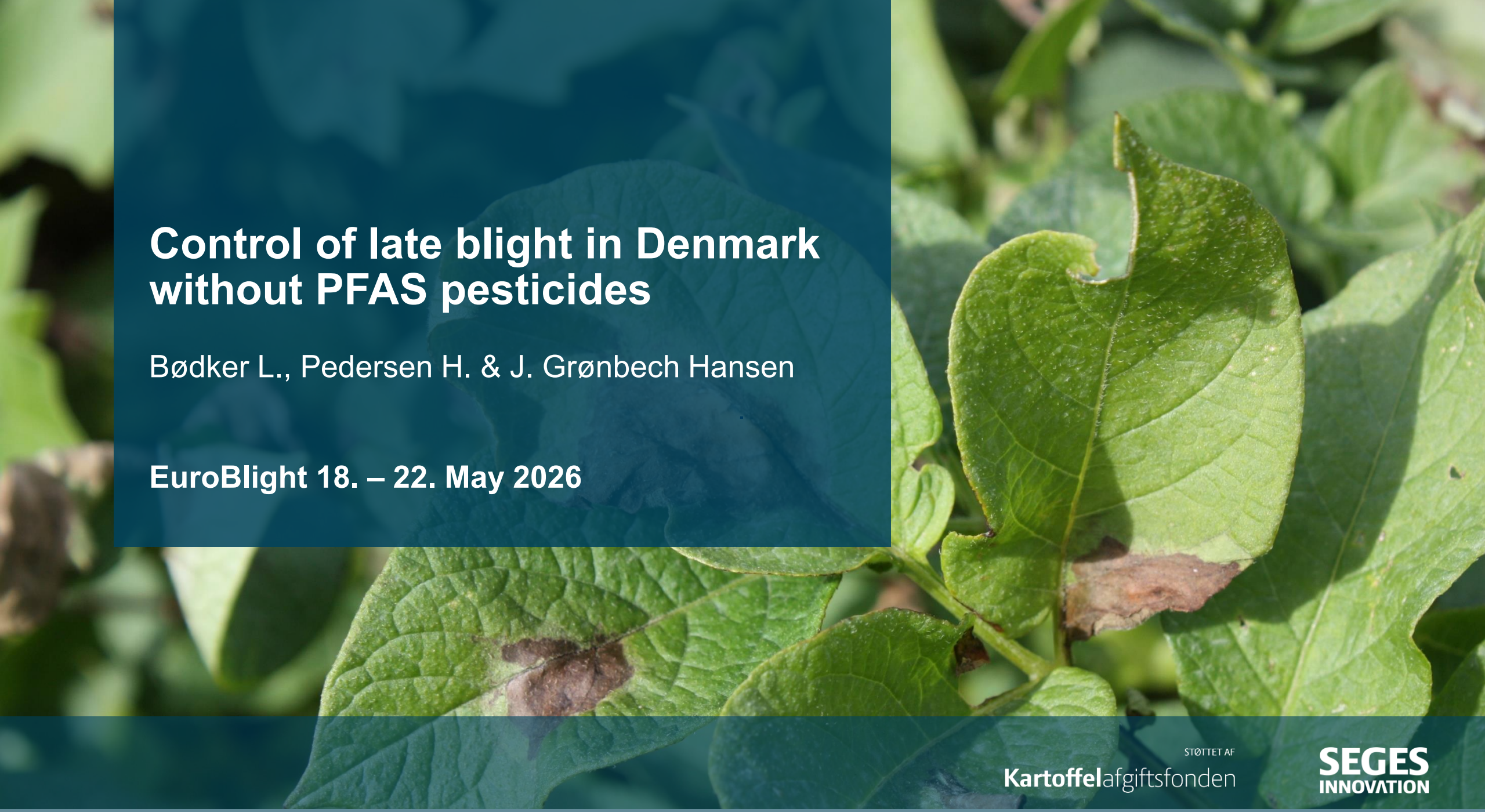
Control of late blight in Denmark without PFAS pesticides

Bødker L., Pedersen H. & J. Grønbech Hansen

EuroBlight 18. – 22. May 2026



STØTTET AF
Kartoffelafgiftsfonden
SEGES INNOVATION

Availabel fungicide - 2026

Denmark

- Fluazinam
- Oxathiapiprolin
- Mandipropamid
- Cymoxanil
- Propamocarb
- (Azoxystrobin)

EU

- Fluazinam
- Oxathiapiprolin
- Mandipropamid
- Cymoxanil
- Propamocarb
- Fluopicolide
- Cyazofamid
- Amisulbrom
- Ametoctradin
- Kobberhydroxide
- Potassium phosphonate
- Metalaxyl-M

SEGES INNOVATION

Availabel fungicide - 2027

Denmark

- ~~Fluazinam~~ (ban from 2027)
- Oxathiapiprolin
- Mandipropamid
- Cymoxanil
- Propamocarb
- (Azoxystrobin)
- Ametoctradine?
- Potassium phosphonate?
- Fosetyl-Al?

EU

- Fluazinam
- Oxathiapiprolin
- Mandipropamid
- Cymoxanil
- Propamocarb
- Fluopicolide
- Cyazofamid
- Amisulbrom
- Ametoctradin
- Kobberhydroxide
- Potassium phosphonate
- Metalaxyl-M

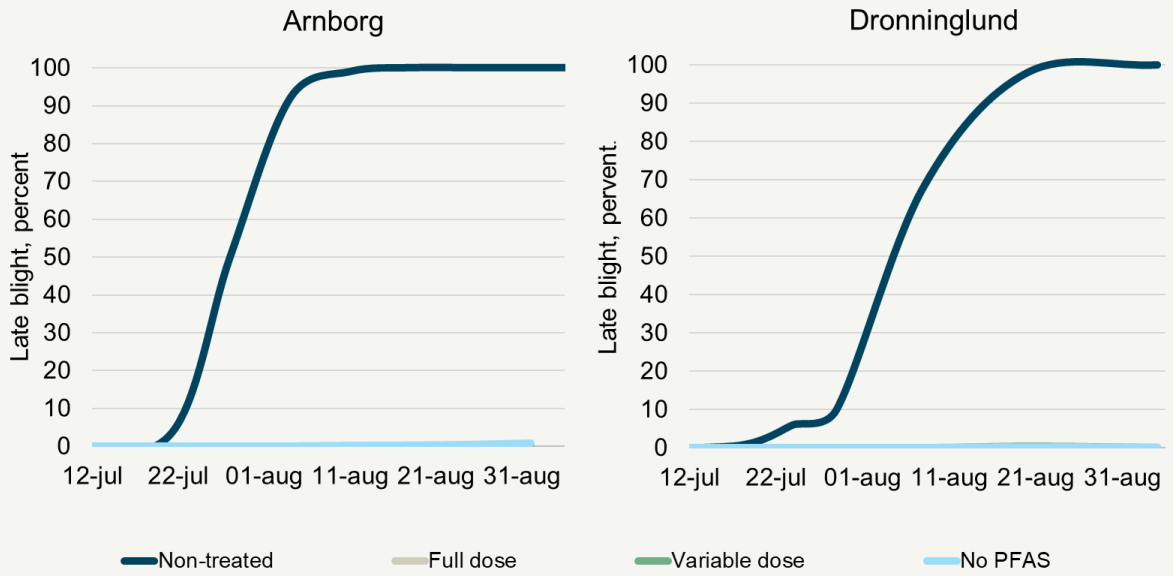
SEGES INNOVATION

Control strategy 2027?
Susceptible varieties

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	No. of
Dato	12-jun	19-jun	26-jun	03-jul	10-jul	17-jul	24-jul	31-jul	07-aug	14-aug	21-aug	28-aug	04-sep	11-sep	treatments
Mandipropamid	0,6			0,6		0,6		0,6		0,6		0,6			6
Fluazinam															0
Oxathiapiprolin			0,15		0,15										2
Propamocarb		1,4	1,4		1,4		1,4		0,7*		1,4		0,7*		7
Cymoxanil	0,2	0,2		0,2		0,2	0,2		0,2	0,2			0,2		8
Azoxystrobin								0,5				0,5			2
	Start blok		Growth block				Middle block				Final block				25

SEGES INNOVATION

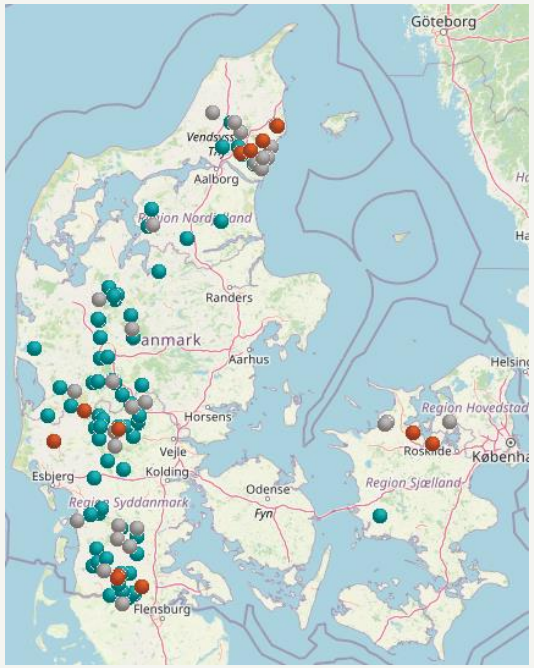
Mix and alternation 2025



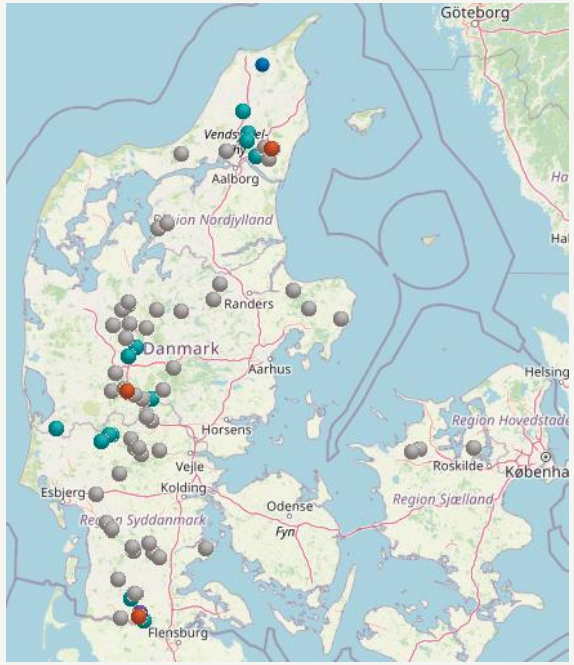
Effect of mix- and alternation on EU43

EuroBlight
A potato late blight network for Europe

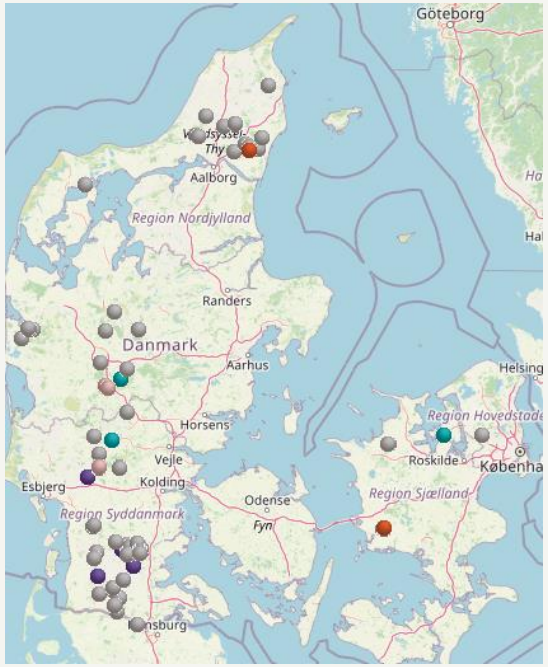
2022 (64 pct.)



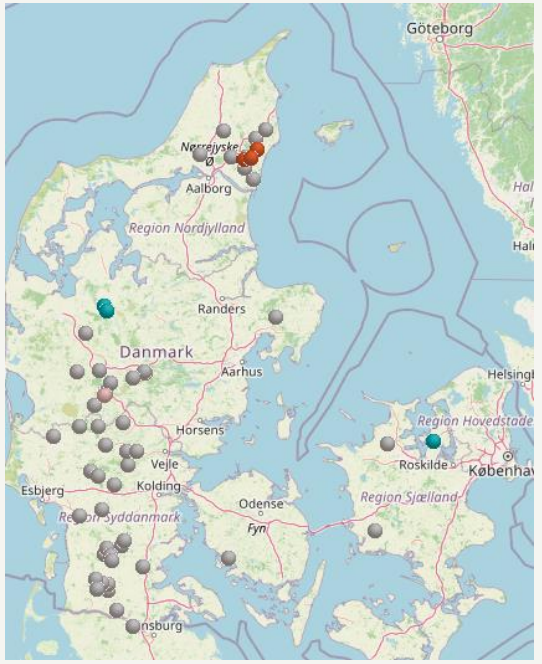
2023 (20 pct.)

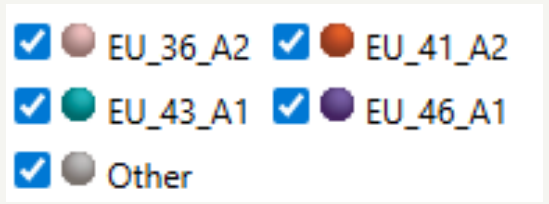


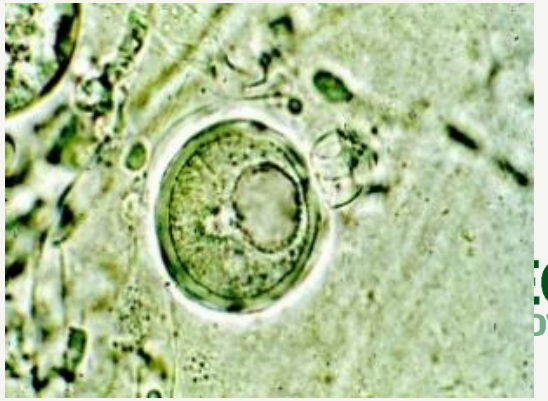
2024 (5 pct.)



2025 (4 pct.)

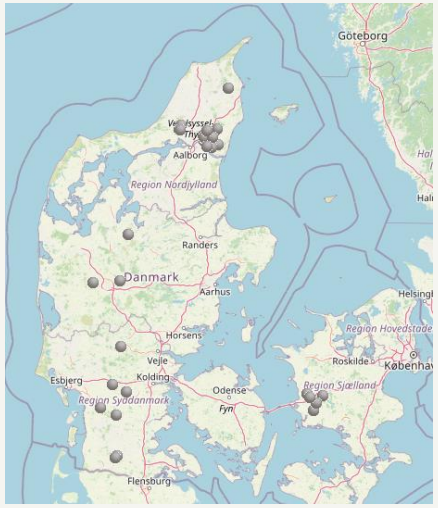




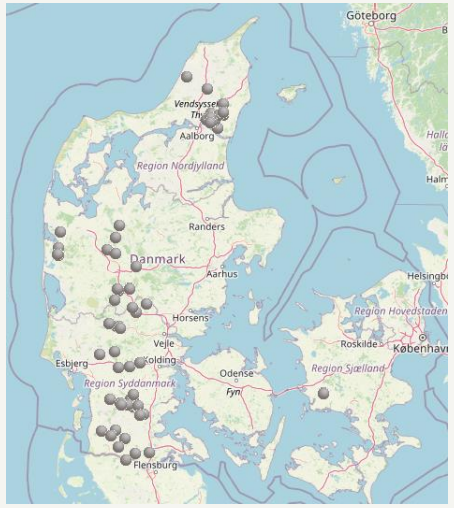


Sexual recombiantion – every year!

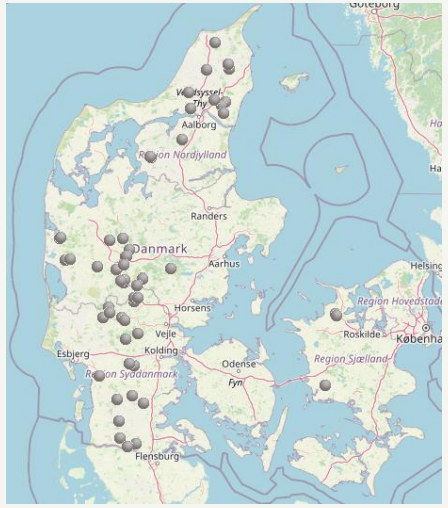
2018



2019

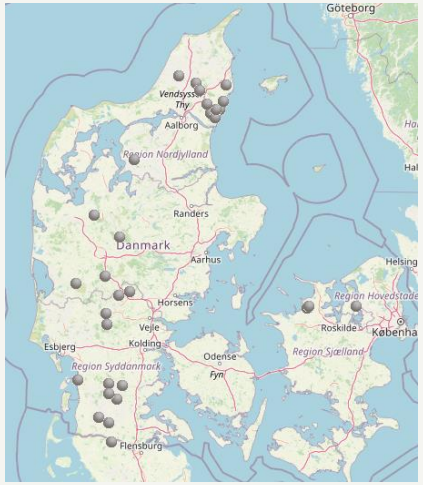


2020

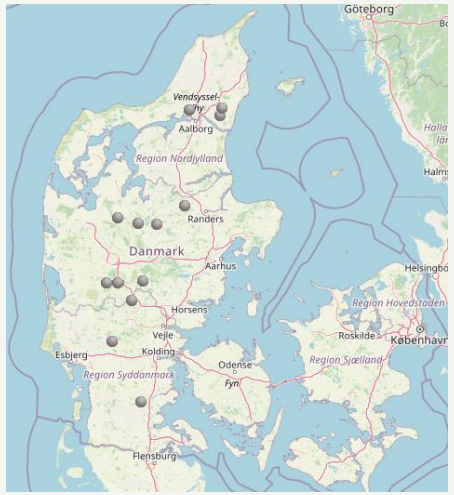


2021

2022

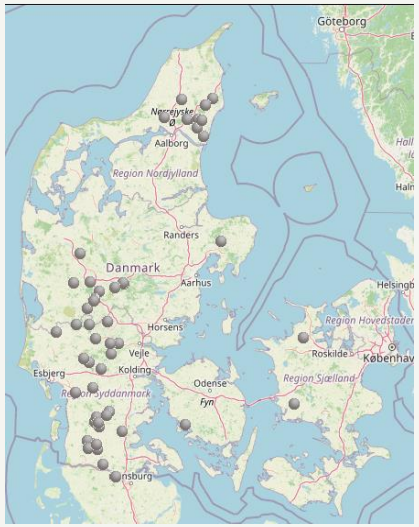


2023



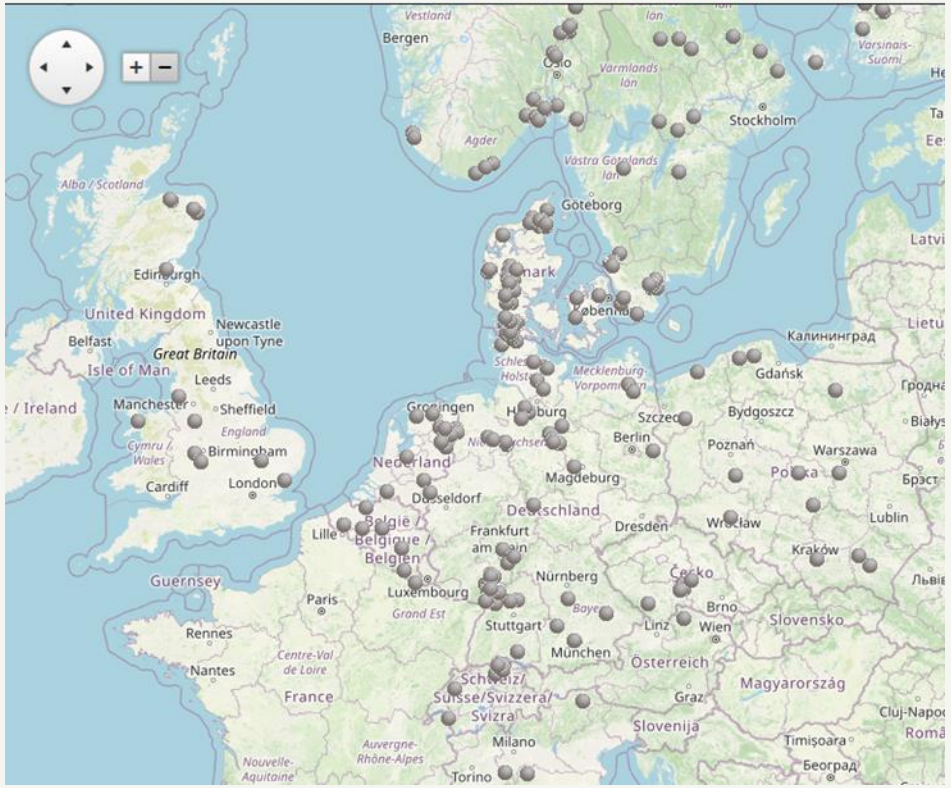
2024

2025

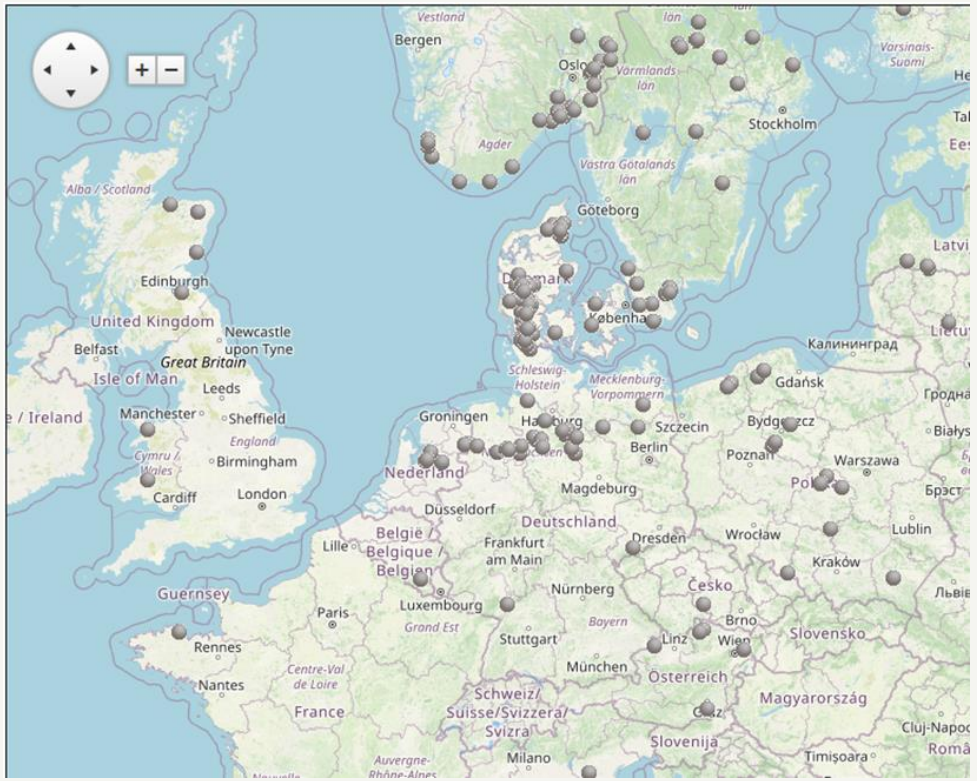


Sexual recombination in Europe

2024

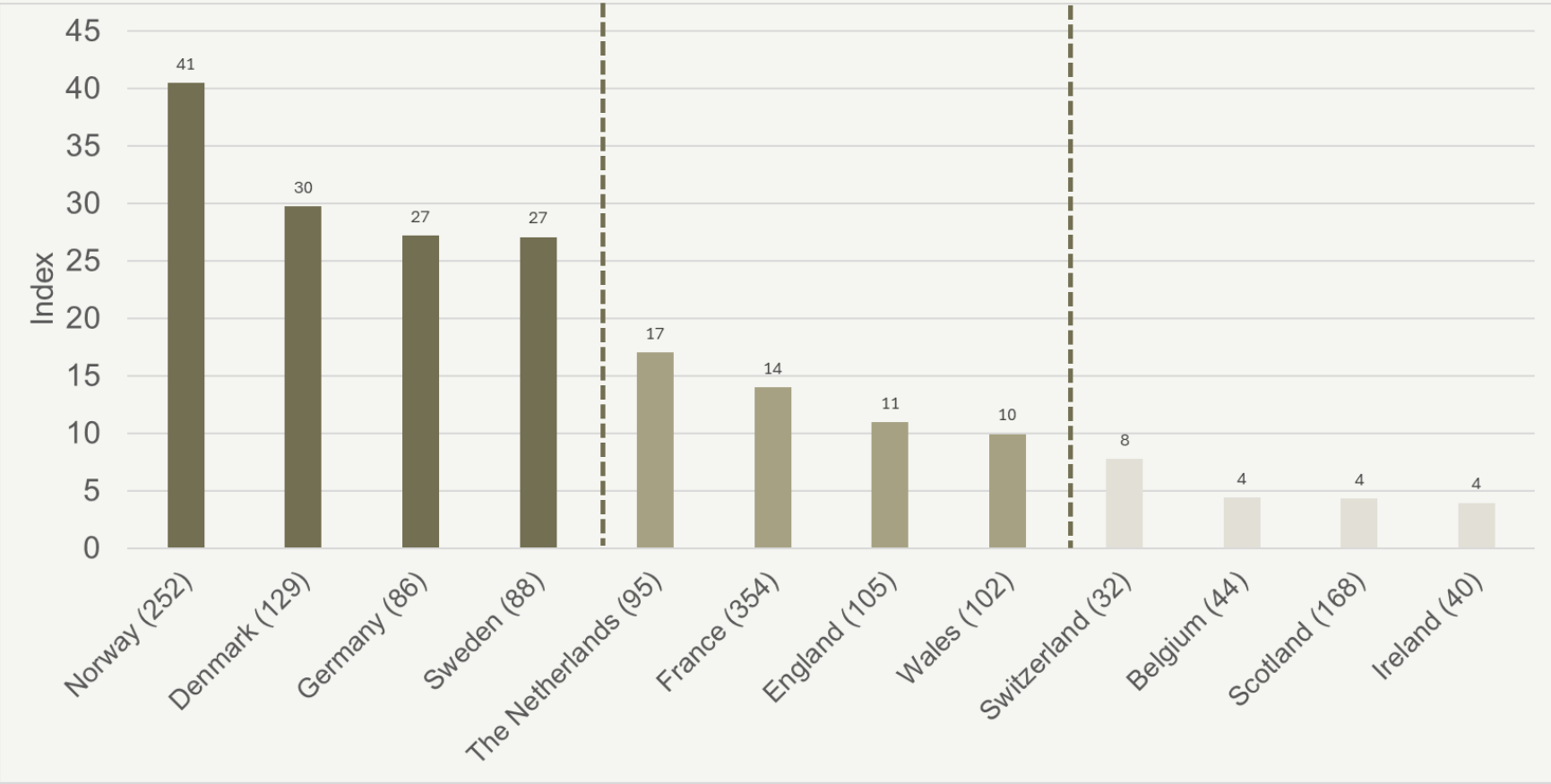


2025



SEGES INNOVATION

Genetic Diversity
Stoddard & Taylor Diversity Index (G)



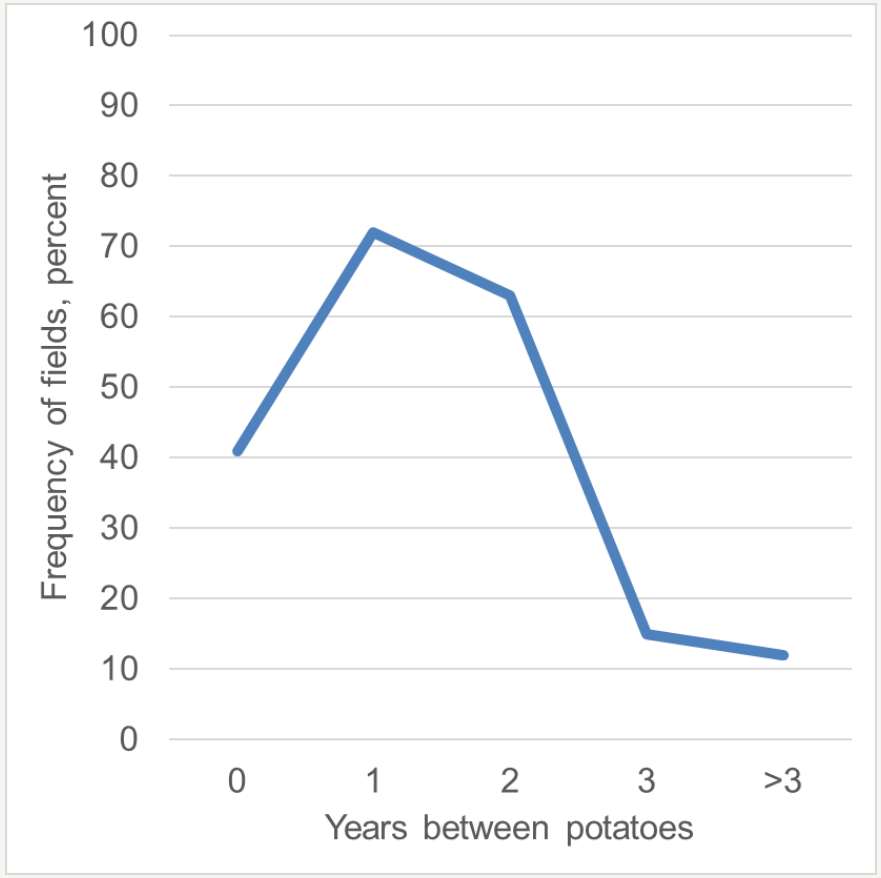
Dataset continuously updated – values may change as new isolates are added

Survival of oospores
(”short” term survival structure?)

- At least 2 years in Sweden (Andersson et al., 1998)
- At least 4 winter in Scandinavia (Nordskog et al., unpublished data)
- At least to the next growing season in Finland (Lehtinen and Hannukkala 2004)
- Up to 4 years in Holland (Turkensteen et al., 2000)
- Survival of two years in Mexico (Fernandez-Pavia et al. 2004)

SEGES INNOVATION

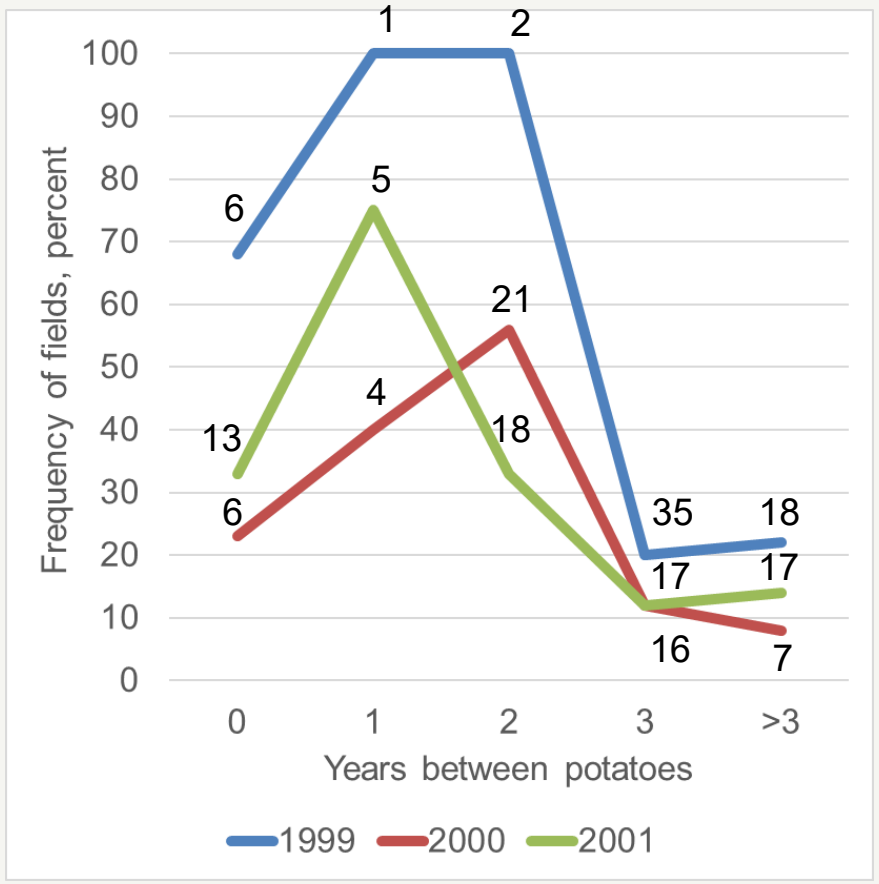
Crop rotation and late blight?
Frequency of fields with blight (186 fields)



(Source: Bødker, L., Pedersen, H., Kristensen, K., Møller, L., Lehtinen, A. & A. Hannukkala 2006.)

SEGES INNOVATION

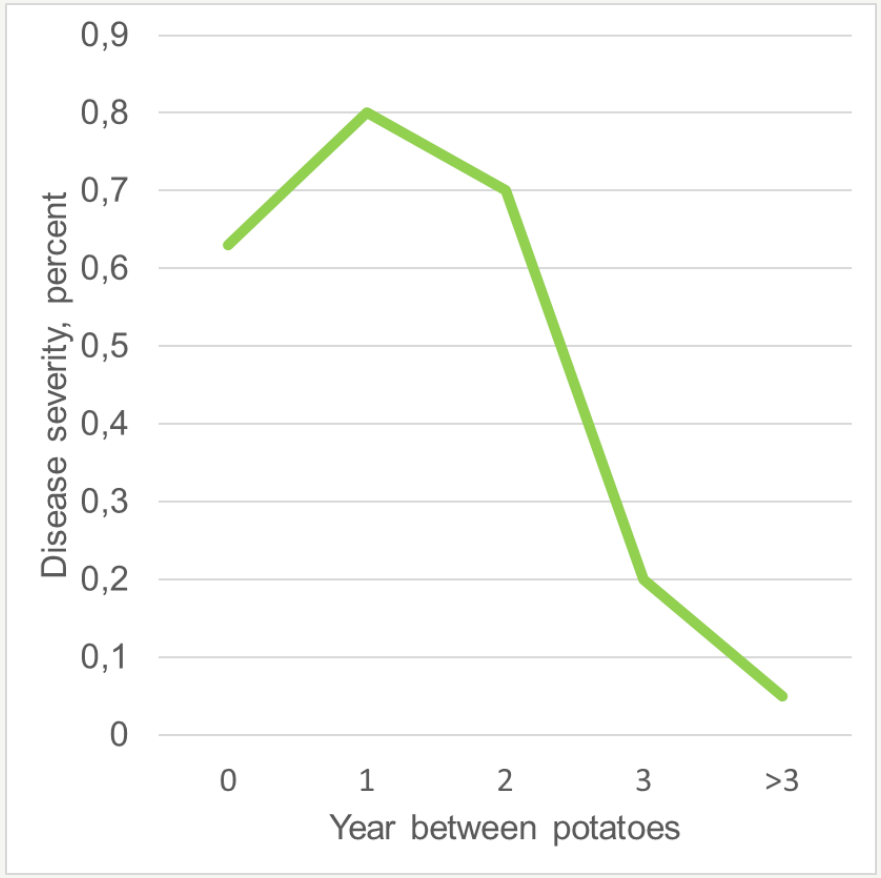
Crop rotation and late blight?
Frequency of fields with blight (186 fields)



(Source: Bødker, L., Pedersen, H., Kristensen, K., Møller, L., Lehtinen, A. & A. Hannukkala 2006.)

SEGES INNOVATION

Crop rotation and late blight?
Disease severity



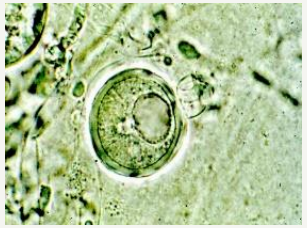
(Source: Bødker, L., Pedersen, H., Kristensen, K., Møller, L., Lehtinen, A. & A. Hannukkala 2006.)

SEGES INNOVATION

History of oospore – renewal of focus!

A1

1845-1852



A2

1976

A2

1984

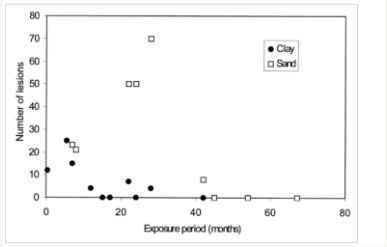
Hohl &Iselin 1984

Plant Pathology (2000) **49**, 688–696

Production, survival and infectivity of oospores of *Phytophthora infestans*

L. J. Turkensteen[a], W. G. Flier[a]*†, R. Wanningen[a]‡ and A. Mulder[b]

[a]*Plant Research International, PO Box 16, 6700 AA Wageningen; and* [b]*H. L. Hilbrands Laboratory for Soilborne Pests and Diseases (HLB), Kampsweg 27, G418PD Wijster, The Netherlands*



Andersson et al. 1998

1992 - 2001

2026

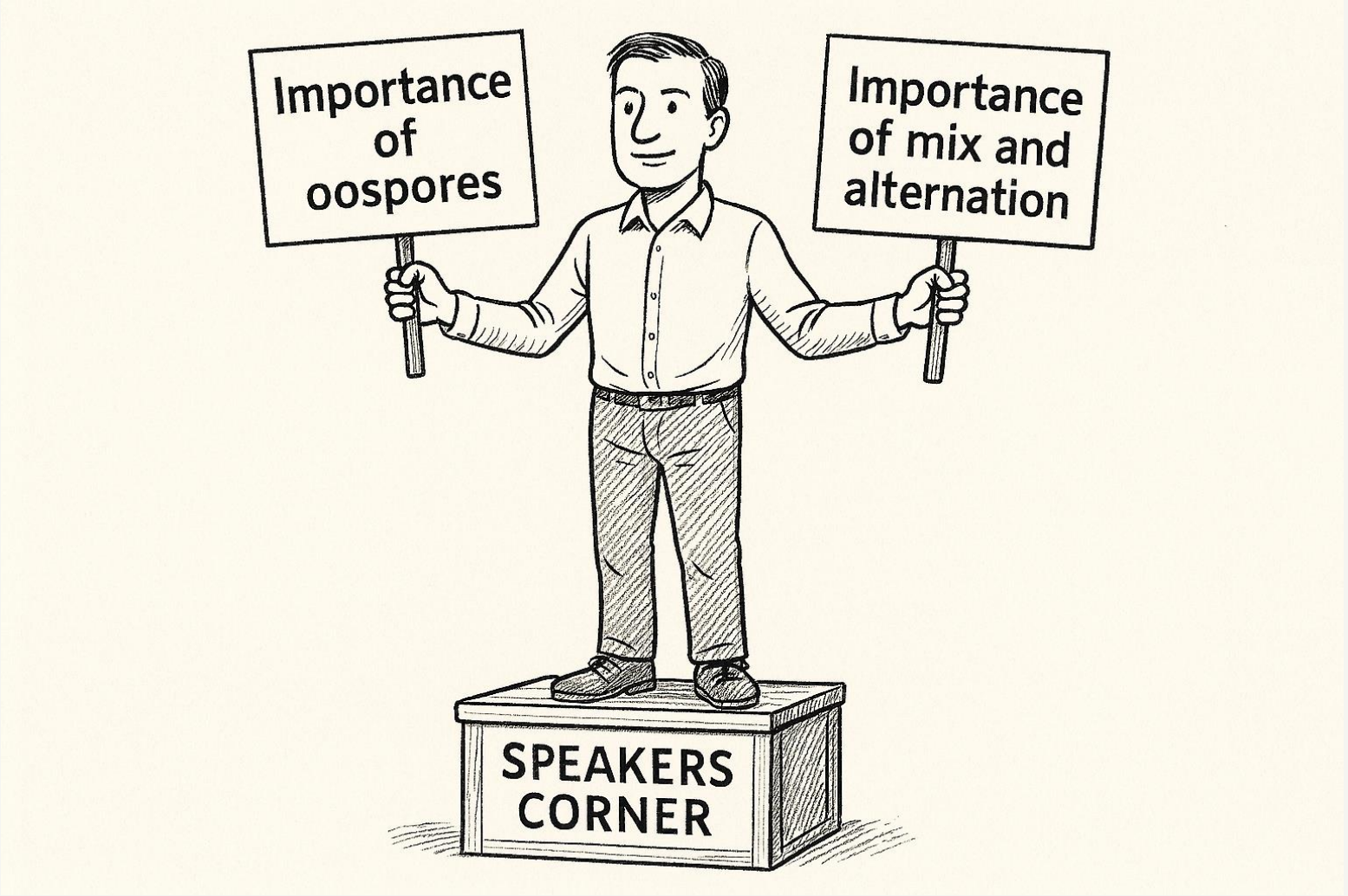
Aprox. 25 yr

Aprox. 25 yr

- Single R-genes breakdown
- Single site MoA breaks down
- Virulence and fungicide resistance is linked to region
- EU41, EU43, breakdown Rpi-vnt1.1, ……
- High genetic diversity in genotypes

SEGES INNOVATION

Conclusion



SEGES INNOVATION