



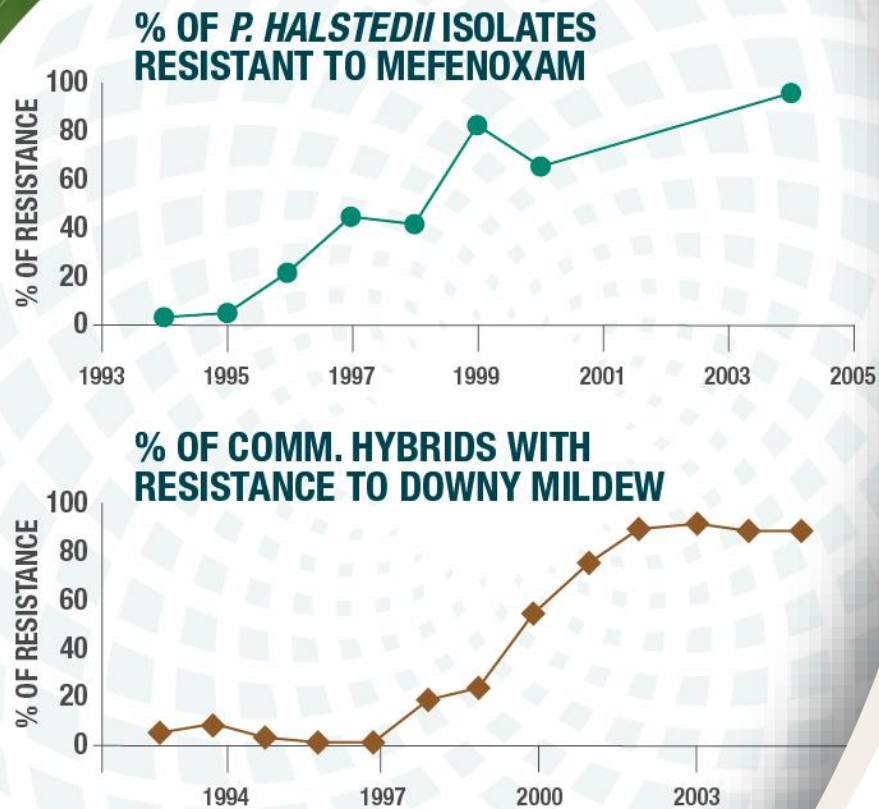
**Downy Mildew of Sunflower – Innovative control with
the seed-applied technologies  **Plenaris**[®] (Oxathiapiperolin)
and  **Ressivi**[™] (Acibenzolar-S-methyl)**

20th International Sunflower Conference, Novi Sad, Serbia.
21st June, 2022
Domenico Di Bianco, Julien Fourmont, Andrey Atanasov, [Brigitte Slaats](#)



syngenta.

Evolution of Resistance in France



- Most Mefenoxam resistant *Plasmopara halstedii* isolated evolved in France when most of the downy mildew control was based on seed treatment only

Source: 2014 Analyse de risque phytosanitaire *Plasmopara halstedii* -agent responsable de la maladie du mildiou tournesol. Avis de l'Anses Rapport

Pillars for integrated Downy Mildew Management

1

GOOD
AGRICULTURAL
PRACTICES



2

GENETIC
RESISTANCE



3

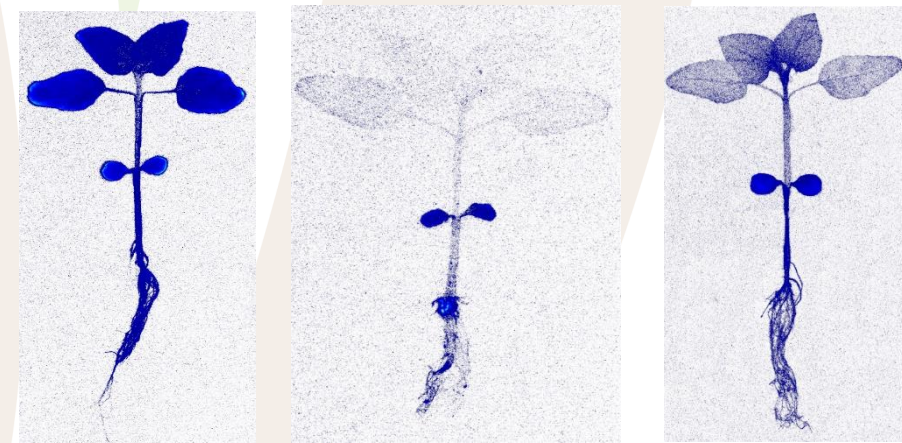
CHEMICAL CONTROL



Introducing Two New Seed-applied Technologies for Downy Mildew Control

ACTIVE INGREDIENT	Metalaxyl-M (MFX)	Oxathiapiproline (OXTP)	Acibenzolar-S-methyl
KEY BRAND	APRON [®] XL	PLENARIS [®]	RESSIVI [™]
CHEMICAL CLASS	Phenylamide	Piperidinyl thiazole isoxazoline	Benzothiadiazole
SYSTEMICITY	Translaminar and acropetal	Low-moderate	Acropetal
SPECTRUM OF ACTIVITY	<i>Plasmopara halstedii</i> , <i>Pythium</i> spp.	<i>Plasmopara halstedii</i>	<i>Plasmopara halstedii</i>

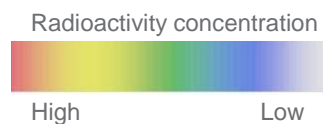
Results – ¹⁴C radiolabeled study – 19 DAT



MFX

OXTP

ASM



* Figures from Physical Chemistry JH

Active ingredient	Log P*	Water solubility (ppm)*
Acibenzolar-s-methyl	3.10	7.7
Mefenoxam	1.71	26000
Oxathiapiprolin	3.66	0.18

Mode of Action

Ressivi™ FS375

Mode of Action:

- **Acibenzolar-S-methyl (ASM) induces functions of salicylic acid in the plant BEFORE any attack.**
- This **triggers activation of natural plant defense mechanisms.**
- **ASM induces the suppression of both primary and secondary infection caused by *Plasmopara halstedii*.**
- Resistance risk to Ressivi™ is considered low.

CROP	PATHOGEN	APPLICATION RATE	
		Per Seed	Per 150,000 Seeds
SUNFLOWER	<i>Plasmopara halstedii</i>	25 µg ai	10 ml

Plenaris® FS200

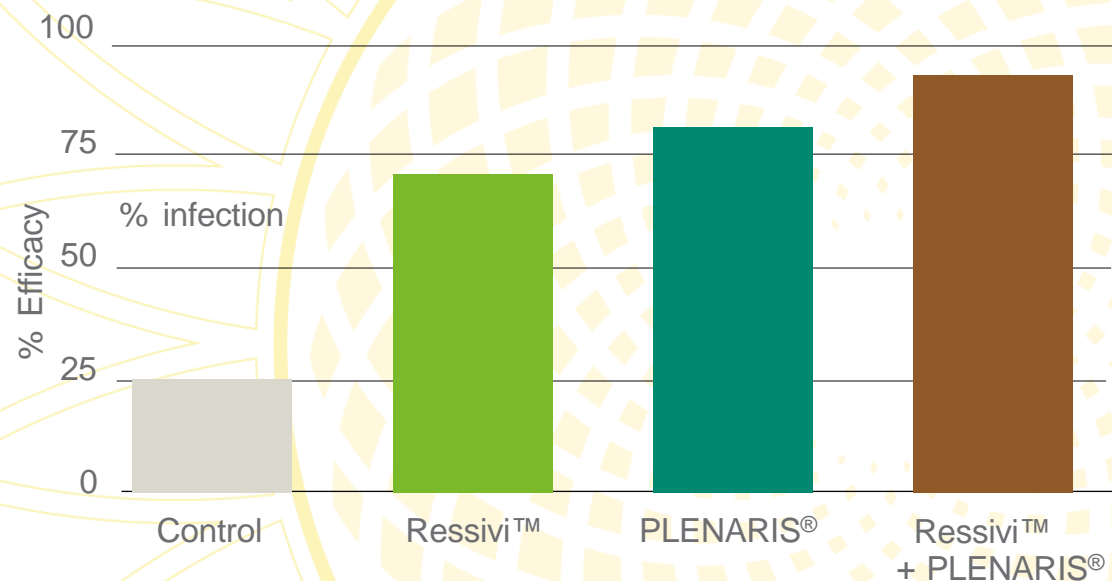
Mode of Action:

- **Oxathiapiperolin has an entirely new mode of action against downy mildew. It inhibits the oxysterol binding protein (OSBP) homologue, which is involved in the movement of lipids between membranes.**
- Inhibiting OSBP may disrupt other processes in the fungal cell, such as signaling, maintaining cell membranes, and the formation of complex lipids, essential for cell survival
- FRAC : OSBPI group 49 = medium to high resistance risk

CROP	PATHOGEN	APPLICATION RATE	
		PER SEED	Per 150,000 Seeds
SUNFLOWER	<i>Plasmopara halstedii</i>	18.75 µg ai	14.1 ml

Field Performance

- RESSIVI™ and PLENARIS® provide over 90% efficacy



Averages based on 14 field trials conducted in Bulgaria, Spain, France, Hungary, Italy and Romania in 2016 and 2017. The control represents % infection by downy mildew and the data was collected between 32 and 64 days after sowing. Susceptible and resistant hybrid varieties were tested.

Spring 2022 Trial in France

Location : Monferran-Savès, France

Sowing Date: 15 April 2022

Sowing depth: 5 cm, 72 000 seeds/ha

Crop Rotation : Durum wheat (2021), sunflower (2020), durum wheat (2019), sunflower (2018)

Variety: M3 Hybrid, 93% germination



 **Maxim**® (Base)

 **Apron**®XL

 **Plenaris**® +  **Ressivi**™

Damaged Plants in %

	11/05/2022	19/05/2022
M3 MAXIM 025 (BASE)	18.0	55.4
M3 MAXIM 025 + APRON XL	18.2	43.9
M3 MAXIM 025 + APRON XL + RESSIVI	1.8	7.6
M3 MAXIM 025 + RESSIVI + PLENARIS	0.0	0.0

Recommendations

M9 or **LOW to MODERATE**
downy mildew disease
pressure



Other varieties or
HIGH agronomic risk



RESSIVI™ can be replaced by APRON® XL in countries in which MFX-resistance has not occurred.

Bringing plant potential to life

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