Multiyear resistance management trials

EuroBlight May 2024: Oxathiapiprolin

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Resistance management

- Oxathiapiprolin is vulnerable for resistance development in *Phytophthora infestans* population
- Upon the introduction of oxathiapiprolin it was decided to develop a resistance management strategy
- What is better? spraying 3 x in block or alternating the Zorvec application with another fungicide (resistance breaker)?
- Included multisite resistance breaker & multisite resistance breaker + curative

Trial set-up

- Trials were set up in Ayr (UK), Freising (D), Lelystad (NL) and Villers St Christophe (Fr)
- The first trial was in 2019, the last one according to the protocol was in 2022
- Usually, 7 treatments, in 3 or 4 replicates
    - Commercial, non-Zorvec programme
    - Block of 2 or 3 Zorvec application
    - Alternating 2 or 3 Zorvec application and 2 different breakers

Spray program example NL 2019

Werkelijke uitvoeringsdatum	2-jul	9-jul	12-jul	16-jul	19-jul	23-jul	30-jul	1-aug	6-aug	8-aug	13-aug	16-aug
A	Infinito 1.6 L	Infinito 1.6 L		Infinito 1.6 L		Infinito 1.6 L	Infinito 1.6 L		Infinito 1.6 L		Infinito 1.6 L	
B	Zorvec Enicade 0.15 L + Dithane DG NT 1.5 KG		Zorvec Enicade 0.15 L + Dithane DG NT 1.5 KG			Zorvec Enicade 0.15 L + Mancozeb 1.5 KG		Dithane DG NT 2 kg		Dithane DG NT 2 kg		Dithane DG NT 2 kg
C	Zorvec Enicade 0.15 L + Dithane DG NT 1.5 KG		Dithane DG NT 2 kg		Zorvec Enicade 0.15 L + Dithane DG NT 1.5 KG		Dithane DG NT 2 kg		Zorvec Enicade 0.15 L + Dithane DG NT 1.5 KG			Dithane DG NT 2 kg
D	Zorvec Enicade 0.15 L + Dithane DG NT 1.5 KG		Nautile WG 2 kg		Zorvec Enicade 0.15 L + Dithane DG NT 1.5 KG		Nautile WG 2 kg		Zorvec Enicade 0.15 L + Dithane DG NT 1.5 KG			Curzate M 2.5 kg
E	Zorvec Enicade 0.15 L + Dithane DG NT 1.5 KG		Zorvec Enicade 0.15 L + Dithane DG NT 1.5 KG			Dithane DG NT 2 kg	Dithane DG NT 2 kg		Dithane DG NT 2 kg		Dithane DG NT 2 kg	
F	Zorvec Enicade 0.15 L + Dithane DG NT 1.5 KG		Dithane DG NT 2 kg		Zorvec Enicade 0.15 L + Mancozeb 1.5 KG		Dithane DG NT 2 kg		Dithane DG NT 2 kg		Dithane DG NT 2 kg	
G	Zorvec Enicade 0.15 L + Dithane DG NT 1.5 KG		Nautile WG 2 kg		Zorvec Enicade 0.15 L + Mancozeb 1.5 KG		Nautile WG 2 kg		Dithane DG NT 2 kg		Dithane DG NT 2 kg	

oxathiapiprolin + other active

Multisite breaker + curative

Commercial non Zorvec programme

Multisite breaker

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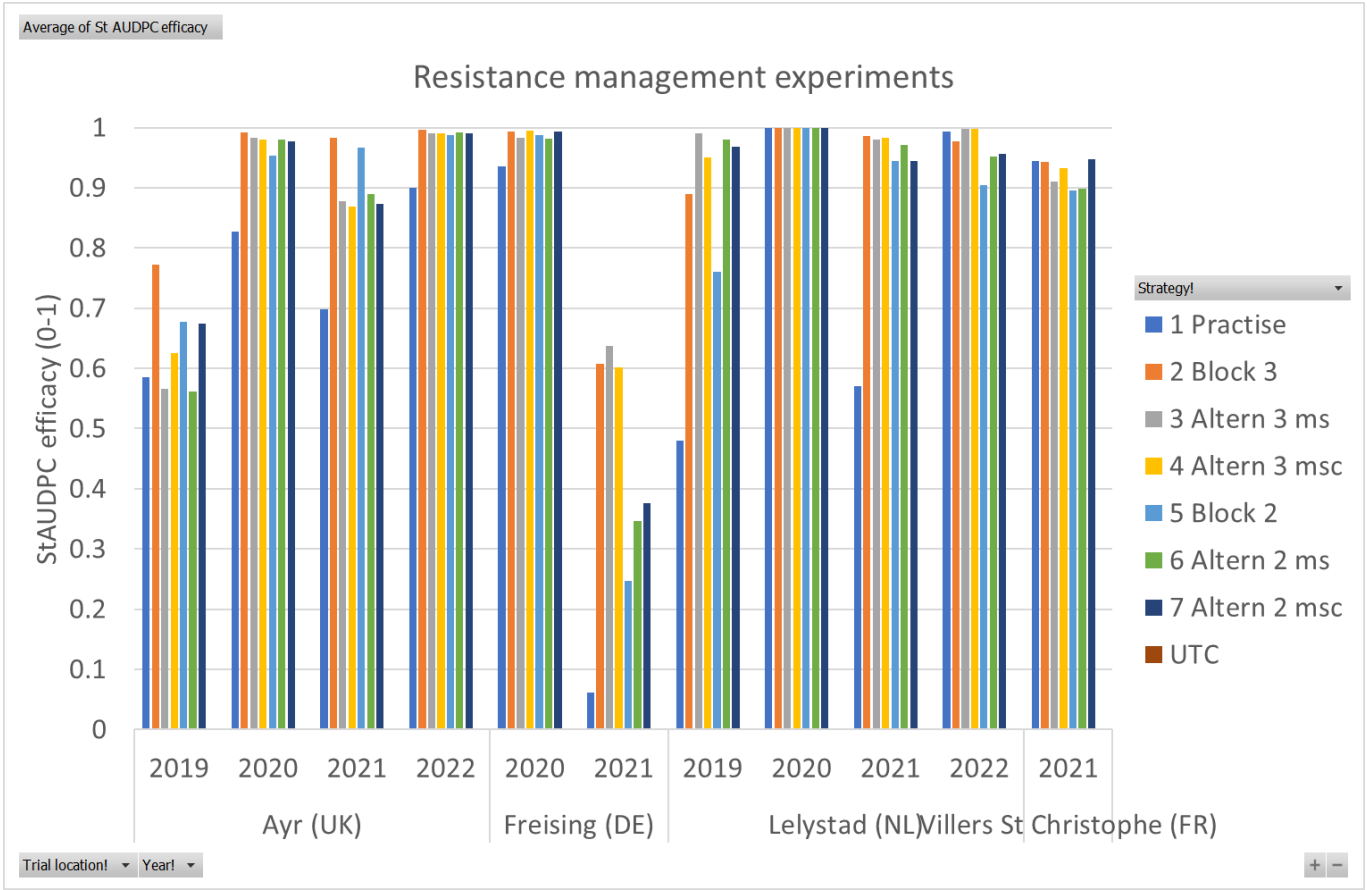
Efficacy (0-1) of spray program



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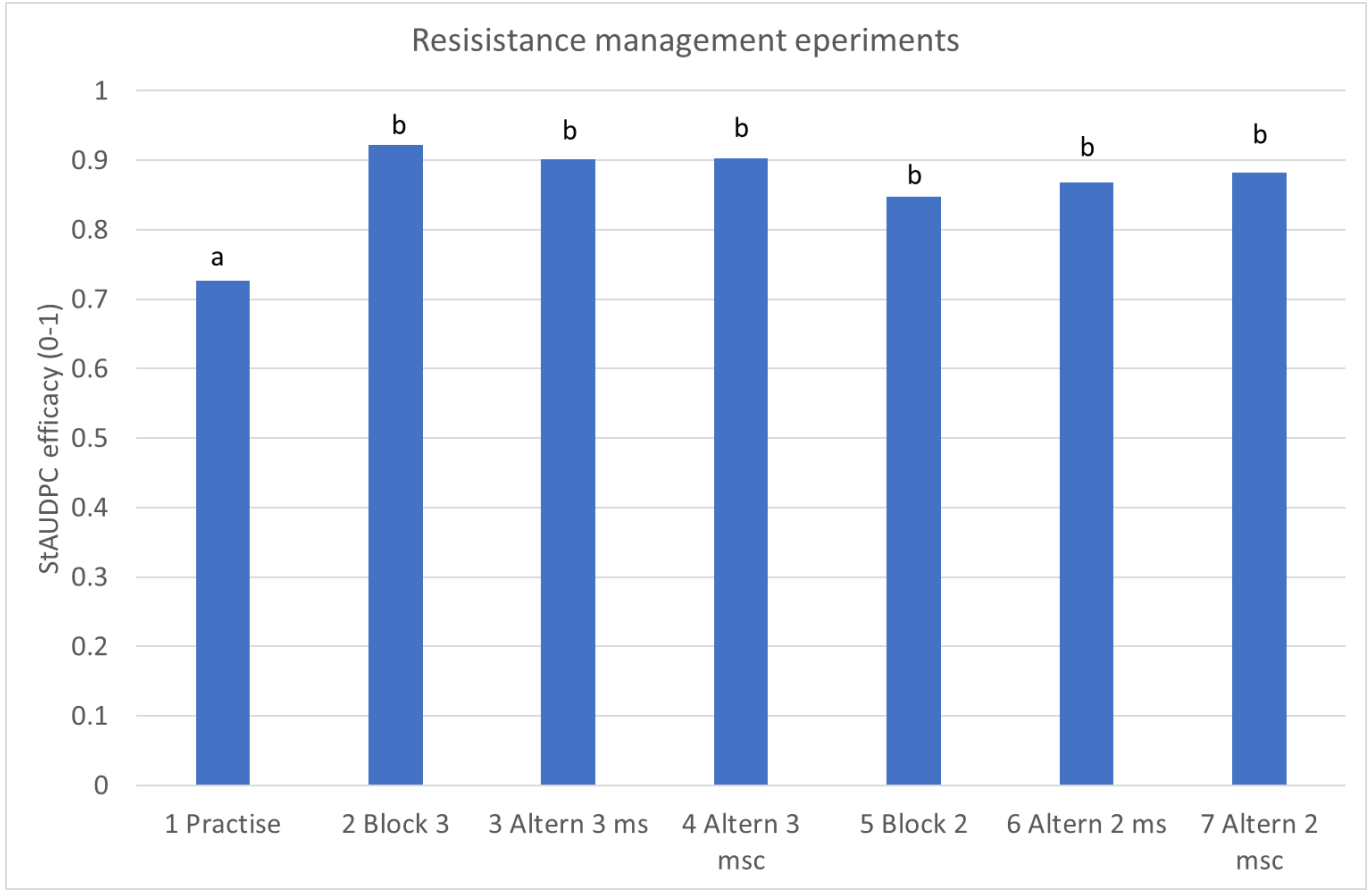
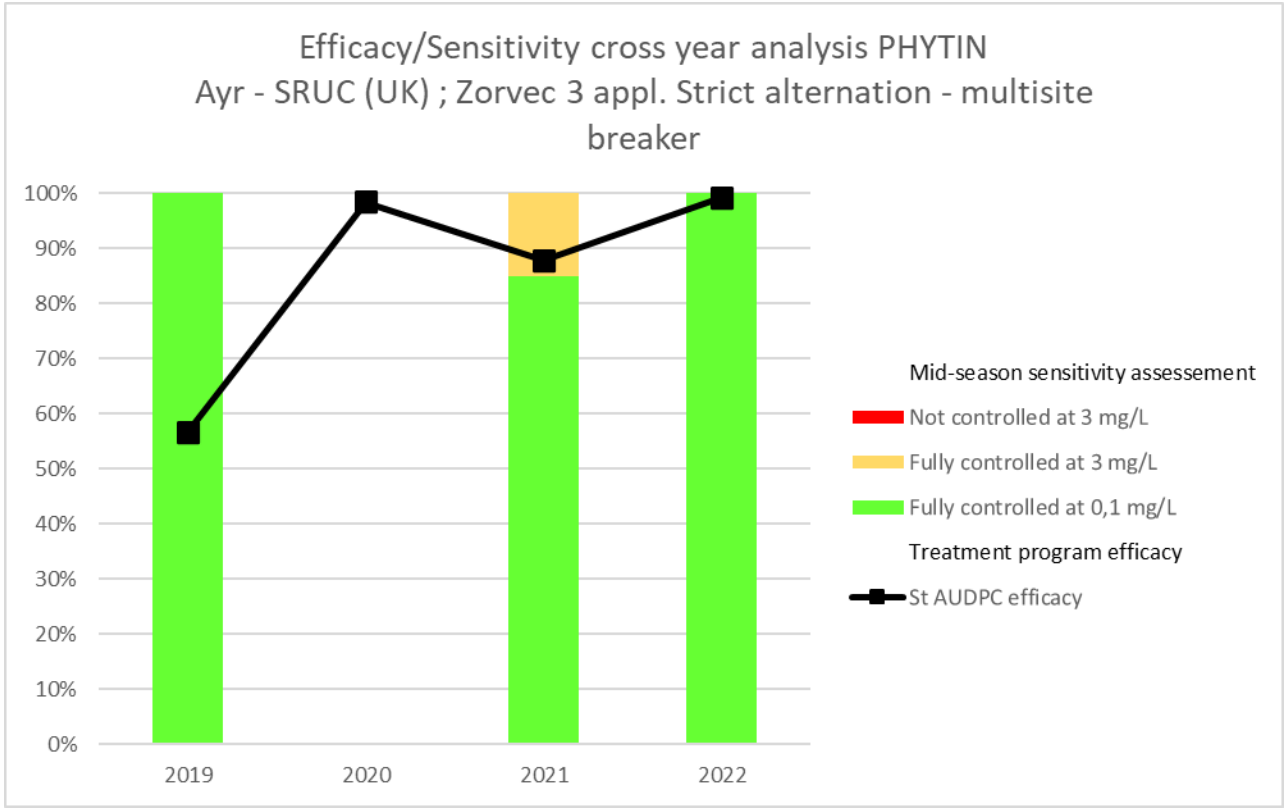


Control of *P. infestans* at 0.1 mg/l oxathiapiprolin bio-assay with leaf discs

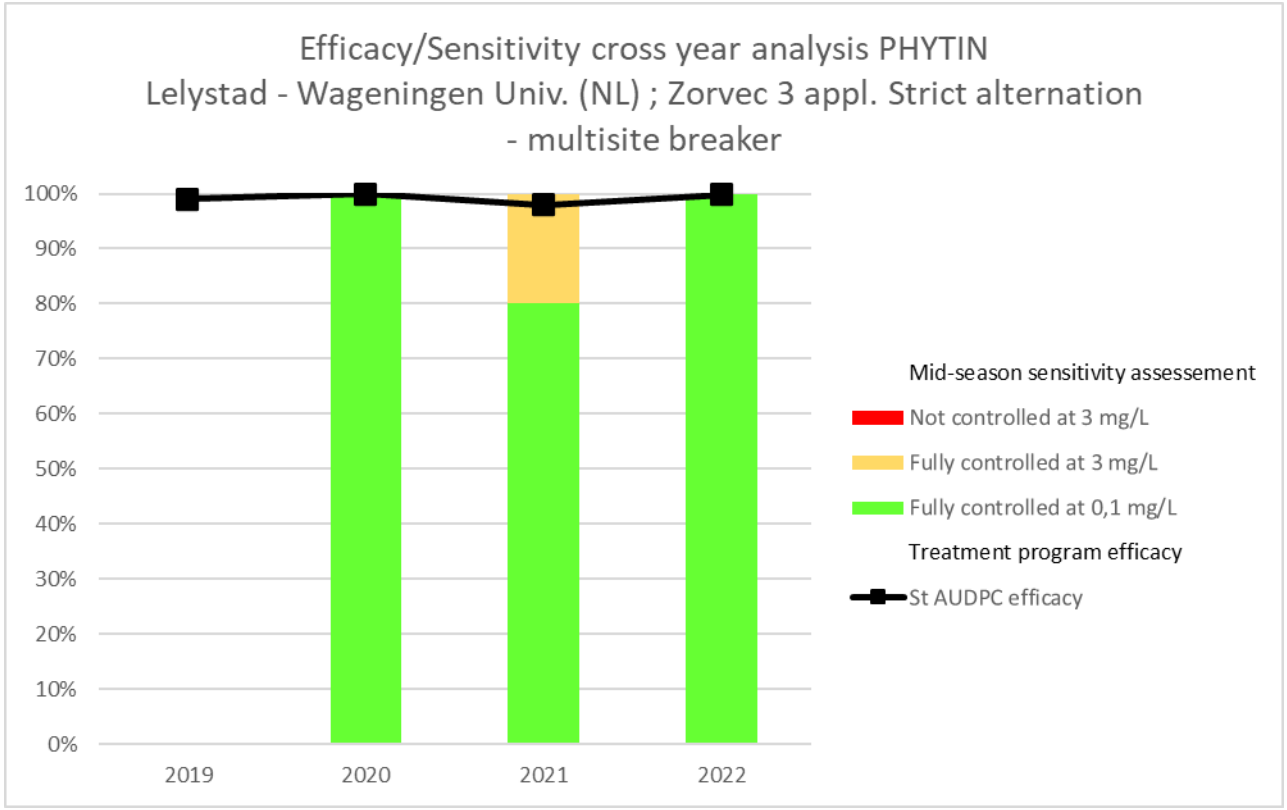
Blanks are no viable *P. infestans* retrieved from sampled lesions or no lesions were present

All *P. infestans* isolates retrieved were at least controlled at 3 mg/l oxathiapiprolin

Control of *P. infestans* at 0.1 and 3 mg/l oxathiapiprolin, example



Control of *P. infestans* at 0.1 and 3 mg/l oxathiapiprolin; an example



Conclusions multiyear trials 2019-2022

- 11 trials gave enough disease pressure
- Blocking or alternating of oxathiapiprolin gave no significant difference in potato late blight control
- 2 or 3 times oxathiapiprolin did not make a significant difference in disease control
- All viable *P. infestans* isolates retrieved during the experiments could be fully controlled at least with 3.0 mg/l oxathiapiprolin, the majority (96%) at 0.1 mg/l

Update Resistance OSBPIs in PHYTIN

- **Resistance to oxathiapiprolin developed in Benelux and western Germany**
  - ✓ Detection of single cases of resistance in other EU countries
  - ✓ Resistance mechanism is target-site alteration : mutations at the **O**xy**S**terol **B**inding **P**rotein (OSBP).
  - ✓ **Mutations: G770V,** I816M**, N837F, N837L,** K884E**, N837I**

➢ FRAC changed the use recommendations for OSBPI based products

- All companies provided clear evidences showing resistance to OSBPI is not related to EuroBlight genotypes
  - ➢ **Resistance to oxathiapiprolin can occur in any genetic background (EU43, EU46 & EU36)**
  - ➢ **Sensitive strains were found to be EU43, EU46 & EU36**
- Very Robust monitoring program for 2024

New recommendations to maximize Zorvec products effective life

Current labels allow for 4 applications max or no more than 33% of total fungicide applications

- In all European regions
  - Strict alternation of Zorvec with products of a difference MOA
  - 7 day spraying interval (or 10 days in case of low disease pressure)
  - Recommendation for no use on seed potatoes

- Most of the Europe (countries of high inclination like UK/IE but resistance not spotted, and countries of lower inclination
  - **Normal disease pressure** – 20% of the total number of sprays or no more than 3 applications, whichever is lower
  - **High disease pressure and/or highly susceptible varieties** –In addition, utilize a tank mix of a curative MOA (cymoxanil, propamocarb)

New recommendations to maximize Zorvec products effective life

Current labels allow for 4 applications max or no more than 33% of total fungicide applications

- Areas of high inclination and resistance spotted (Netherlands, Belgium, and Germany) Number of Applications and tank-mixtures:
  - **Normal disease pressure** – **2** applications max or 20% of the total number of sprays, whichever is lower –
  - **High disease pressure and/or highly susceptible varieties** –# of application as above, additionally utilize a tank mix of a curative MOA (cymoxanil, propamocarb)

Thank you

Questions?