

Attractiveness of semiochemical stimuli paired with field-deployed traps of *Halyomorpha halys* in Europe and the USA – Results of a multinational trapping study

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Distribution of *Halyomorpha halys* (BMSB) in Europe



- Native to East Asia
- Introduced in the USA and Europe
- First recorded in Hungary in 2013



Significance



- Highly **polyphagous** (100+ plant species)
- Reduced quality of damaged fruits
- **Severe crop losses**
(e.g., 37 million USD in apples in the USA in 2010)
- **Nuisance pest** (overwintering adults)



Polyphagy and damage to crops...



Photo: T. Haye



Photo: B. Cissel



Nuisance pest...



Hungary (2018)



**First record in
Hungary:**

**Budapest,
11 October 2013**



Budapest, 30 October 2013

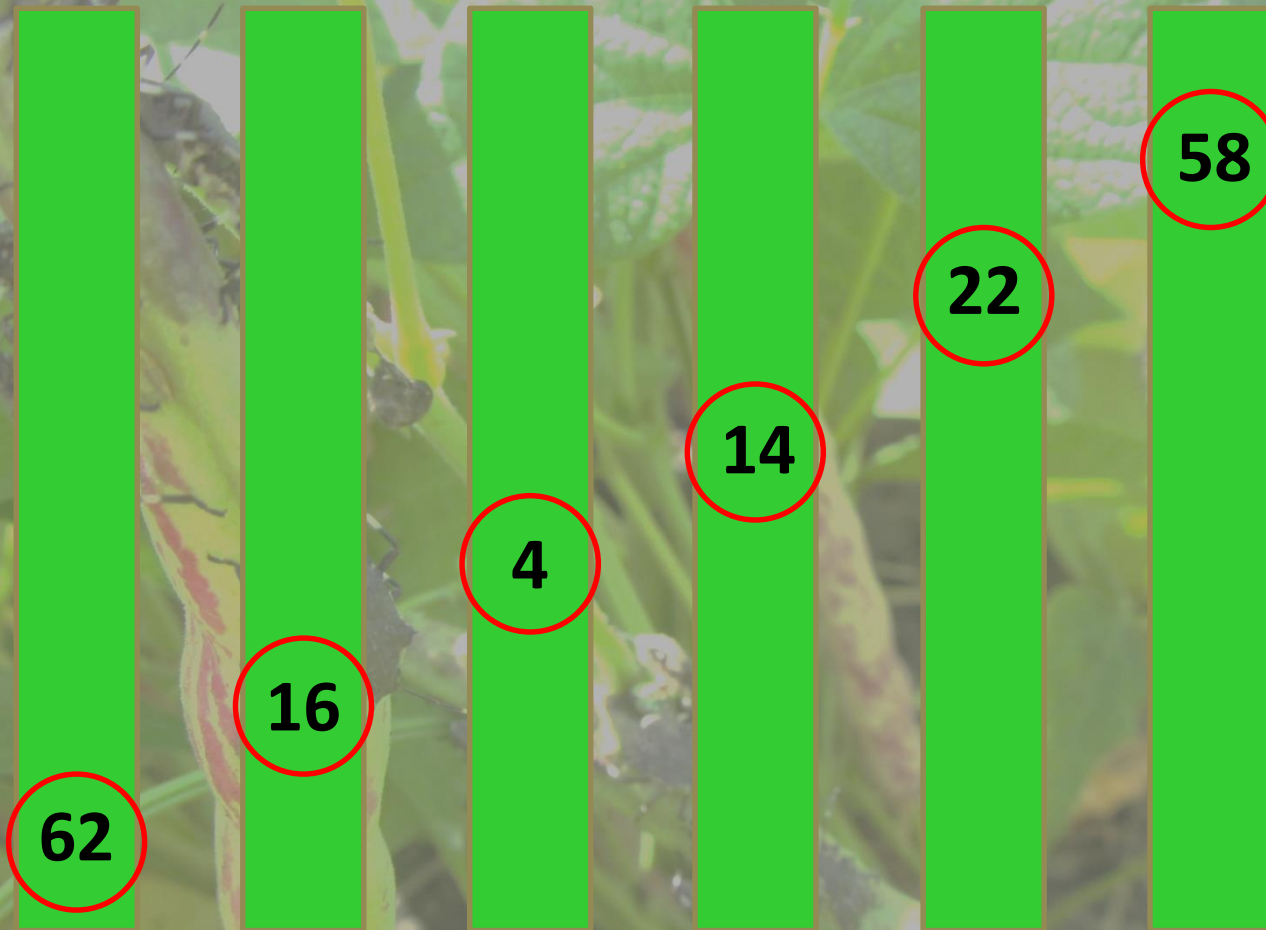
In late summer 2016, growers in Budapest
began to complain about
'stink bug damage' to
dry bean and forced green hot pepper...

Dry bean (cv. Etna)

- Damaged seeds found in **94%** of dry bean pods



Distribution of BMSB within the dry bean plot



Total #: 174 nymphs + 2 adults = 176 BMSB / 6x1 m

Further species: *N. viridula* (19), *Nabis* sp. (3), *Nysius ericae* (1)

Forced hybrid green hot pepper (cv. Daras)

- **100%** of the green hot pepper fruits affected



Initiating a multinational study

Objective:

To evaluate the population-level response of *H. halys* in Europe to semiochemical stimuli

Material and methods

- **Clear sticky cards** (15.3 × 30.5 cm, STKY™ Dual Panel Adhesive Trap, Trécé, Inc., USA) hung horizontally in or near *H. halys* host trees with twist ties at a height of 1–1.5 m from the ground; replaced biweekly

Initiating a multinational study

Material and methods (cont.)

- Three replicate transects at each site
- Each transect spaced min. 50 m apart
- In each transect, there were one of four treatments:

PHER (*H. halys* aggregation pheromone) – 20 mg of murgantiol

MDT (synergist) – 200 mg (methyl (2*E*,4*E*,6*Z*)-2,4,6-decatrienoate)

PHER + MDT – 20 mg + 200 mg

Unbaited control

- Each treatment spaced min. 50 m apart
- Lures not changed (lasting 8 weeks)

Initiating a multinational study

Material and methods (cont.)

- Traps checked weekly (August–October 2016)
- The number of males, females and nymphs per trap recorded, and all individuals then removed
- Treatments sequentially rotated within each replicate biweekly

Initiating a multinational study

Country	# Reps	Sampling date	Landscape	Location of traps	Insecticides?
USA	3	10 Aug – 26 Sep	Rural	Perimeter of orchard	Yes
Italy (1)	3	9 Aug – 27 Sep	Suburban	Edge of wooded border/buildings	No
Italy (2)	3	9 Aug – 26 Sep	Suburban	Edge of wooded border/hedgerow	No
Italy (3)	3	8 Aug – 27 Sep	Suburban	Edge of wooded area	No
Hungary	3	18 Aug – 6 Oct	Suburban	Edge of wooded border	No
Switzerland	3	8 Aug – 26 Sep	Urban	Park	No
Greece	3	9 Aug – 4 Oct	Suburban	Edge of wooded border/hedgerow	No

Source: Morrison III et al. (2017)

Trapping site in Hungary

— Location of traps

▭ Neighbouring crops

○ Buildings (not all shown)

➔ See the scale



Google

100 m

Results

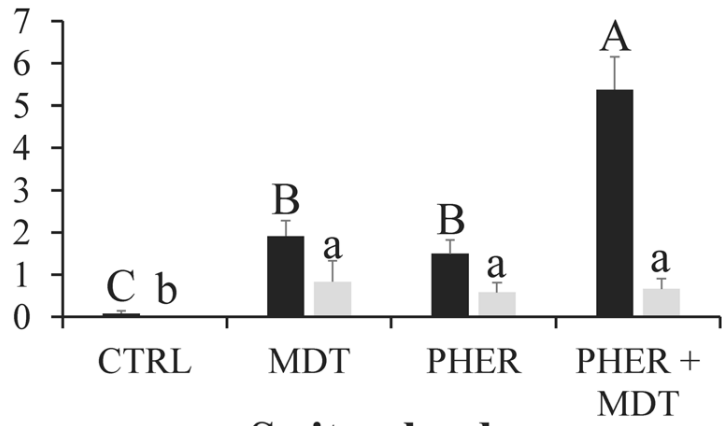
- ✓ In total, **6280 *H. halys* adults** captured in the USA and Europe
- ✓ Each lure alone as well as the lures in combination attracted significantly **more adults than the unbaited control**
- ✓ More adults were captured **near the end of the sampling period**
- ✓ The presence of MDT with PHER had a **synergistic effect** on the attraction of adults than when traps only had PHER
- ✓ There was **no sexual dimorphism** in response to any of the semiochemical treatments

Results

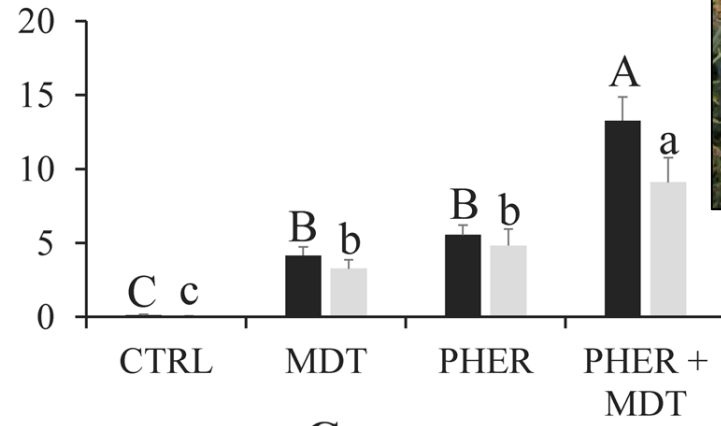
- ✓ In total, **3034 *H. halys* nymphs** captured in the USA and Europe
- ✓ Each lure alone as well as the lures in combination attracted significantly **more nymphs than the unbaited control**
- ✓ Nymphal captures peaked near **the middle of the sampling period**
- ✓ The presence of MDT with PHER had **NO synergistic effect** on the attraction of nymphs than when traps only had PHER

Mean (\pm SE) weekly capture of *H. halys* per trap

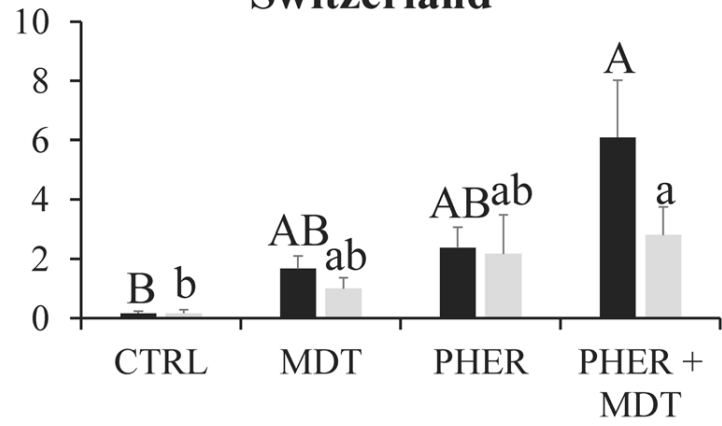
USA - Maryland



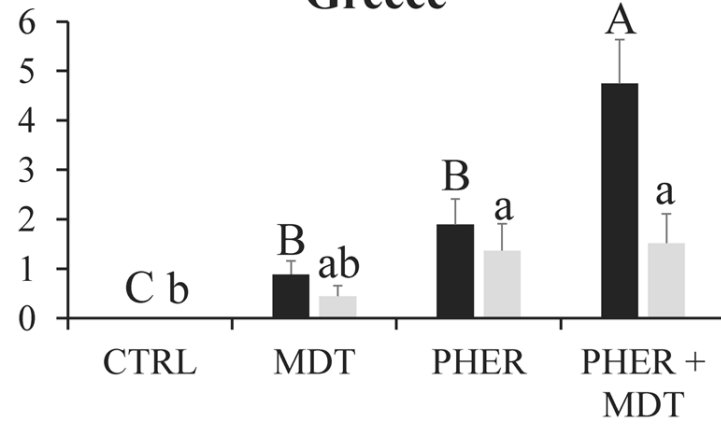
Italy



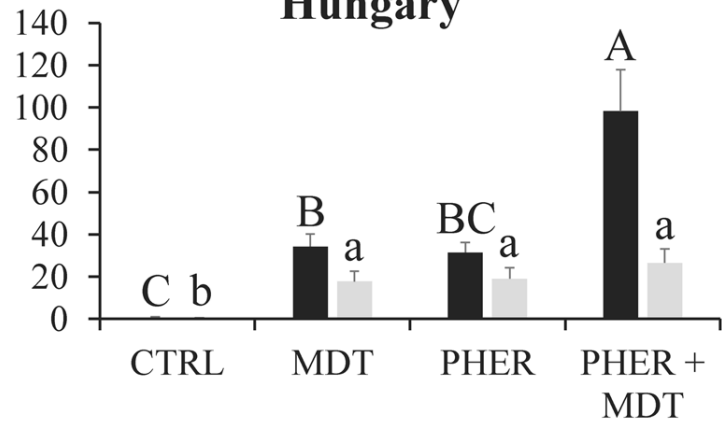
Switzerland



Greece



Hungary



■ Adults
■ Nymphs

Pairwise comparisons among treatments

Upper case letters: within ADULTS

Lower case letters: within nymphs

Semiochemical treatment

Source: Morrison III et al. (2017)

Discussion

- ✓ **Similar qualitative patterns of response** to traps with lures containing PHER + MDT across all the sites (countries)
- ✓ **Synergistic effect** of combining the MDT with PHER on the attraction of adults but not on that of nymphs (→ patchy and clumped distribution of nymphs?)
- ✓ The use of **clear sticky cards** as a trapping mechanism appeared to be effective, further expanding the repertoire of effective trap designs
- ✓ Further result: There was **broad-based attraction by a range of *H. halys* haplotypes** to the semiochemical stimuli



Thank you for
your attention!

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