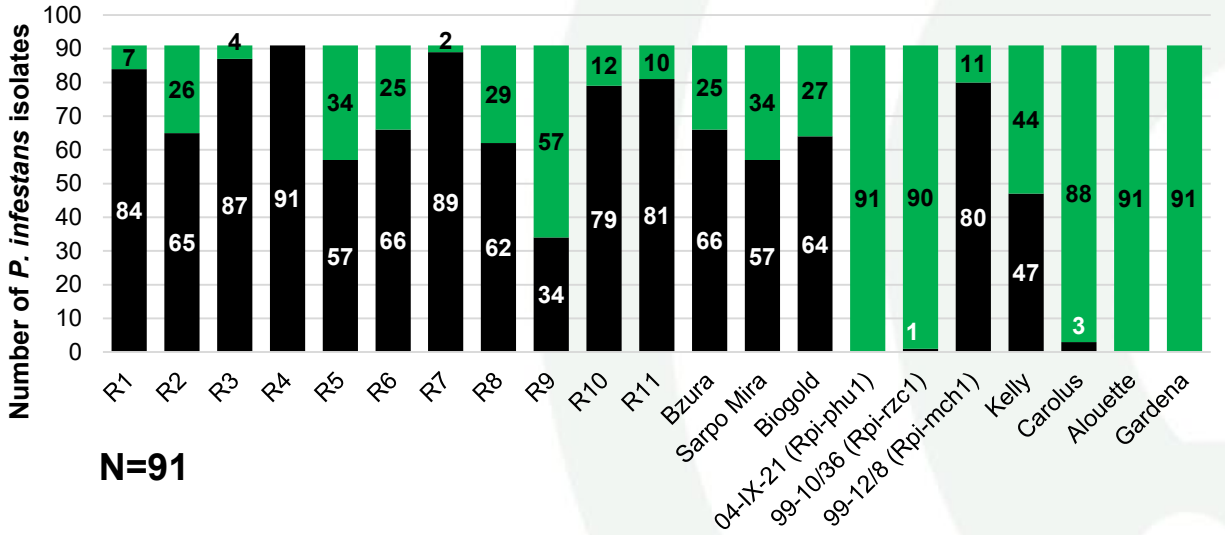
- selection of isolates with different SSR genotype
- selection of isolates from different locations with the same SSR genotype
- exception year 2018 -> 96 isolates collected -> all tested

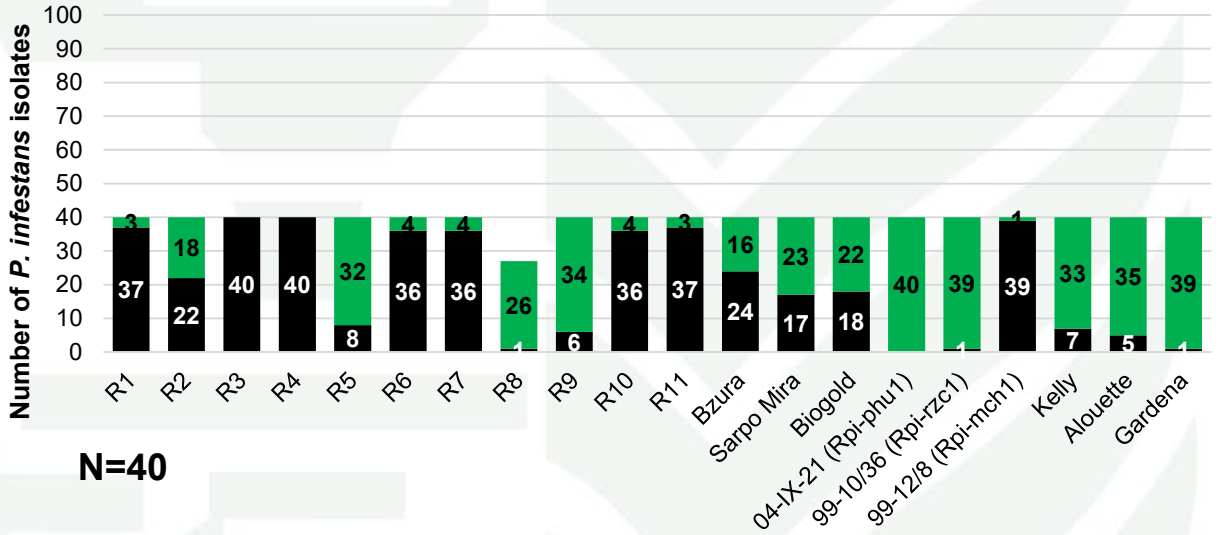
Virulence

virulent avirulent









Conclusions:

- A collection of 640 isolates from 8 locations from 2016-2020
- The number of *P. infestans* isolates of A2 mating type increased compared to previous studies (Brylińska et al. 2016; Janiszewska et al. 2021)
- The number of isolates resistant or intermediately resistant to metalaxyl increased compared to previous studies (Brylińska et al. 2016; Janiszewska et al. 2021)
- The population of *P. infestans* in Poland remains genetically diverse (189 genotypes)
- Genotypes known in Europe were detected: 13_A2, 34_A1, 36_A2, 37_A2
- In year 2020, isolates of genotype 41_A2 were identified for the first time

Role of seed potatoes?

- The most common genotypes (13_A2; 97 isolates) from all seed sources
- 22 isolates of the 41_A2 genotype were not evenly distributed among potatoes: found on plants from seed potatoes from only 3 sources
- 2 cases: genotypes unique for 1 source but found only in 1 location
- 1 genotype unique for 1 source of seeds found in 2 locations

Population too diverse to draw conclusions

Future plans:

- Statistical analysis, STRUCTURE program, MSN
- Analysis of the genetic structure depending on the origin of the seed potatoes
- Analysis of the genetic structure of *P. infestans* (years, locations, individual years in the locations)
- Publication

Norway grants

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Thank you

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Thank you for your attention

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