PANEL ON EFFICACY EVALUATION OF FUNGICIDES AND INSECTICIDES

EPPO meeting, Barcelona 28th-30th November 2017

4.16 *Halyomorpha halys* and other Hemiptera (Rhyncota Heteroptera) on tree fruit crop **17-23174**

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*Halyomorpha halys* – Brown Marmorate Stink Bug

BMSB is:

- very polyphagous (> 300 host plants)
- extremely mobile (among the crops and wild species in the hedges and ornamental plants) and invasive
- long-lived (several months) and prolific (overlap of 2-3 generations/year)
- harmful at all the stages and instars (not egg and 1° juvenile form)
Bortolotti *et al*., 2015

Leskey *et al*., 2012.
DOI: 10.1564/23oct07
DOI 10.1007/s13355-015-0350-y
Proposal for a standard

**Case study:**

Open field trials performed since 2015 in Emilia-Romagna Region (Northern Italy)

Protocol designed to evaluate the insecticide activity in open field confition

Knock-down effect in 24 h


Specific but effective for several outputs
Damage evaluation

Some trials focused on the efficacy evaluation of the insecticides based on the fruit damage assessment failed.

Because:

- Migration of insects among the treated plots (*plot size* is a key point)
- Migration of new insects from outside (the *landscape surrounding the trial site* is very important for the success)

→ *persistence* of the products tested
→ *activity* of the products tested
Efficacy evaluation by direct mortality observation

**Knock-down effect**

**Material and Methods**

Net placed below the plants to cover the soil surface

- $T_0 = \text{experimental application (App. 1) with the products to be tested}$
- $T_{24} = \text{efficacy assessment (Ass. 1) of what have fallen in the net after App. 1}$
- $T_{24} = \text{inventory application (App. 2) with a standard (5 times the max. label rate)}$
- $T_{48} = \text{efficacy assessment (Ass. 2) of what have fallen in the net after App. 2}$

$$\text{mortality (\%) in 24 h} = \frac{(n^\circ \text{ dead insects collected in Ass. 1})}{(n^\circ \text{ total insects collected in Ass. 1} + \text{Ass. 2})} \times 100$$
Knock-down effect
Knock-down effect

Classification:
Dead
Moribund
Alive

Species:
BMSB
other pests
beneficials
Knock-down effect

1st Assessment regarding App.1

2nd Assessment regarding App. 2

Assessment (final)

T0  T24  T48  T72  T96

Experimental App.  Inventory App.

tested product  reference standard
An higher uniformity among the plots could be achieved using the aggregation pheromone.

Problem:
FIELD DISTRIBUTION OF THE PEST

A minimum size of the plot has to be considered to have high number of individuals and therefore consistent data.
Efficacy evaluation by direct mortality observation

**Knock-down effect**

**Outputs:**

- knock-down effect of the tested products (mortality in the field in 24 h)

- selectivity on the beneficials present in the trial site

- monitoring under controlled conditions the individuals alive and moribund collected after App. 1 it is possible to evaluate the effect of a single experimental application over the time: recovery of mobility, side-effects on behavioural (anti-feeding effect) and physiology (development of juvenile instars and reproductive parameters of adults)
Efficacy evaluation by direct mortality observation

Knock-down effect

Strengths of this approach:

- hypothesis of low (or none) migration of BMSB in- and out-side the trial site (short trial period) and re-distribution of the target pest with the pheromone for a higher uniformity

- good way to evaluate contact insecticides

Weakness and limits:

- the insecticides active for ingestion (systemics) and the residual activity are not evaluable

- very specific approach with relative results depending by the reference standard adopted, …