OECD project on natural background

EU Biopesticide WG – 10 June 2024

IBMA
INTERNATIONAL BIOCONTROL
MANUFACTURERS ASSOCIATION

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Lymantria dispar

- A key parameter for the risk assessment of semiochemicals is the definition of the **natural background level**

- The natural background level corresponds to the exposure that might occur naturally in the environment from a high-density population of emitting organisms and thus, expected to be **experienced by humans and other non-target organisms** and not having any effect

- The natural background level can either be a **fix threshold value** (i.e. 375 g semiochemical/ha (150 g/acre) per year) or it can be **calculated separately per each species**

Worst-case scenario

$$PRR = RIO \times NRO$$

For pheromone blends, the natural background is calculated separately per each component

Where:

PRR (Population Release Rate) = release rate of the semiochemical from a justified high population of the source organism in nanograms per hectare and hour (ng/ha/h).

RIO (Release of an individual organism) = release rate of the semiochemical by an individual organism in one hour (ng/h).

NRO (Number of Releasing Organisms) = number of releasing organisms per hectare.

$$NRO = \frac{YLD}{MPY} \times \frac{\% \, INF}{100} \times OCC$$

or

$$NRO = PPH \times FIP$$

Where:
YLD (Yield) = total yield of the crop in one cropping cycle (Kg/ha)
MPY (Mass per yield unit) = average mass of a standard unit (Kg) of the crop
% INF (Infestation rate) = % of harvested units affected by the target organism
OCC (Occupancy) = no. of releasing individuals per individual plant part

Where:
PPH (Plants per hectare) = number of plants per one hectare.
FIP (Female individuals per plant) = number of individual calling females per single plant

Validate, **refine** and **apply** the current calculation method and update OECD GD followed by a tailored and specific workshop on semiochemicals

01 Confirm method suitability with experimental phase

02 Refine the process including an additional step of verifying the reliability of the peer-reviewed input data

03 Provide examples of the applicability of the method

04 Propose harmonised natural background levels for a set of semiochemicals commonly uses in plant protection in OECD countries (e.g. SCLPs, Mealybugs, …)

- Experimental determination of semiochemicals is extremely complex and, in most cases, not possible. For this reason, a calculation method was developed, and threshold values historically determined

- When measuring experimentally the airborne concentration of a semiochemical, there is a dilution factor to take into account (*L. botrana* example)

- When using the calculation method, the laboratory determined released by female may be an overestimation, however the pest presence on the crop is an underestimation (*P. citri* example)

- Real exposure is most likely higher than that experimentally determined or mathematically calculated

The natural background (PRR) is calculated using the following formula:

RIO x FIP x PPH

Where:

- RIO (Release of an individual organism), is the release rate of the semiochemical by a single individual
- FIP(Female individuals per plant), is the number of individual calling females per single plant
- PPH (Plants per hectare), is the number of fruits yielded per one hectare

The quality of the input data determines the overall quality of the calculated value. Therefore, it has been decided to establish a guidance and criteria to assign a quality (reliability) score to the input data. Three categories of reliability have been identified:

1. Reliable without restriction
2. Reliable with restrictions
3. Not reliable

Given the intrinsic diversity of the input data used for each factor of the calculation, different criteria have to be used to assess the reliability of the different calculation factor

RIO

Criteria	Reliable without restriction	Reliable with restrictions	Not reliable
Source	• Peer reviewed literature	• Company reports • Dissemination magazines • Not peer reviewed literature	• Companies web pages
Analytical method*	• Volatile collection with adsorbents using internal standard	• Gland extraction (solvent or thermal) • Body extraction • Volatile collection with SPME with external calibration	• Measurements without any calibration

FIP

Criteria	Reliable without restriction	Reliable with restrictions	Not reliable
Source	• Peer reviewed literature • National competent authorities reports	• Company reports • Dissemination magazines • Not peer reviewed literature	• Companies web pages

- Since some species (e.g. Hemiptera) are present mostly on other parts of the plant and not the fruit, if possible the number of females on the entire plant should be calculated rather than only the number of female on fruits.
- In case of pests that are present only on fruit, this values is calculated as Females Individuals per Fruit, and then number of fruits per plant.

PPH

Criteria	Reliable without restriction	Reliable with restrictions	Not reliable
Source	• Peer reviewed literature • National competent authorities reports • FAO Statistics	• Dissemination magazines/ webpages • Not peer reviewed literature	• Companies web pages

- The geographical origin of the yield and the plantation regime data is irrelevant, since human susceptibility to a given substance (in this case to a given semiochemical) does not change based on the geographical location.

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03 Provide examples of the applicability of the method

Due in Q3 2024

04 Propose harmonised natural background levels for a set of semiochemicals commonly uses in plant protection in OECD countries (e.g. SCLPs, Mealybugs, …)

Due in Q4 2024

Update OECD GD followed by a tailored and specific workshop on semiochemicals

Thank you

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