Minutes of the FRAC OSBPI Working Group Meeting

26 February 2025 – 09:15 to 16:00

Bayer AG, Monheim, Germany

Participants

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Introduction

A FRAC OSBPI Working Group was formed in 2015 to generate common resistance management recommendations for the fungicides oxathiapiprolin and fluoxapiprolin. OSBP fungicides are active against oomycete fungi and used for the control of Phytophthora and downy mildews of numerous crops. OSBPIs inhibit an oxysterol binding protein (OSBP) homologue. Oxysterol binding proteins are implicated in the movement of lipids between membranes, among other processes. Inhibiting OSBP may disrupt other processes in the fungal cell, such as signaling, maintaining cell membranes, and the formation of more complex lipids that are essential for the cell to survive.

Oxathiapiprolin and fluoxapiprolin are cross-resistant.
OSBPIs have been classified under the FRAC Code 49. The resistance risk is medium to high.

FRAC Code	Target site and code	Group name	Chemical group	Common name	Comments
49	F9 lipid homeostasis and transfer/ storage	OSBPI oxysterol binding protein homologue inhibition	piperidinyl-thiazole-isoxazolines	Oxathiapiprolin Fluoxapiprolin	Resistance risk assumed to be medium to high (single site inhibitor). Resistance management required. .

Review of sensitivity monitoring 2024

Grape downy mildew (*Plasmopara viticola*)

Data presented by Bayer, Corteva and Syngenta

In 2024, sensitivity data have been generated for samples originating from Austria, Brazil, China, Croatia, Czech Republic, France, Germany, Hungary, Italy, Portugal, Switzerland, Slovenia, and Spain.

Most 2024 samples in monitored areas were sensitive.

In France, extensive monitoring shows a largely sensitive situation. Less sensitive populations were detected in commercial vineyards of Armagnac and Cognac. A single population with reduced sensitivity was again found in Vallée du Rhône and for the first time in Alsace.

In Italy, the frequency of resistant populations/isolates remains moderate to high in Veneto, Emilia Romagna and Friuli-Venezia-Giulia.
First cases of resistance were detected in Lombardia and Trentino.

Single cases of reduced sensitivity were also found in Austria (Steiermark & Burgenland), Croatia, Germany (Mosel and Neckar), north Portugal, Slovenia and Spain (Basque).

Data generated in 2024 data was also presented for grape downy mildew populations from Brazil and China which were all characterized as sensitive.

Molecular characterization of less sensitive isolates collected in 2024 mostly revealed the presence of target site mutations N752I and I792F (homolog to N837I and I877F, based on *P. infestans* homology numbering)
As in previous years, a few samples/isolates carried target site mutations G685I/V, and L778W (homolog to 770and 863 positions based on *P. infestans* homology numbering). For the first time, V735G mutation (homolog to V820G in *P. infestans*) was detected in a few samples in FR and IT.

Potato/tomato late blight (*Phytophthora infestans*)

Data presented by Bayer, Corteva and Syngenta

In 2024, sensitivity data have been generated for samples originating from potato and tomato crops in Austria, Belgium, Brazil, Croatia, Colombia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Indonesia, Ireland, Italy, Kenya, Latvia, Lithuania, Mexico, Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, Switzerland, United Kingdom, and Vietnam.

All samples collected from tomato crops in Europe were sensitive.

In potato, in 2024, high frequencies of resistance were found in Belgium, West-Germany and the Netherlands. In these countries, reduced efficacy of OSBPI-based products has been observed.

Moderate to high frequency of resistant strains/populations were detected in Poland and Portugal.

Single resistant samples were found in Denmark, France, Greece, Kenya, Norway, Sweden, and the UK with no reports of reduced product performance.

Resistance was also found in potato crops of the Antioquia region of Colombia, Indonesia and in south Vietnam (in tomato).

All 2024 samples from potato crops in Austria, Brazil, Croatia, Czech Republic, Finland, Italy, Hungary, Ireland, Latvia, Lithuania, Mexico, Slovenia, Spain, Switzerland and were fully sensitive.

Molecular studies conducted in 2024 revealed the presence of target site mutations G770V and N837I/F/L. Strains with double mutations N837F + G770V were also reported and are also associated with high resistance factors. Mutation I816M was detected but does not impact sensitivity to OSBPIs.

Genotypes of *Phytophthora infestans* are classified by Euroblight. These genotypes could express variable levels of aggressiveness, but are not linked to fungicide resistance, which is genetically independent. OSBPI resistance has been found in multiple Euroblight genotypes.

Cucurbit downy mildew (*Pseudoperonospora cubensis*)

Data presented by Corteva and Syngenta

In 2024, sensitivity data have been generated for samples originating from China and Vietnam.

In 2024, molecular studies conducted with samples from Vietnam revealed the homolog of N837I mutation in *P. infestans* in a few sites.

In 2024, populations from China with higher EC_{50} values were detected in Henan, Shandong, Liaoning, Hebei, Guangxi, Guandong, Sichuan, and Yunnan provinces.

Lettuce downy mildew (*Bremia lactucae*)

No 2024 data was presented.

In 2021, sensitivity data have been generated for samples originating from Belgium, Croatia, Germany and Greece. All the samples analyzed were sensitive.

Onion downy mildew (*Peronospora destructor*)

No 2024 data was presented.

In 2020, populations from Bulgaria, Croatia, Italy, Germany, Spain, Greece, Slovenia, Poland, Lithuania, Netherlands and Hungary were analyzed at Syngenta by sequencing of the OSBP gene. None of the target site mutations known to cause reduced sensitivity to OSBPI fungicides in other pathogens were detected.

Sunflower downy mildew (*Plasmopara halstedii*)

Data presented by Corteva

In 2024, molecular showed no mutation in samples originating from Bulgaria, Greece, France, Germany, Hungary, Italy, Romania, Slovakia and Spain

Citrus Phytophthora root rot (*Phytophthora palmivora* and *P. nicotianae)*

No 2024 data was presented.

In 2020, samples of *Phytophthora palmivora* and *P. nicotianae* from the USA (Florida) were found to be fully sensitive.

Recommendations for 2025

OSBPI – General Use Recommendations

- Fungicide programs must deliver effective disease management. Apply OSBPIs at effective rates and intervals according to manufacturers' recommendations. Effective disease management throughout the season is a critical component to delay the build-up and spread of resistant pathogen populations.

- Apply OSBPIs only preventatively and in mixtures with effective fungicides from different cross-resistance groups.

- The mixture partner should give effective control of the target disease(s) at the rate and interval selected.

- Foliar exposure to OSBPI products should not exceed thirty-three percent (33%) of the total period of protection needed per crop.

The number of foliar applications of OSBPI products within a total disease management program must be limited as follows:

OSBPI – Grapes

- Make no consecutive applications of OSBPI fungicides.
- Make no more than two (2) applications per season.
- If the total number of applications targeting downy mildew is 4 or less, apply only one (1) application of OSBPI.

OSBPI – Potato

- Make no consecutive applications of OSBPI fungicides.
- Make no more than three (3) applications per season.
- If the total number of applications targeting late blight is 6-10, make no more than two (2) applications per season.
- If the total number of applications targeting late blight is 5 or less, make only one (1) application per season.
- In countries where OSBPI resistance has developed, make no more than two (2) applications per season.

OSBPI – All other crops

- Make no more than four (4) applications or maximum 33% of the total period of protection needed per crop, whichever is more restrictive.

- Where the total number of fungicide applications targeting oomycetes is less than three (3), apply no more than one (1) application of an OSBPI product.

- There should be no more than two (2) foliar applications of any OSBPI product per crop for the control of soil-borne pathogens.

- Applications of OSBPI-containing products are to be made no more than two (2) times in sequence before applying a fungicide with a different mode of action. In areas where the agronomic risk is very high (e.g., continuous cucurbit cropping) and resistance has already been reported, further restrictions to the number of consecutive applications and alternation are recommended.

OSBPI – Seed/soil treatments

- Where an OSBPI fungicide is used as a seed/soil treatment* then, as a precautionary measure, it should be counted as one of the permitted foliar OSBPI applications per crop.

- The first foliar fungicide applied after an OSBPI seed/soil treatment* must not contain an active substance with the OSBPI MoA and must also provide satisfactory disease control against the fungal pathogen(s) targeted by the OSBPI seed/soil treatment*.

- If needed, continue foliar application with alternating fungicidal MoAs for the remaining growing period.

* directed stem sprays are interpreted as foliar not soil application

OSBPI – Multiple crops

- In case of non-cucurbit multiple crops, do not make more than six (6) foliar applications of OSBPI product per year on the same acreage or greenhouse, targeting the same pathogen.

- Specifically, in the case of cucurbit crops, do not make more than four (4) applications per year on the same acreage or greenhouse, targeting *P. cubensis*.

OSBPI – Nursery crops

- OSBPI products must not be used in nursery production of transplanted agricultural crops.

Next meeting:

February, 25th 2026 (Syngenta site in Basel, Switzerland).