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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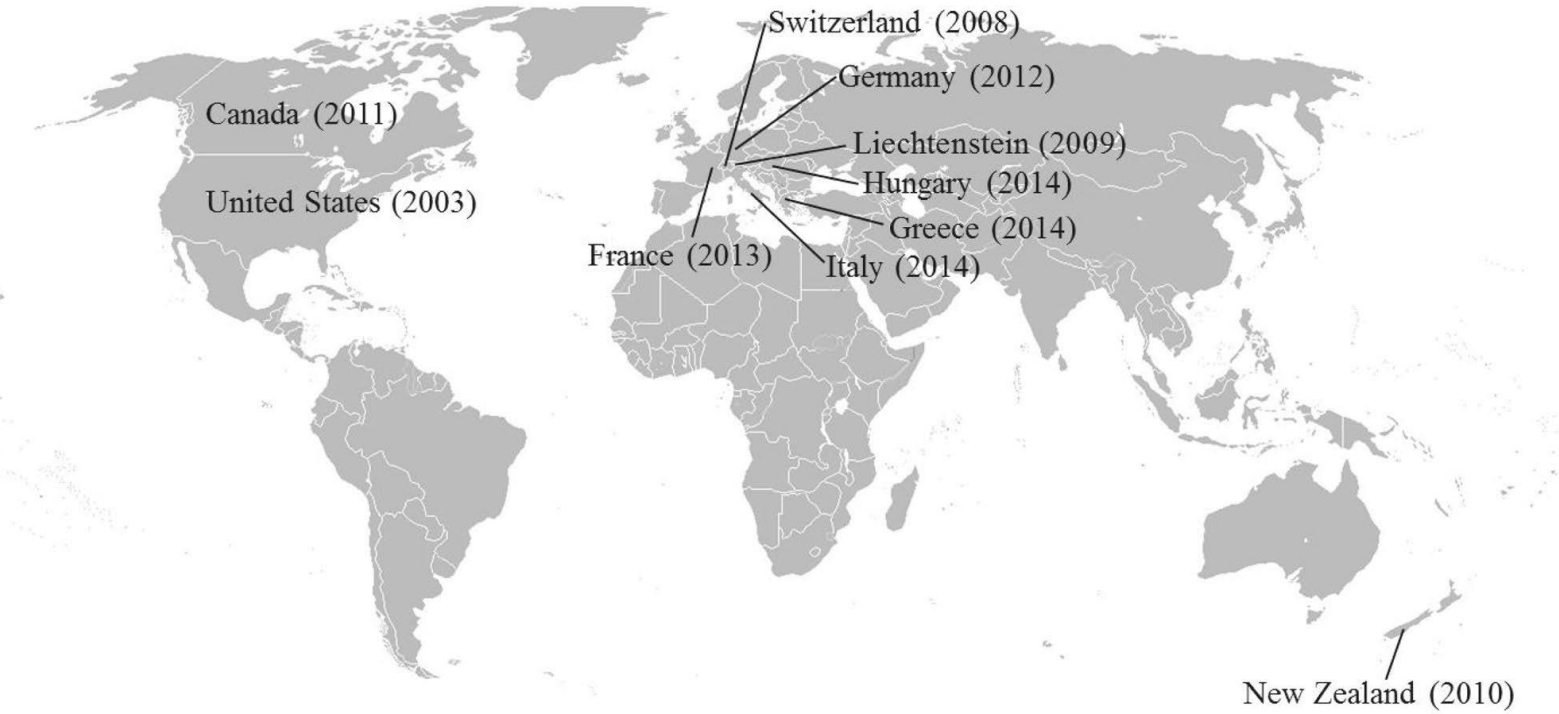
Halyomorpha halys – Brown Marmorate Stink Bug

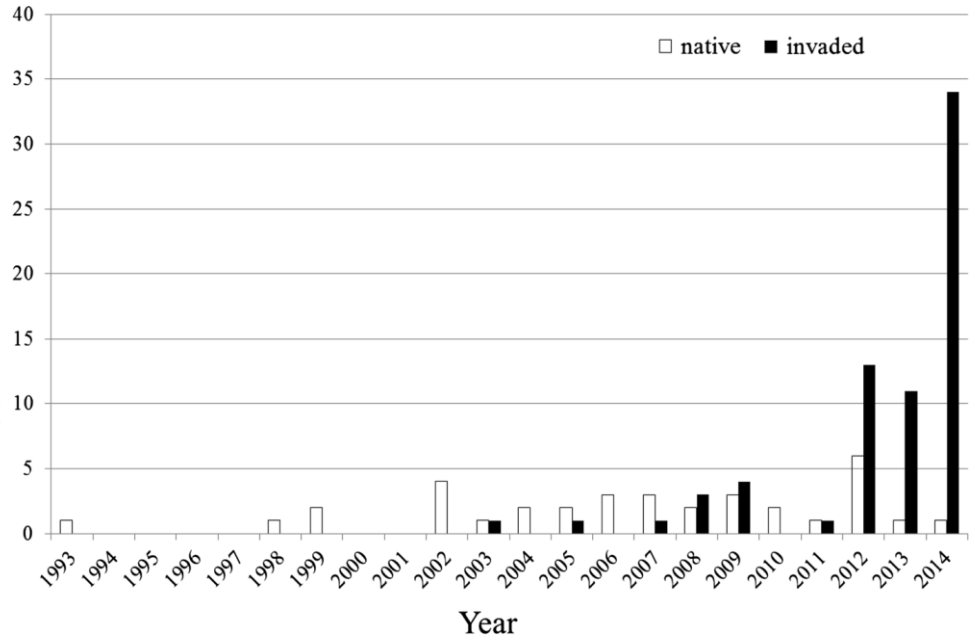
BMSB is:

- 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





Lee, 2015. Appl Entomol Zool (2015) 50:277–290
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

Adapted by Hassan, 1985. Standard methods to test the side-effects of pesticides on natural enemies of insects and mites developed by IOBC/WPRS Working Group “Pesticides and beneficial organisms”. Bull. OEPP/EPPO, 15: 214-255.

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

T0 = experimental application (App. 1) with the products to be tested

T24 = efficacy assessment (Ass. 1) of what have fallen in the net after App. 1

T24 = inventory application (App. 2) with a standard (5 times the max. label rate)

T48 = efficacy assessment (Ass. 2) of what have fallen in the net after App. 2

$$\boldsymbol{mortality}\ (\%)\ \boldsymbol{in\ 24\ h} = \frac{(\boldsymbol{n°\ dead\ insects\ collected\ in\ Ass.1})}{(\boldsymbol{n°\ total\ insects\ collected\ in\ Ass.1 + Ass.2})} * \boldsymbol{100}$$

Knock-down effect

Knock-down effect

Classification:

Dead

Moribund

Alive

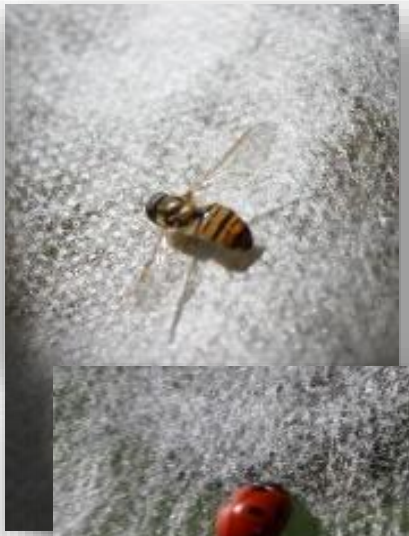
Species:

BMSB

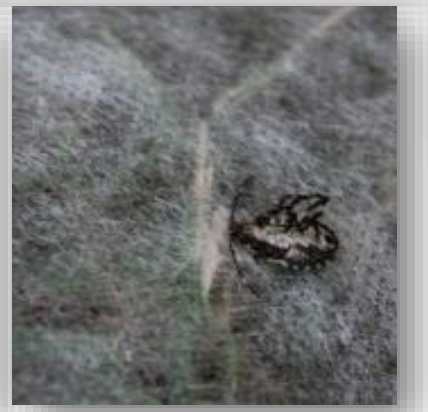
other pests

beneficials

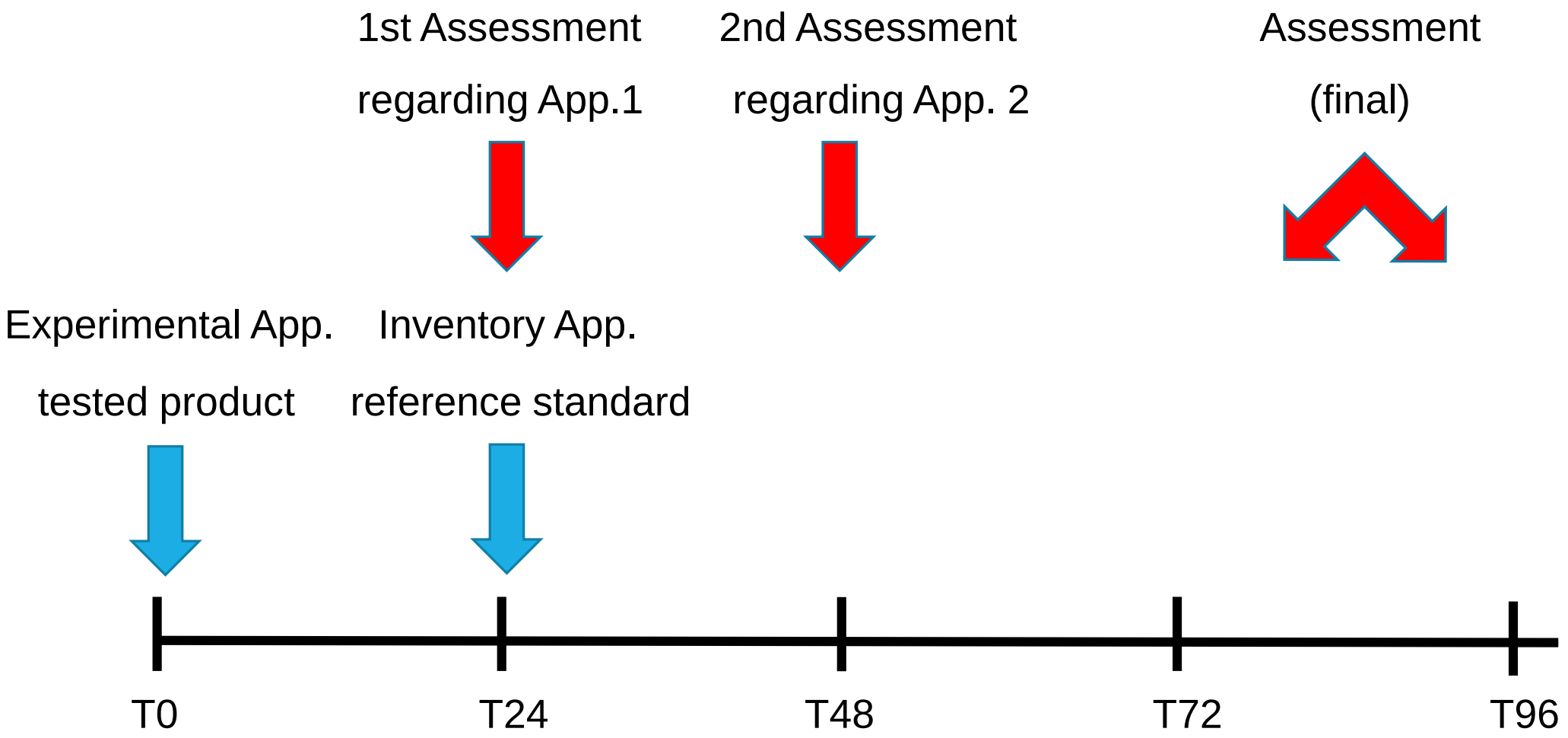




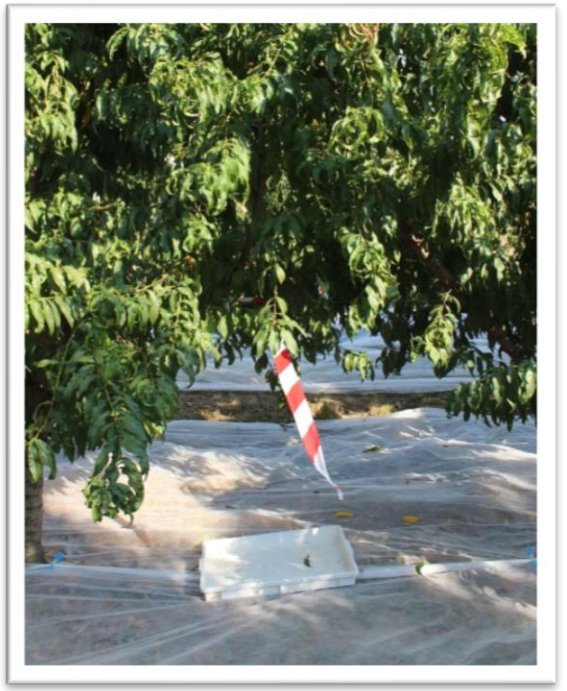




Knock-down effect



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 behavious (anti-feeding effect) and physiology (development of juvenile instars and reproductive parameters of adutls)

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, …