# Performance of Infinito for control of emerging late blight clones

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**EuroBlight meeting Netherlands**

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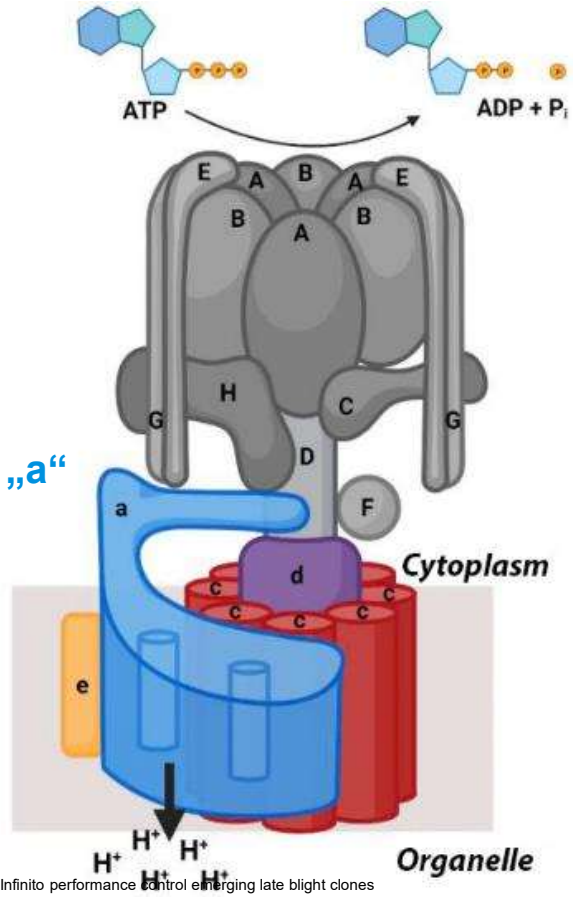
# Mode of Action of Fluopicolide and sensitivity of *Phytophthora infestans*

# Fluopicolide holds a unique mode of action

## Vacuolar-type Proton ATPase, the recently identified `real´ target-site

**Subunit small „a“**




### V-ATPase activity in fungi can affect the

- acidification of the fungal vacuoles
- regulation of intracellular pH
- transport of molecules across the plasma membrane

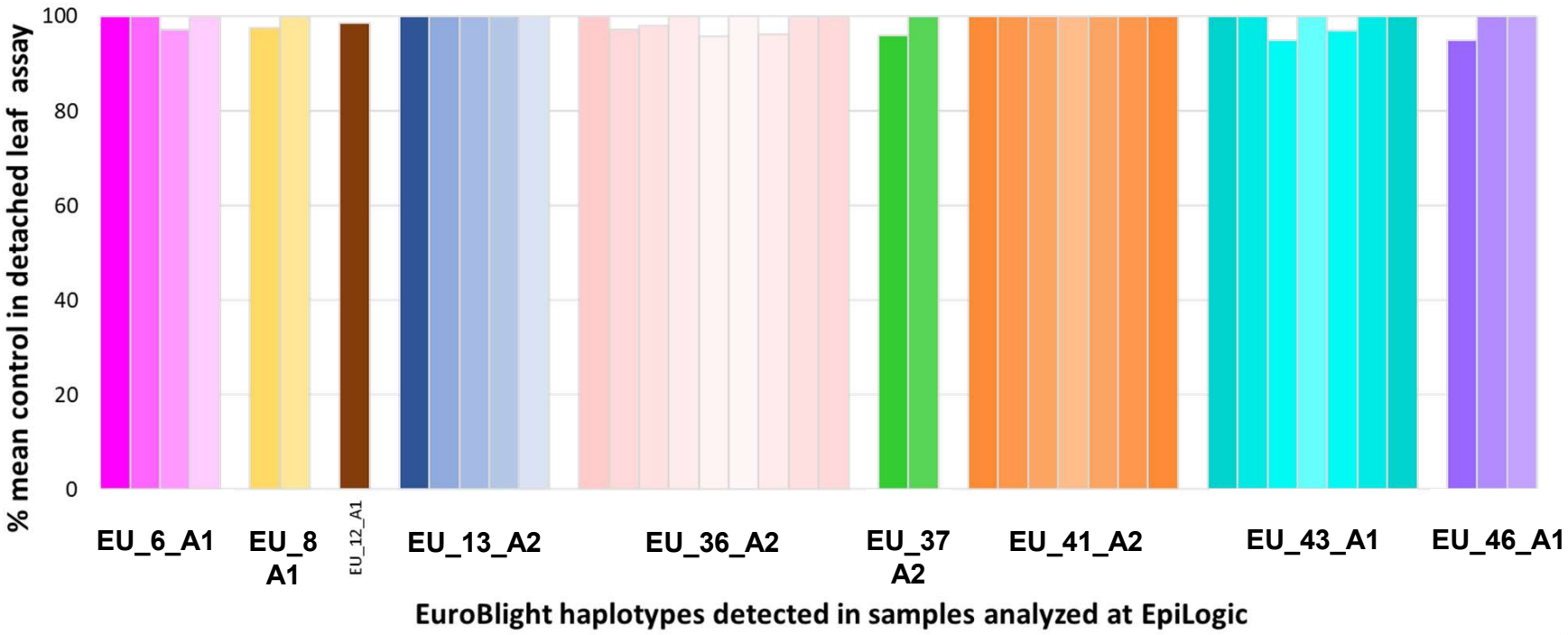
***V-Type ATPase** with **subunit a** identified as the fluopicolide target*
(https://link.springer.com/article/10.1007/s41348-024-00908-y)

**Fluopicolide has a unique mode of action**

# *Phytophthora infestans*: sensitivity of different EuroBlight-types towards fluopicolide

detached leaf test: 30 mg/l fluopicolide, samples collected in 2018 to 2023

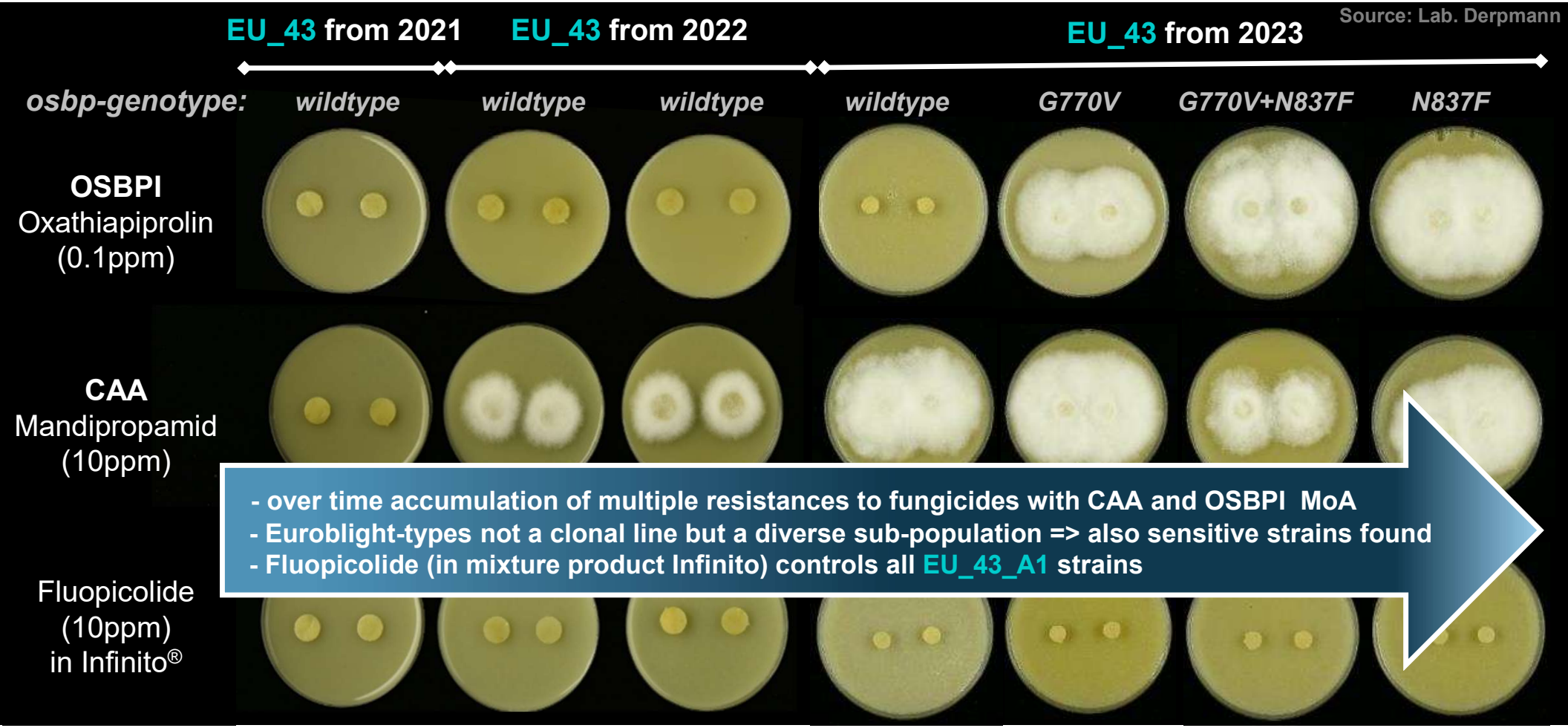
sensitivity data: EpiLogic




**- full sensitivity towards fluopicolide confirmed for all samples, independent of haplotype**

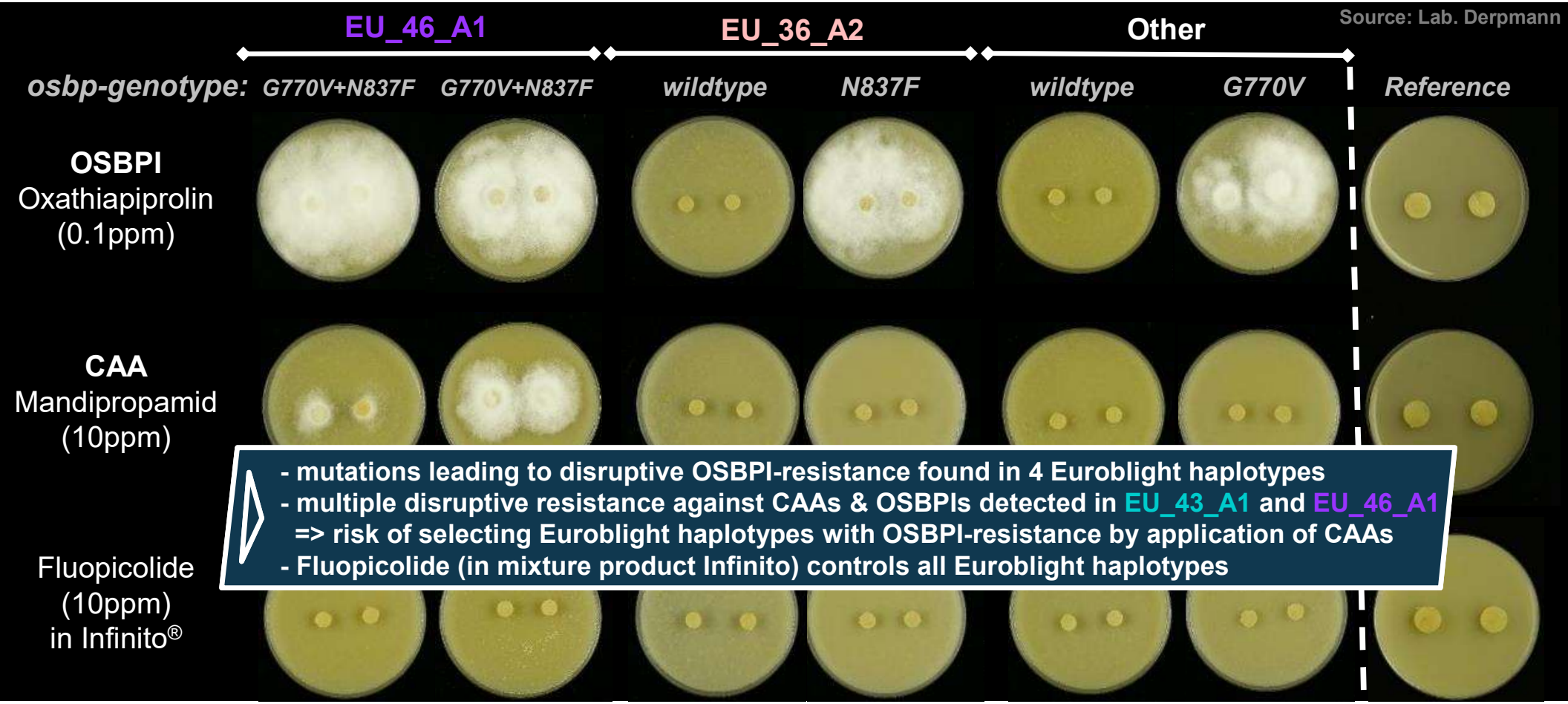

# Further analysis of *P. infestans* strains from various EuroBlight-types

# *P. infestans* – difference in sensitivity of **EU_43_A1**-type according to EuroBlight collected in 2021, 2022 and 2023 (partly from WU, NL)



# *Pytophthora infestans* – difference in fungicide sensitivity of strains from various EuroBlight-types collected in DE/NL in 2023

petri-dishes with discriminatory doses of active ingredients photographed after 7 to 12 DAI with strains



# Cross-resistance study with three Modes of Action (MoA) with different *P. infestans* strains from DE and NL collected in 2023

first results of *in-vitro* Resistance Factors of different *osbp*-genotypes and EuroBlight haplotypes

Source: Lab. Derpmann

| *osbp*-genotype (+I816M*) | EuroBlight haplotype | n | Resistance Factor [$mEC_{50}$ / $mEC_{50}$ wildtype] | | |
|---|---|---|---|---|---|
| | | | Oxathiapiprolin | Mandipropamid | Fluopicolide |
| G770V | EU_43_A1 | 11 | **>1000** | **>1000** | 1 |
| | Other | 1 | **>1000** | 4 | 2 |
| G770V+N837F | EU_43_A1 | 1 | **>400** | **>1000** | 1 |
| | EU_46_A1 | 21 *(+2)* | **>1000 (>1000)** | 14 ***(>600)*** | 1 (1) |
| N837F | EU_36_A2 | 1 | **>1000** | 1 | 2 |
| | EU_43_A1 | 4 | **>1000** | **>1000** | 1 |

**- all *osbp*-genotypes lead to a strong increase in Resistance Factors values for OSBPIs**
**- *osbp*-genotypes are independent of EuroBlight haplotypes (EU_36, EU_43, EU_46 or Other)**
**- independent of *osbp*-genotype or EuroBlight haplotype: all isolates controlled by Fluopicolide**

* role of 816M not clear yet

# Assessing consequences of mutations in *cesA3*-gene affecting CAAs and mutations in *osbp*-gene affecting OSBPIs

methodology of greenhouse experiments

**Plants:** Potatoes,  var. Bintje, BBCH 14-15, n=4

**Spraying:** 300 L/ha in a spray cabin  (one day protective appl.)

**Inoculation:** wildtype and mutants, about $10^4$ Sp./mL, until wet

**Incubation:** 100% humidity 1DAI, then 95% humidity

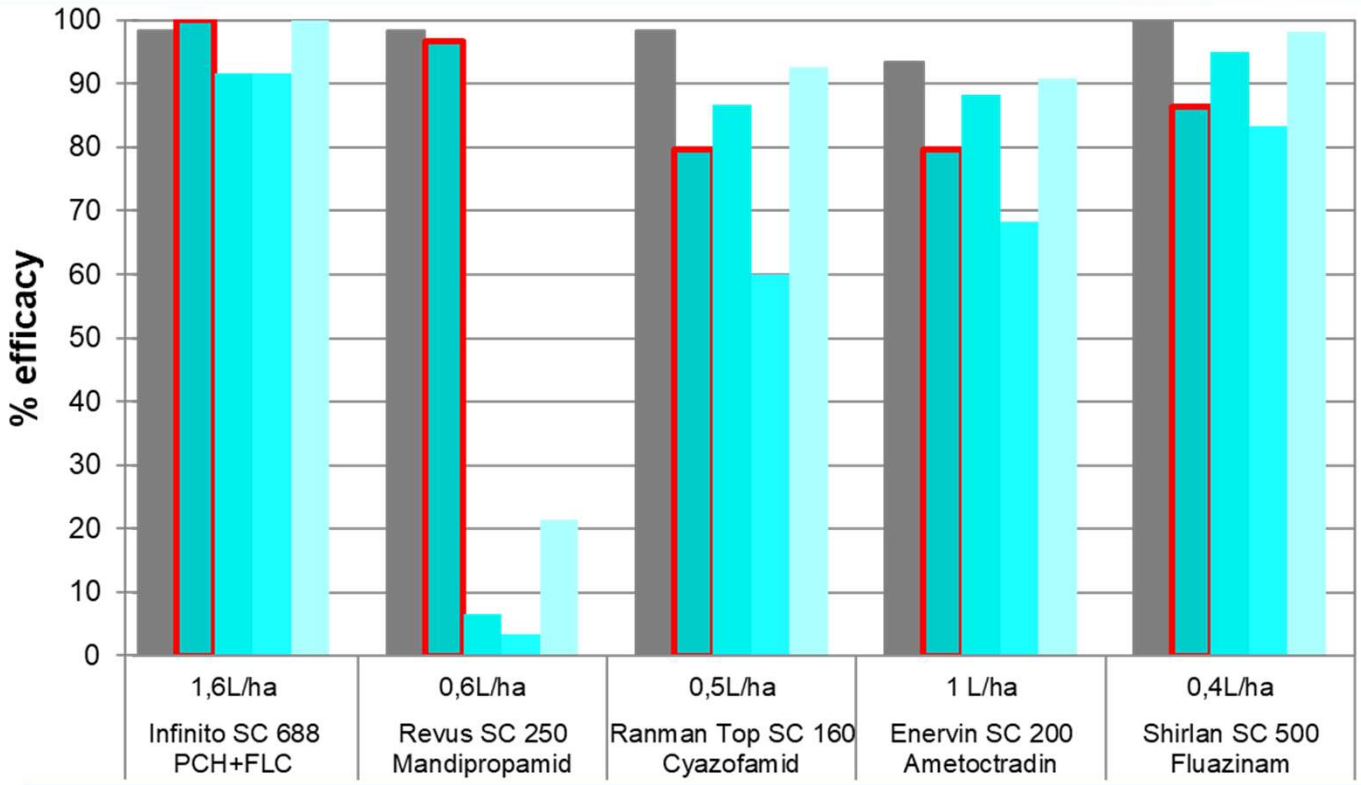

**Measurements:**

- visual assessment at 7 or 8 DAI
- scale: 0-100% disease severity on whole plant
- data analysis done with disease severity data, calculation of efficacy (ABBOTT%) from means

**Separate experiments for each years** always including the same wildtype strain as a reference

# Efficacy of Infinito® on different *P. infestans* strains of the EU_43_A1 'haplotype' from 2021 and 2022, provided by WU

greenhouse experiment, protective application, assessment 8 days after infection




Source: Lab. Hilz

- Reference strain
- EU_43_A1 strain from 2021
- EU_43_A1 strains from 2022 (prob. G1105S in *cesA3*-gene)

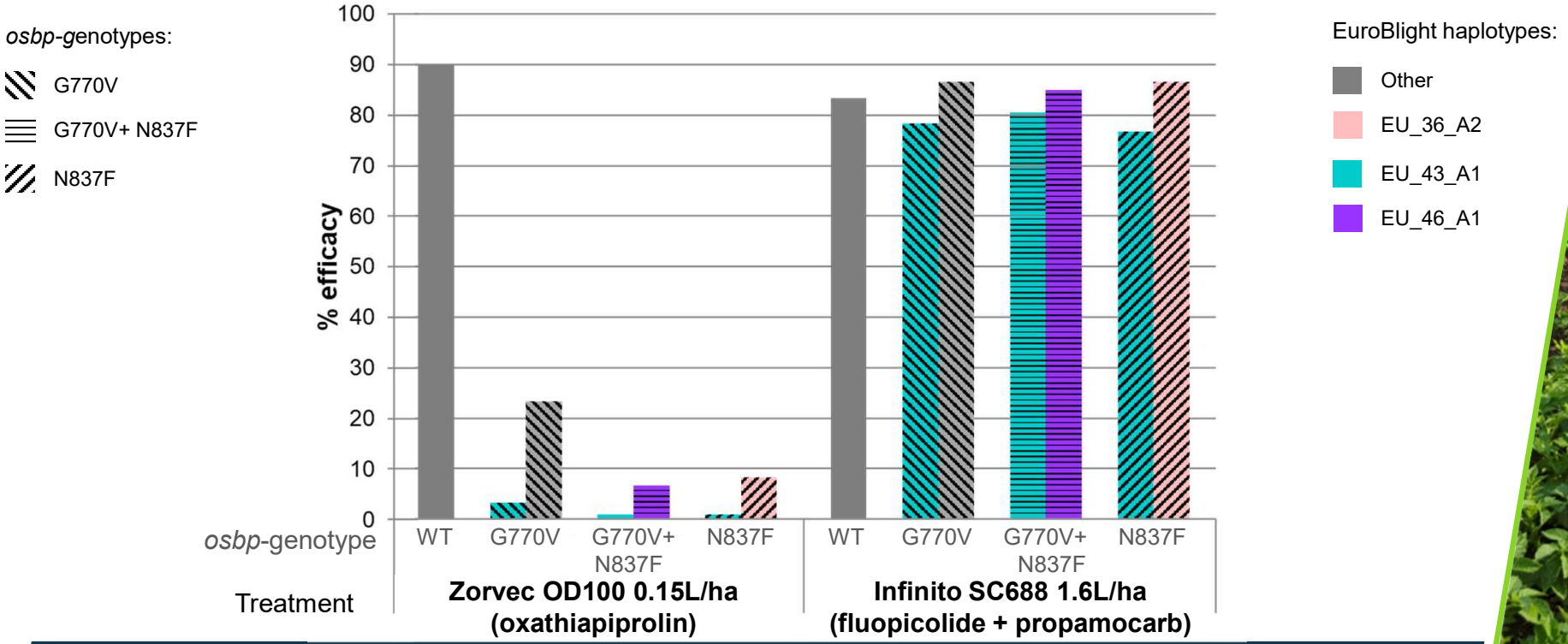
**- All EU_43_A1 isolates from 2021 and 2022 in this study are controlled by Infinito®**
**- EU_43_A1 isolate from 2021 is sensitive to mandipropamid, whereas 2022 isolates are resistant**

WU: Wageningen University

# Efficacy of Zorvec™ and Infinito® on different *P. infestans* strains from Germany and the Netherlands in 2023

greenhouse experiment, protective application, assessment 7 days after infection

Source: Lab. Hilz and Lab. Derpmann




**- all *osbp*-genotypes lead to a strong reduction in efficacy of solo OSBPIs at full dose rate**

**- *osbp*-genotypes are independent of EuroBlight haplotypes (EU_36, EU_43, EU_46 or Other)**

# Time lapse – Infinito performance

# *Need for Fungicide Resistance Management*

# Recommendations 2024

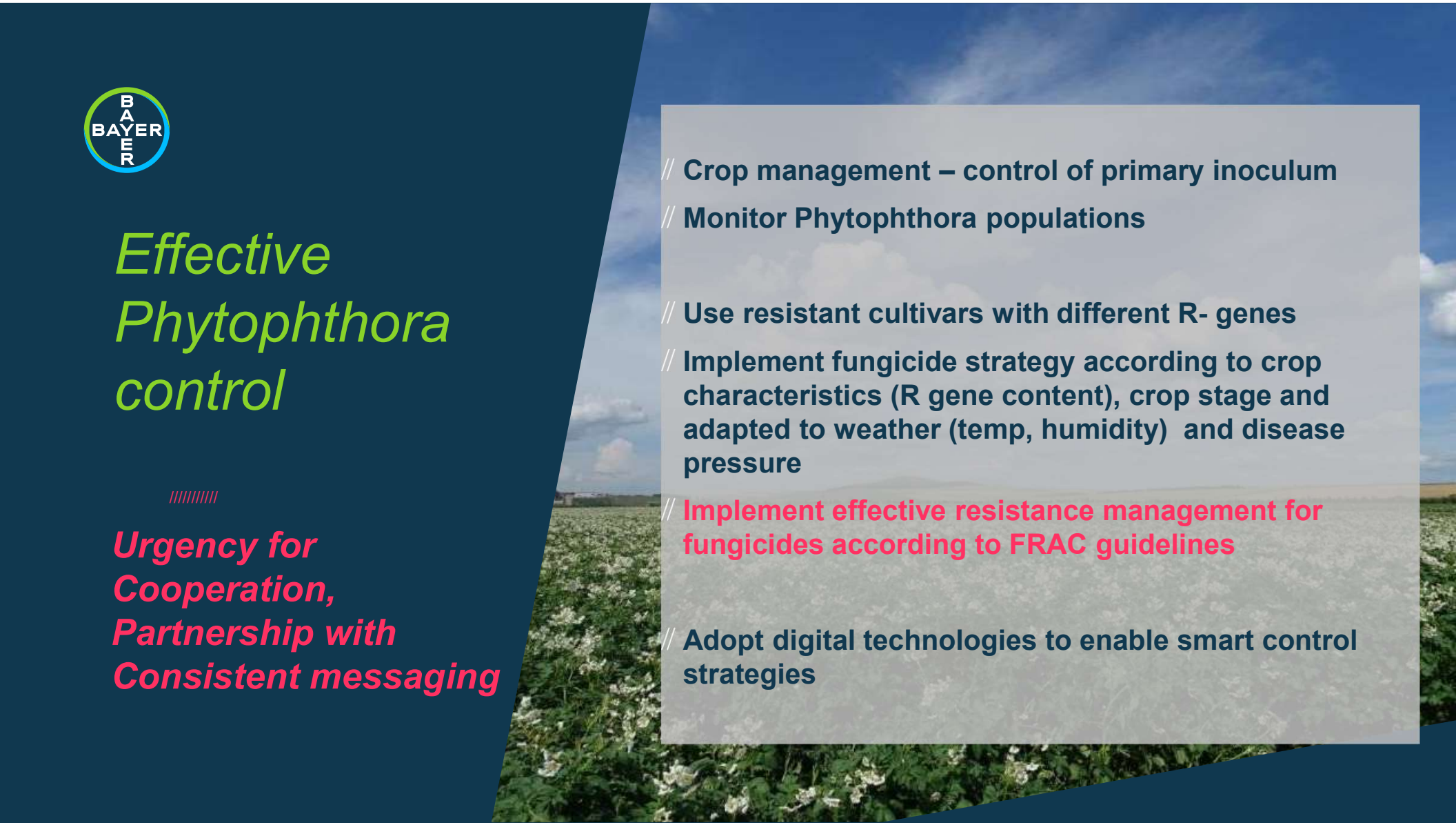
Strongly reduce selection pressure with CAA and OSBPI's fungicides on EU_43 and EU_46

- **Fungicide strategy: Mix and alternate different MOA's**
  - Implement preventive control schemes: do not tolerate any Phytophthora!
  - Strictly implement new FRAC guideline for CAA and OSBPI fungicides (March 2024)
  - No support for block applications: **recommendation for alternation of MOA's**
- **Cultivar resistance / tolerance**
  - Protect novel resistance genes with crop protection products
  - Robust varieties: use stacked resistance genes (e.g. > 2 genes)
- **Task force Phytophthora joint approach:** BO Akkerbouw, LTO, Breeders Association and CropLife
- **Transition to 2030**
  - Sustain fungicide activity with unique mode action, we cannot miss another MOA **(inclusive CfS!)**
  - Sustain activity of R – genes, we cannot miss any of the novel Rpi genes

**Source:** Geert Kessel - WUR

# *Effective Phytophthora control*

***Urgency for Cooperation, Partnership with Consistent messaging***



- Crop management – control of primary inoculum
- Monitor Phytophthora populations
- Use resistant cultivars with different R- genes
- Implement fungicide strategy according to crop characteristics (R gene content), crop stage and adapted to weather (temp, humidity) and disease pressure
- Implement effective resistance management for fungicides according to FRAC guidelines
- Adopt digital technologies to enable smart control strategies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# THANK YOU!

# Acknowledgement