



# Monitoring virulence and mating type of *Phytophthora infestans* in the Netherlands in 2004 and 2005

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## Introduction

The Dutch *P. infestans* population was monitored for virulence against old and new R-genes using bait fields in which unprotected (resistant) plant material was exposed to the Dutch *P. infestans* population.

## Materials and methods

Bait fields were established at 3 locations in the Netherlands. R – gene differentials R1 – R11 and genotypes or cultivars provided by breeders were planted in 6 plant plots. *P. infestans* occurring on this material was cultured, stored and characterized for AFLP pattern (E21/M16), mating type and virulence against R1 – R11.

## Results

**AFLP:** Results are given in Table 1. Fourteen and twenty eight loci were polymorphic (out of 78) in 2004 and 2005. Seven and ten groups of identical isolates were distinguished in 2004 and 2005 respectively.

Table 1. Analysis of genetic variability of *P. infestans* isolates based on AFLP results.

Year	Location	Population #	Average # polymorphic loci	% polymorphic loci
2004	Lelystad	1	0	0
	Vredepeel	2	0.07	12
	Valthermond	3	0	0
2005	Lelystad	4	0.02	8
	Vredepeel	5	0.04	12
	Valthermond	6	0.10	23
2004 All	1,2,3	49	0.07	14
2005 All	4,5,6	66	0.08	28

**Virulence:** Virulence for R1 – R11 was determined in replicated detached leaf experiments. Results are given in Figure 1. The average number of virulence factors per isolate was 9 in both years.

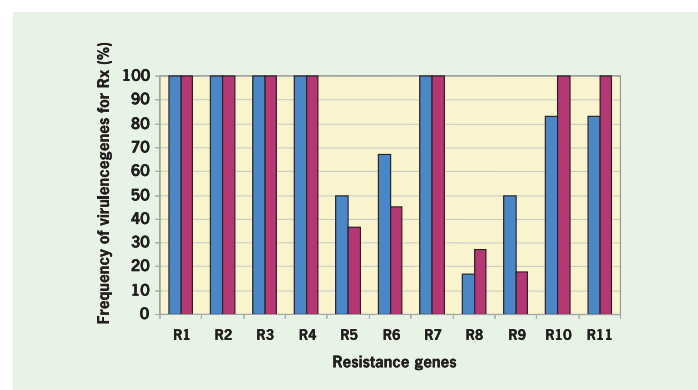


Figure 1. Virulence factor frequency in *P. infestans* isolates based on 68 isolates from 2004 (■) and 2005 (■) grouped by year and AFLP group.

**Mating type:** Mating types were determined for all isolates collected in the bait fields. Results are given in Table 2.

Table 2. Mating type of the bait fields isolates collected in both years and all locations.

	2004			2005		
	Lelystad	Vredepeel	Valthermond	Lelystad	Vredepeel	Valthermond
A1	28	1	0	1	8	21
A2	0	37	37	35	45	16
% A2	0%	97%	100%	97%	85%	43%

Mating types of the isolates collected on the different R – gene differentials and clones or cultivars are given in Table 3. In all experiments, except Valthermond 2005, the *P. infestans* population was dominated by 1 mating type.

Table 3. Potato genotypes in bait fields in two years at three locations and the *P. infestans* mating types isolated from them.

Genotype	Vredepeel		Lelystad		Valthermond	
	2004	2005	2004	2005	2004	2005
R 0	A2	A2	A1	A2	nd	A1
R 1	A2	A2	A1	A2	A2	A1
R 2	A2	A2	A1	A2	A2	A2
R 3	A2	A2	A1	A2	A2	A1
R 4	A2	A2	A1	A2	A2	A1
R 5	A2	A2	*	A2	A2	A2
R 6	A2	A2	A1	A2	A2	A1 & A2
R 7	A2	A2	A1	A2	A2	A1
R 8	A2	A1	*	*	*	A1
R 9	A2	A1	A1	*	*	*
R 10	A2	A2	A1	A1	A2	A1
R 11	A1 & A2	A2	A1	A2	A2	A1
AM 66-42	A2	A2	A1	A2	A2	A1 & A2
Axona	-	A2	-	A2	-	A2
Biogold	A2	A2	A1	A2	A2	*
CMK-MCD1	A2	A2	*	A2	A2	A1
HZPC-02	A2	*	*	*	A2	*
HZPC-04	A2	A2	*	*	A2	*
HZPC-05	A2	A2	A1	A2	A2	A1 & A2
KA-0001	-	A2	-	A2	-	A2
KA-0002	-	A2	-	A2	-	A2
KA-95-0140	A2	A2	*	*	A2	*
Sarpo Mira	-	A2	-	*	-	*
Spirit	-	A2	-	A2	-	A1
VR -92-501	-	A2	-	A2	-	A2

- : Genotype not included in this experiment.

\* : *P. infestans* not found in this genotype.

nd : Not done.

## Conclusions

- The *P. infestans* population in the bait fields was mostly dominated by one or a few *P. infestans* genotypes.
- P. infestans* accumulated an average of 9 virulence factors in the Netherlands, including at least virulence against R1, R2, R3, R4, R7, R10 and R11.
- P. infestans* could be isolated from all genotypes in the bait fields suggesting the presence of virulence against at least some of the new R- genes in addition to a complex R1 – R11 virulence spectrum.
- Monitoring of the *P. infestans* population is an essential component of R-gene deployment.