

THE OSTRINIA TRAP WHICH CATCHES: COMPARING THE PERFORMANCE OF A NEW BISEX CORN BORER LURE WITH THAT OF SYNTHETIC SEX PHEROMONE

Tóth M.,¹ Szarukán I.², Nagy A.², Furlan L.³, Benvegnu' I.³, Rak Cizej M.⁴, Ábri T.², Kéki T.², Körösi Sz.², Pogonyi A.², Toshova T.⁵, Velchev, D.⁶, Atanasova, D.⁷, Kurtulus A.⁸, Kaydan B.⁸



Foto: Bozsik G.



¹Plant Protection Institute, CAR HAS, Budapest, **Hungary**

²Plant Protection Institute, Fac. Agric. Food Sci. Environ. Man., Debrecen University, **Hungary**

³Veneto Agricoltura, Settore Ricerca Agraria, Legnaro, **Italy**.

⁴Slovenian Institute of Hop Research and Brewing, Zalec, **Slovenia**

⁵Institute of Biodiversity and Ecosystem Research BAS, Sofia, **Bulgaria**

⁶Maize Research Institute, Knezha, **Bulgaria**

⁷Agricultural University, Plovdiv, **Bulgaria**

⁸Cukurova Üniversitesi, Adana, **Turkey**



Foto: www.



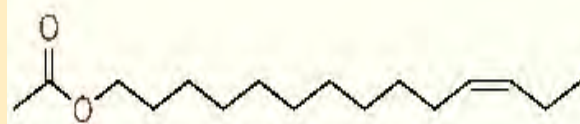
European corn borer (*Ostrinia nubilalis*) trapping:

Prelude 1:

Two components have been identified from female-produced sex pheromone a long time ago (Klun & Brindley, J. Econ. Ent. 63: 779-780, 1970)



Foto: Tóth M.



(Z)-11-tetradecenyl acetate



(E)-11-tetradecenyl acetate

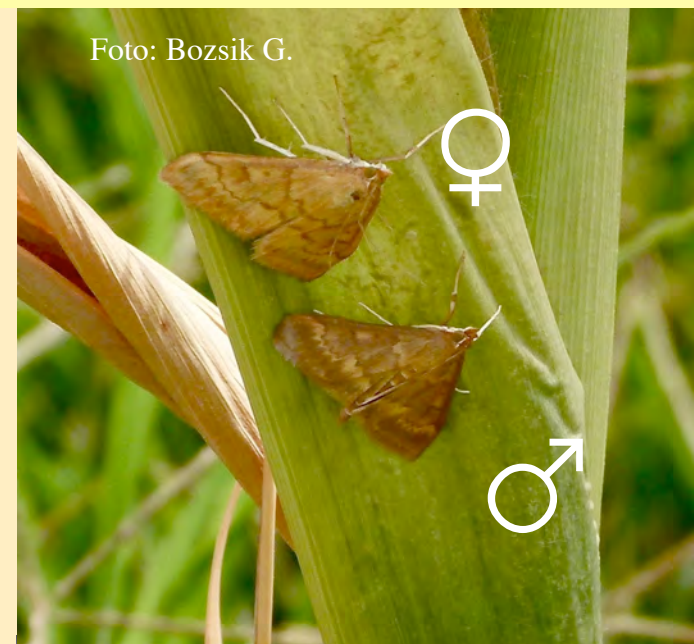


Foto: Bozsik G.



Foto: www.



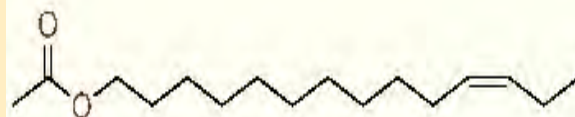
European corn borer (*Ostrinia nubilalis*) trapping:

Prelude 1:

Later two pheromone strains were described, the *Z* strain, with a ratio of 97:3 (*Z*)-11-tetradecenyl acetate and (*E*)-11-tetradecenyl acetate, and the *E* strain

using the roughly opposite ratio of 4:96 *Z*:*E*.

(Kochansky et al, J. Chem. Ecol. 1: 226-231, 1975)



(*Z*)-11-tetradecenyl acetate



(*E*)-11-tetradecenyl acetate

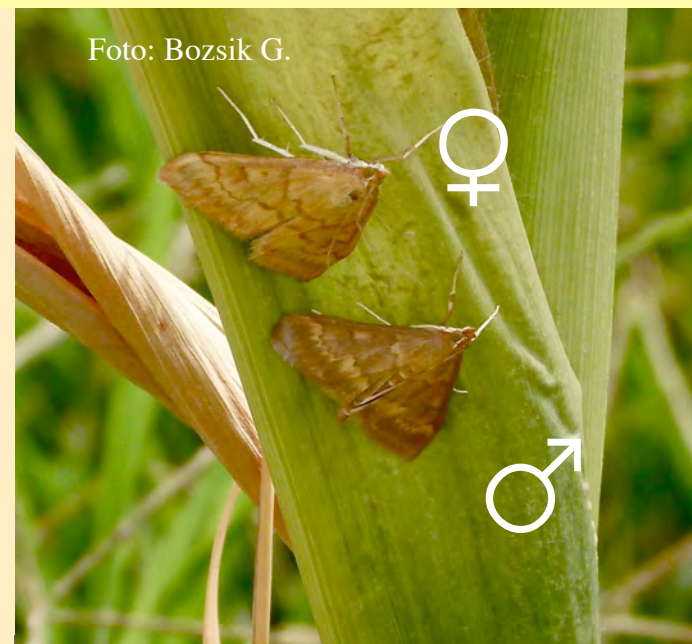


Foto: Bozsik G.



Foto: www.



Foto: Tóth M.

European corn borer (*Ostrinia nubilalis*) trapping:

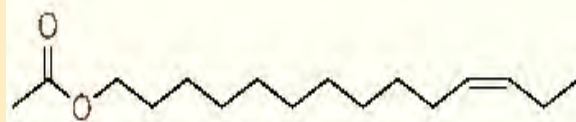
Prelude 1:

In Europe the Z strain is predominant, the E strain is present south of the Alps and occasionally it hybridizes with the Z strain.

(Maini et al., Boll. Ist. dei Entomol. Univ. Bologna, 34:15-25, 1978, Büchi et al., Mitt. Schweiz. Entomol. Ges. 55:33-53, 1982, Anglade et al., Agronomie 4:183-187, 1984, Barbattini et al., Frustula Entomol. 7:1-21, 1985, Pena et al., J. Chem. Ecol. 14:1359-1366 1988.)



Foto: Tóth M.



(Z)-11-tetradecenyl acetate



(E)-11-tetradecenyl acetate



Foto: Bozsik G.



Foto: www.



European corn borer (*Ostrinia nubilalis*) trapping:

Prelude 1:

However, the field activity of the known synthetic pheromone is very unreliable.

For example in an European study the performance of traps with synthetic pheromone was classified as “not satisfactory” in 13 out of 10 countries!

(Szócs, IWGO Newsletter 31:4, 2011).



Foto: Tóth M.

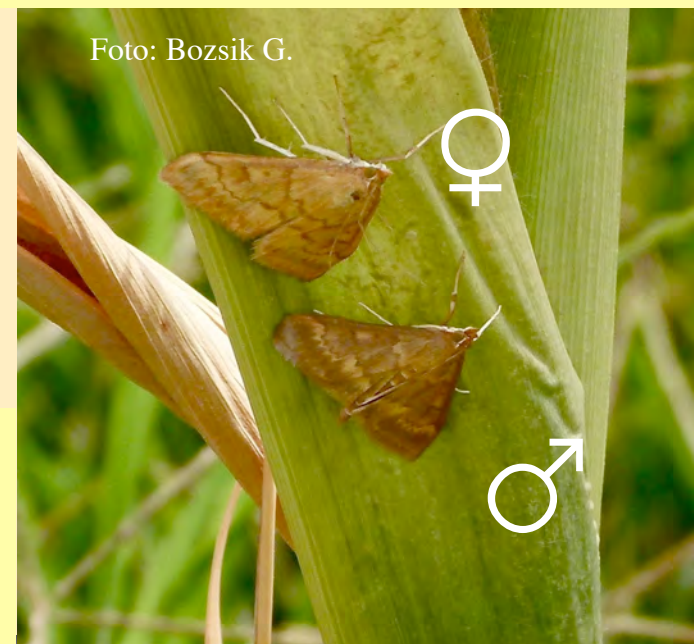


Foto: Bozsik G.



Foto: www.

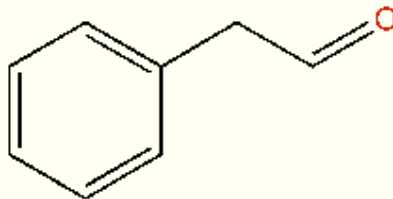


European corn borer (*Ostrinia nubilalis*) trapping:

Prelude 2:

Phenylacetaldehyde is weakly attractive for corn borers.

(Maini et al., Boll. Ist. Ent. "G. Grandi" Univ. Bologna, 45:157, 1990)



Our approach:
systematical screening
of candidate floral
compounds added to
phenylacetaldehyde
(with the hope of
increasing field
activity)

Foto: Bozsik G.



Foto: www.



Foto: Tóth M.

Finally we found that the addition of 4-methoxy-phenethyl alcohol to phenylacetaldehyde increased catches significantly!

(Tóth et al., Acta Phytopath. 51:247, 2016)

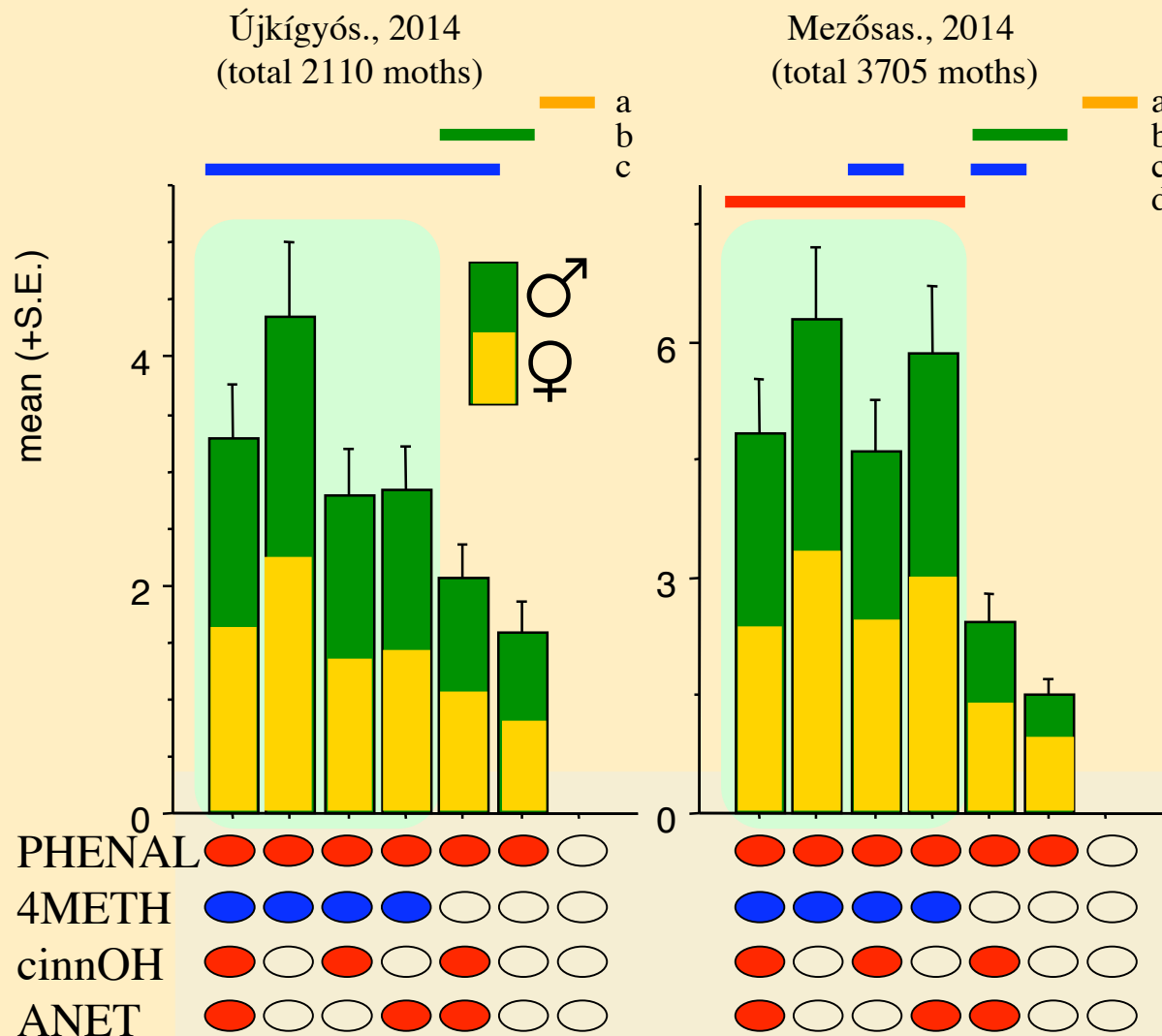
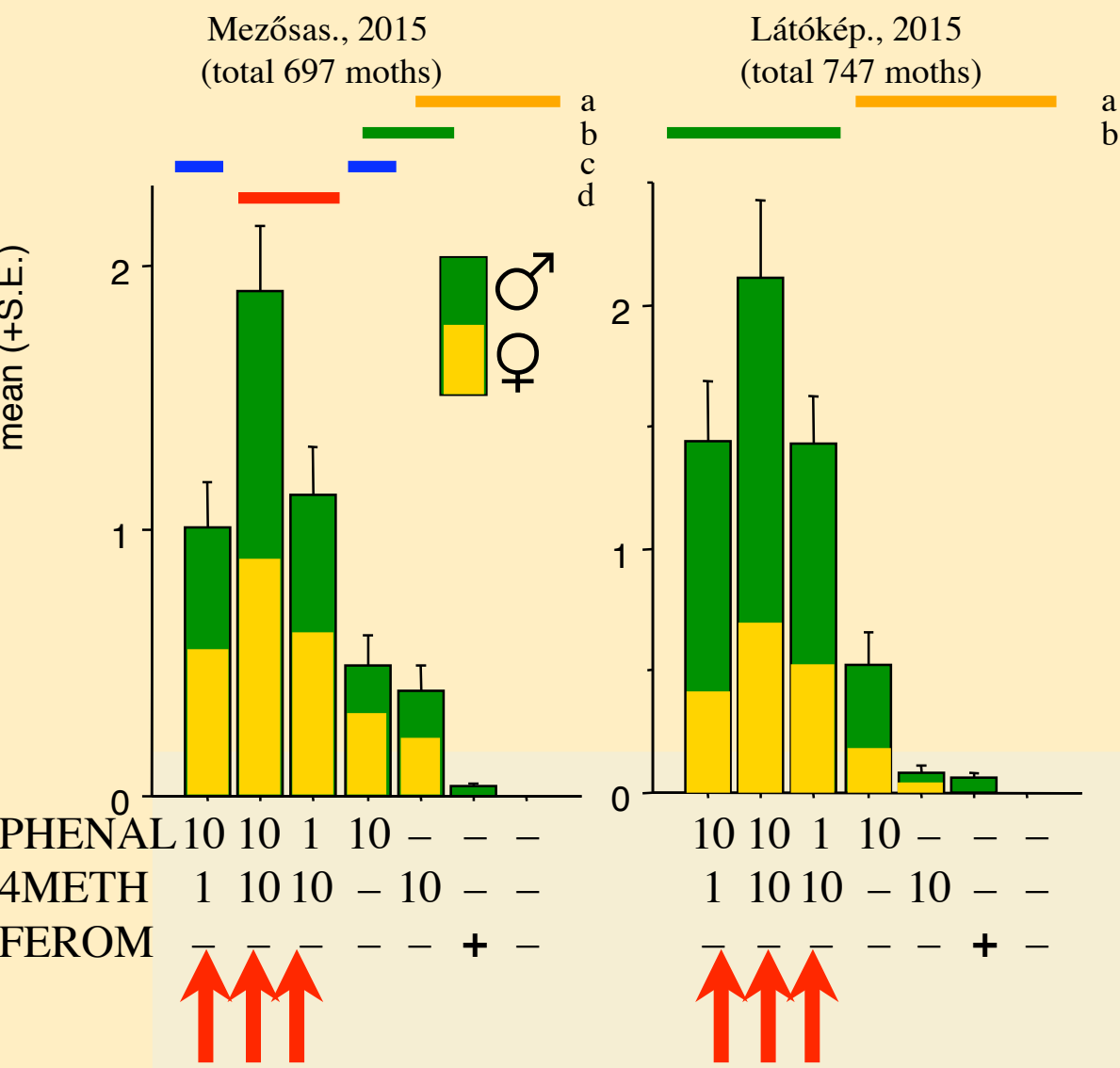


Foto: www.



Best catches were recorded with the 1:1 blend.

(Tóth et al., Acta Phytopath. 51:247, 2016)

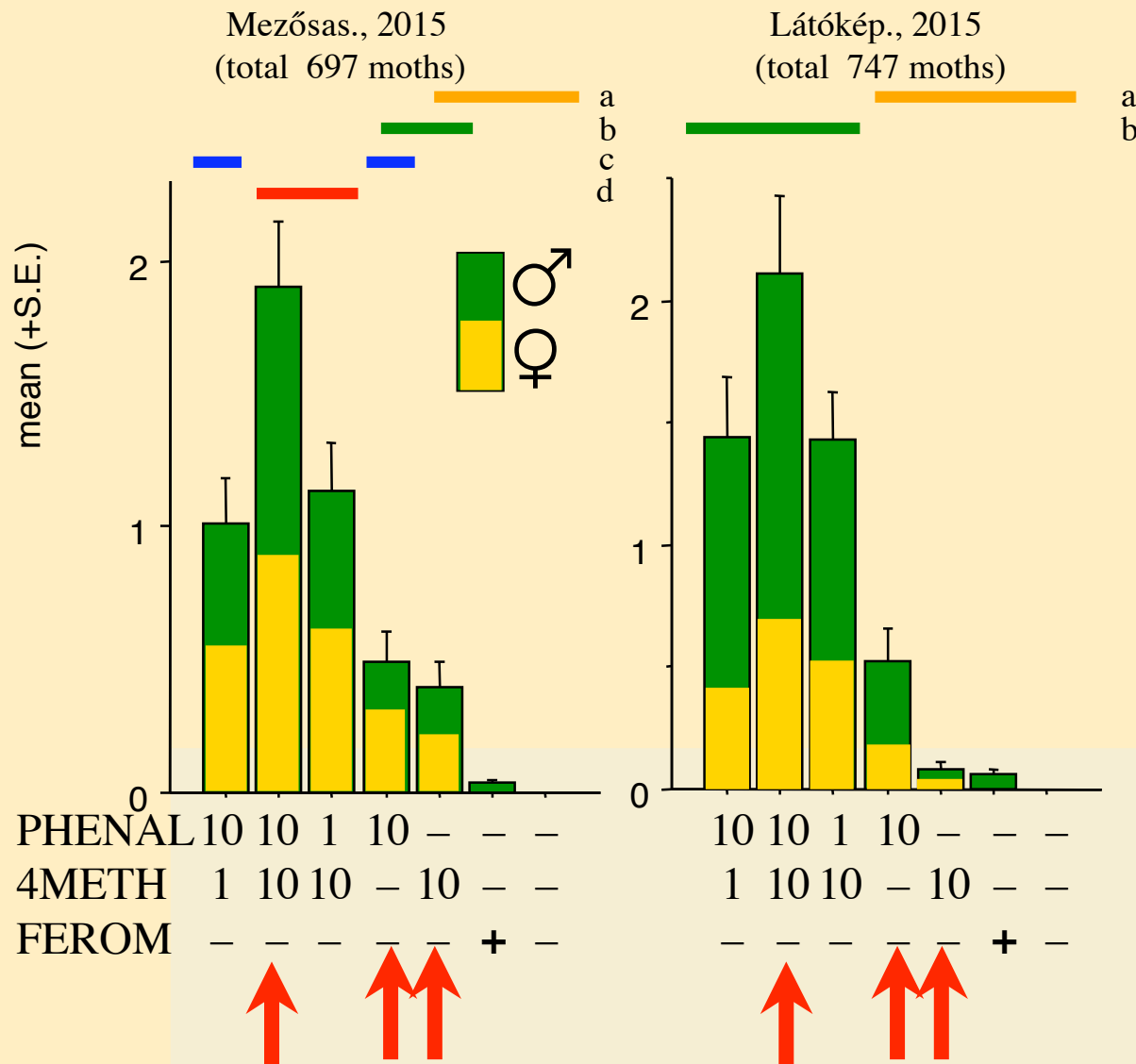


FEROM = synthetic pheromone (Z)



The effect was clearly synergetic.

(Tóth et al., Acta Phytopath. 51:247, 2016)



FEROM = synthetic pheromone (Z)

Foto: Bozsik G.



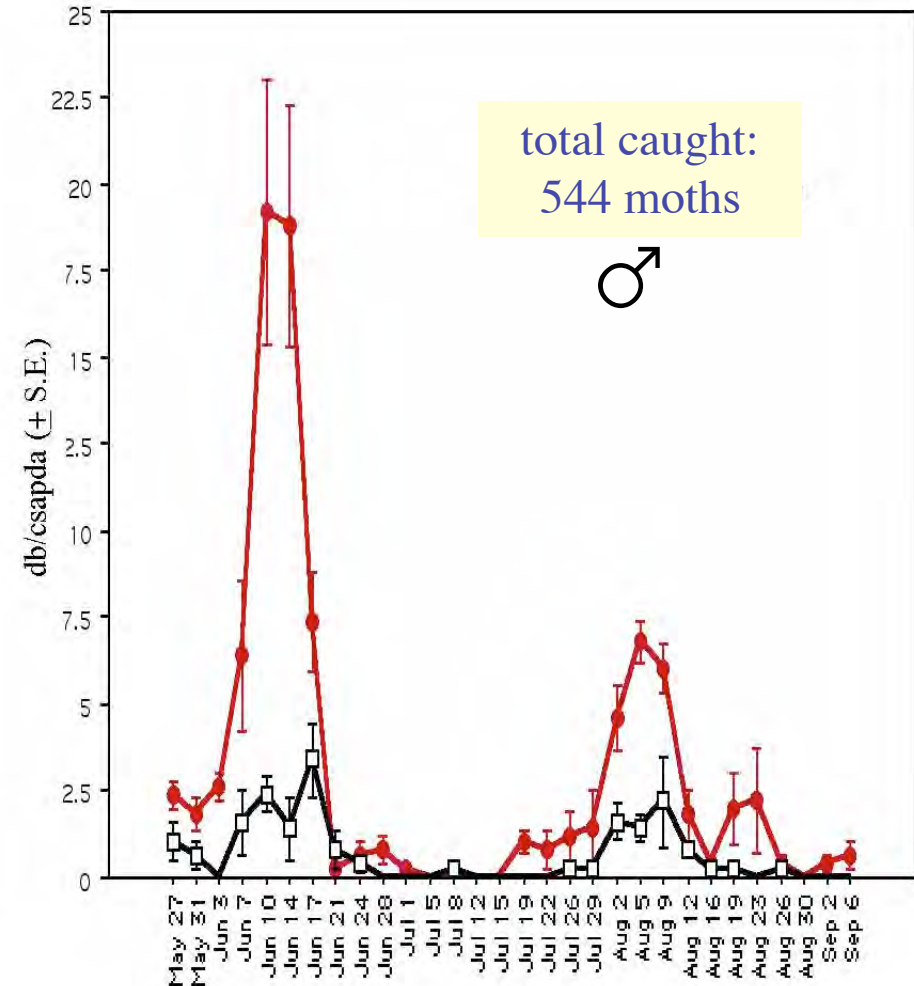
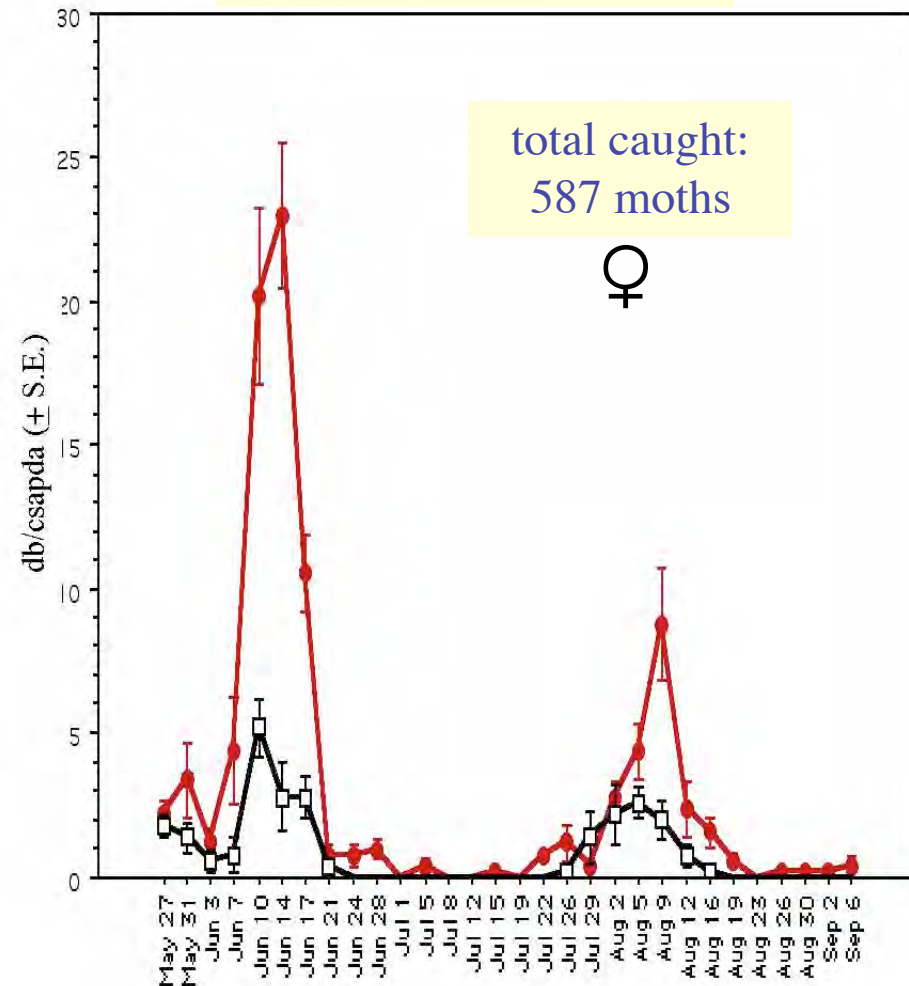
Foto: www.



The binary bisexual lure is much more suitable for monitoring!

Mean catches / trap of *O. nubilalis* during the flight season
(Mezősas, Hungary, May 24 - September 6, 2014)

● binary bisexual lure
□ phenylacetaldehyde only



Preliminary comparison with pheromone: catches with Z strain synthetic pheromone appeared to be negligible as compared to the bisexual lure!

(Tóth et al., *Acta Phytopath.* 51:247, 2016)

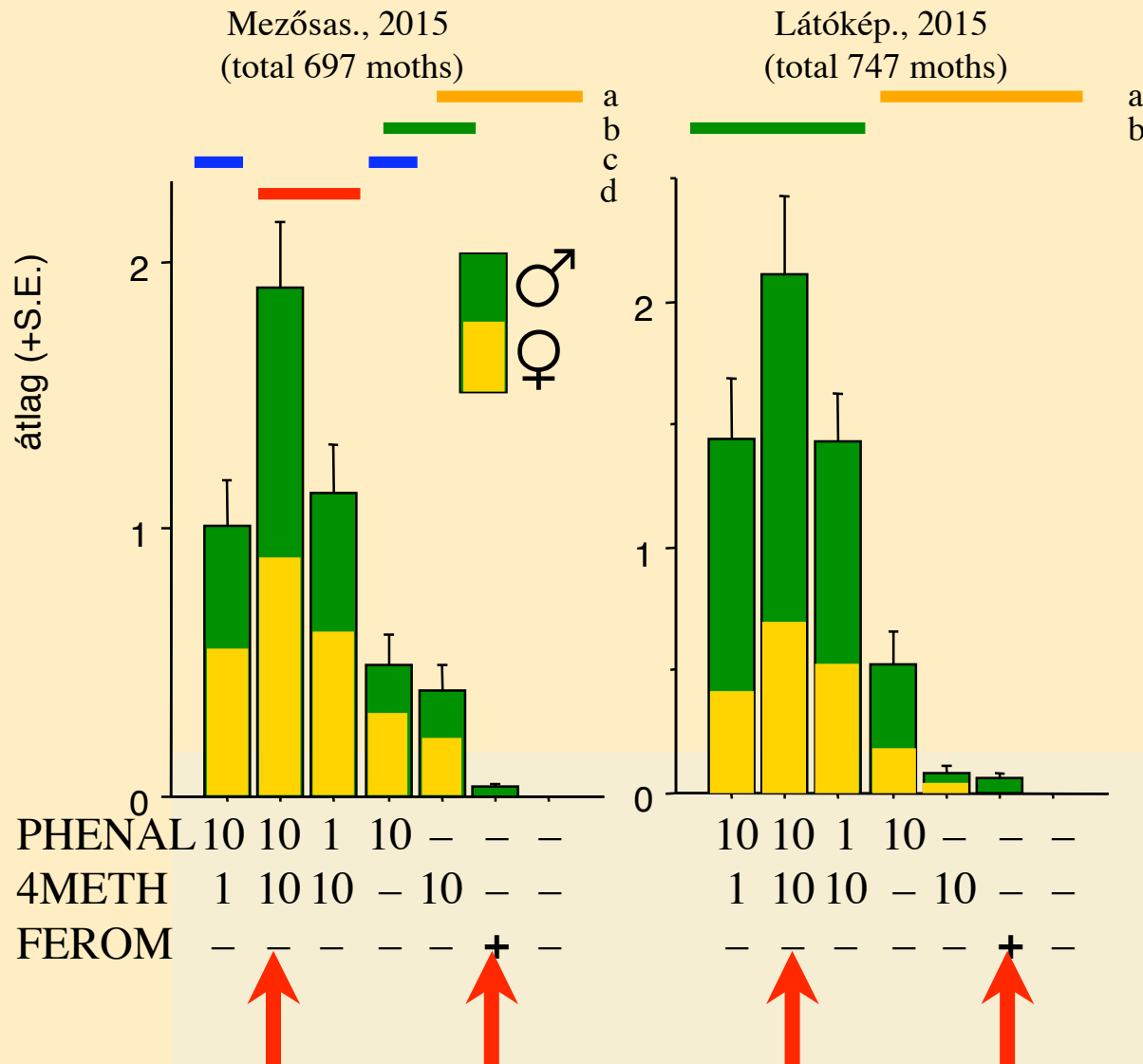


Foto: www.



FEROM = synthetic pheromone (Z)

The purpose of the following study was to perform a more in-depth comparison between the bisexual lure and the synthetic pheromone.

Types and sources of synthetic pheromone used for comparison in the different countries:

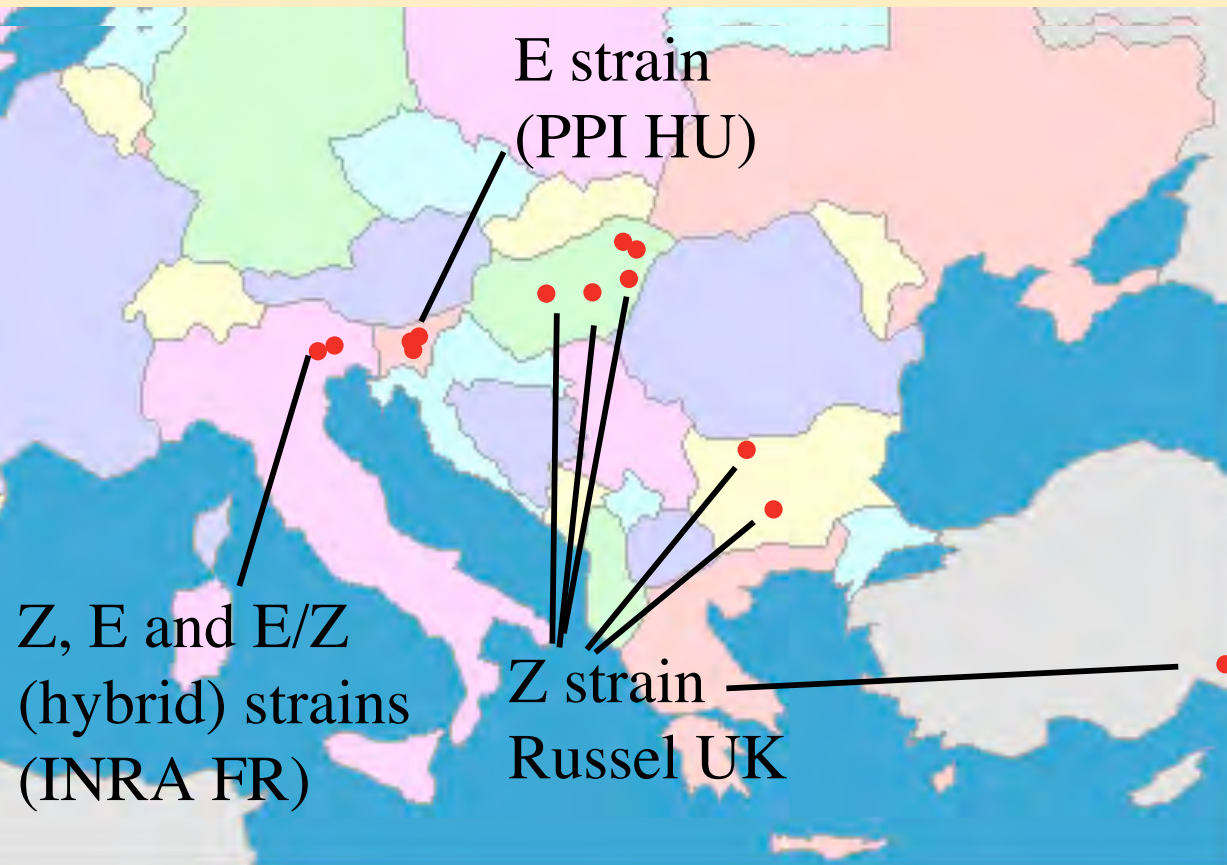
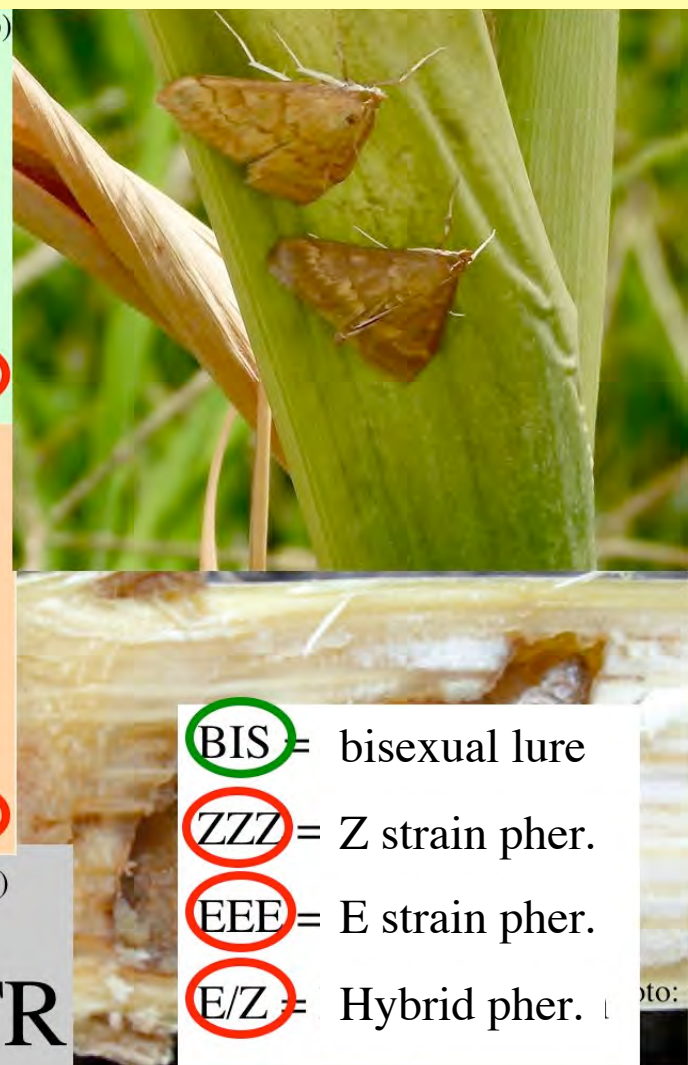
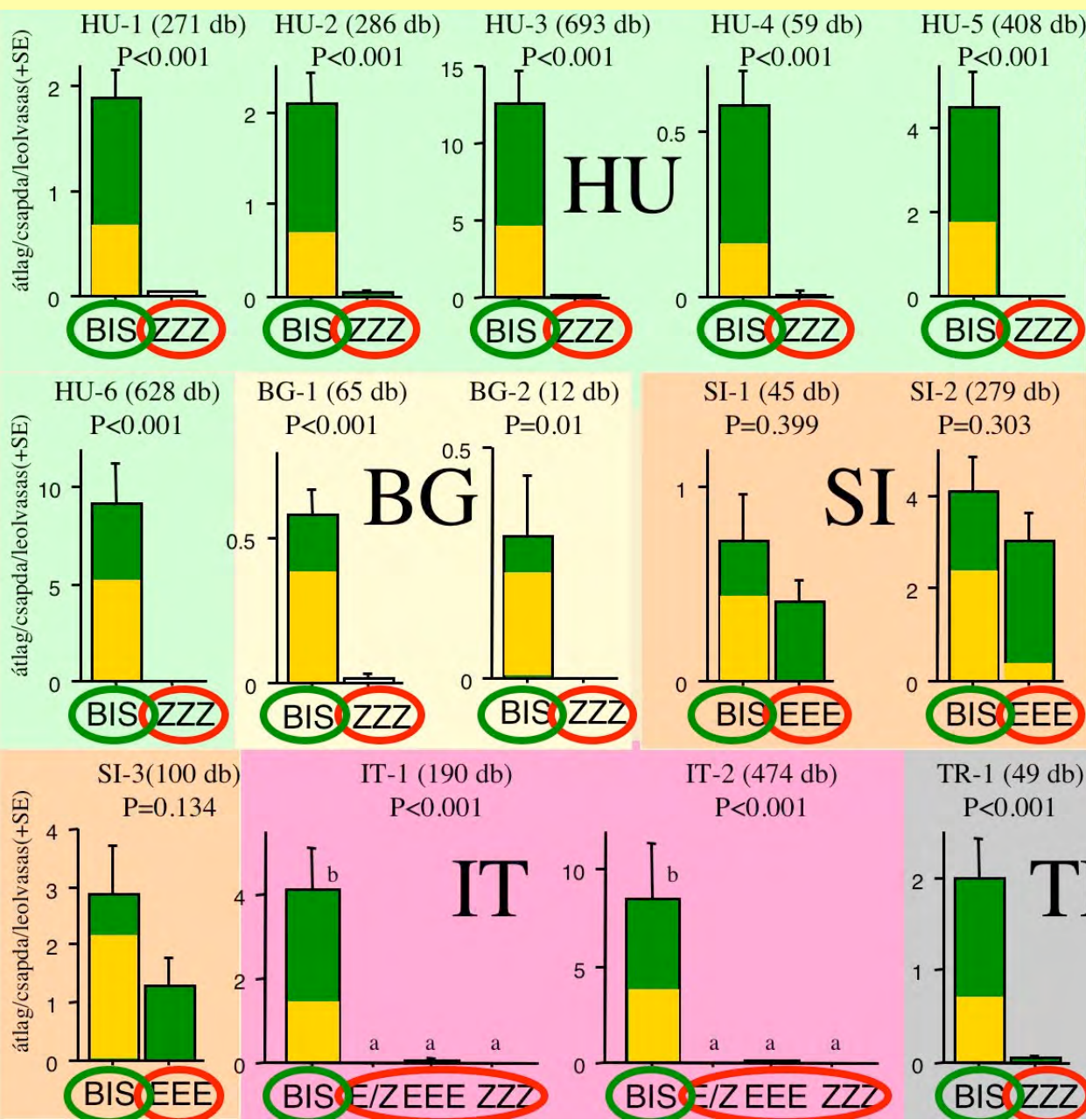


Foto: www.

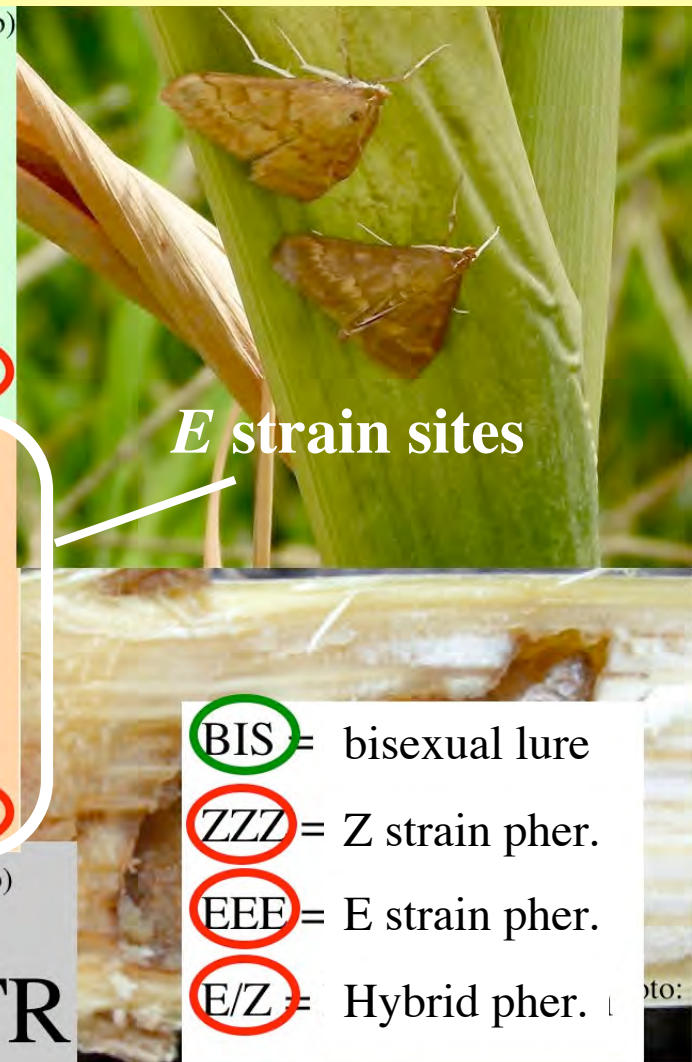
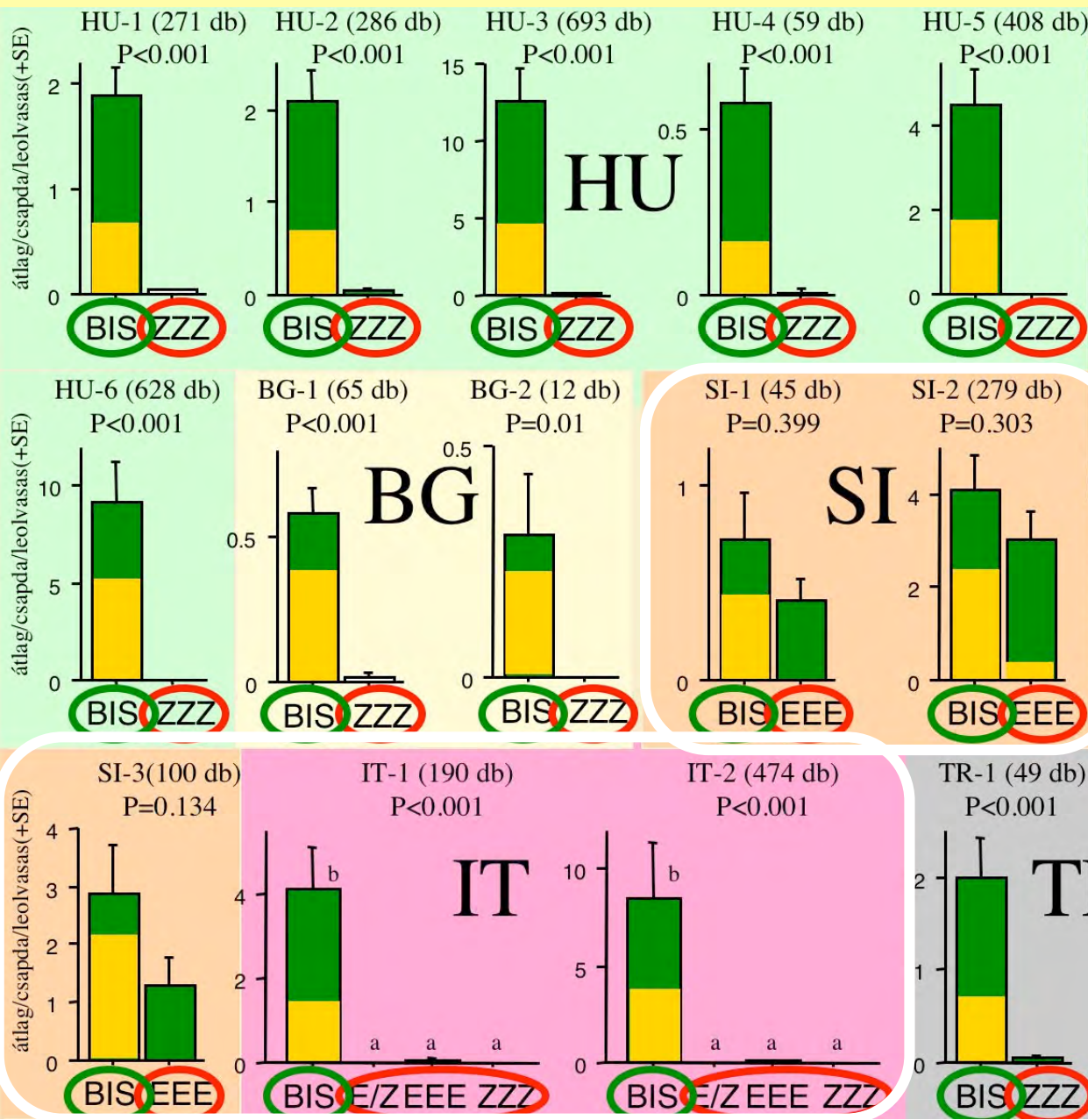


The bisexual lure invariably caught more than synthetic pheromone (difference not significant in Slovenia only)!

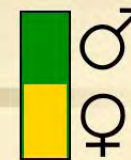


BIS = bisexual lure
ZZZ = Z strain pher.
EEE = E strain pher.
E/Z = Hybrid pher.

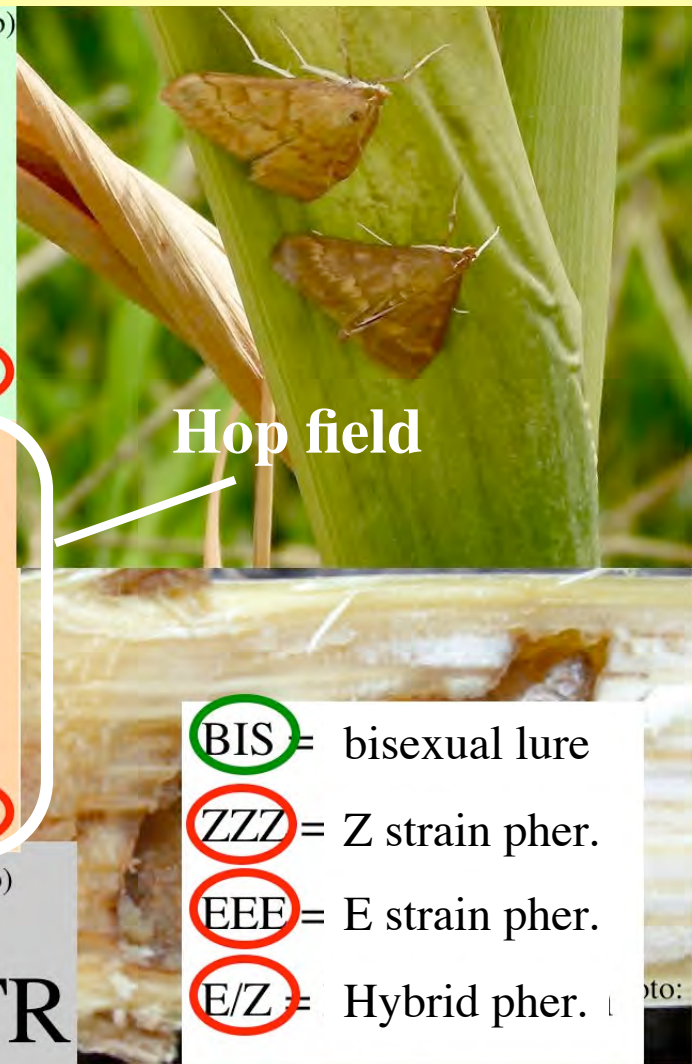
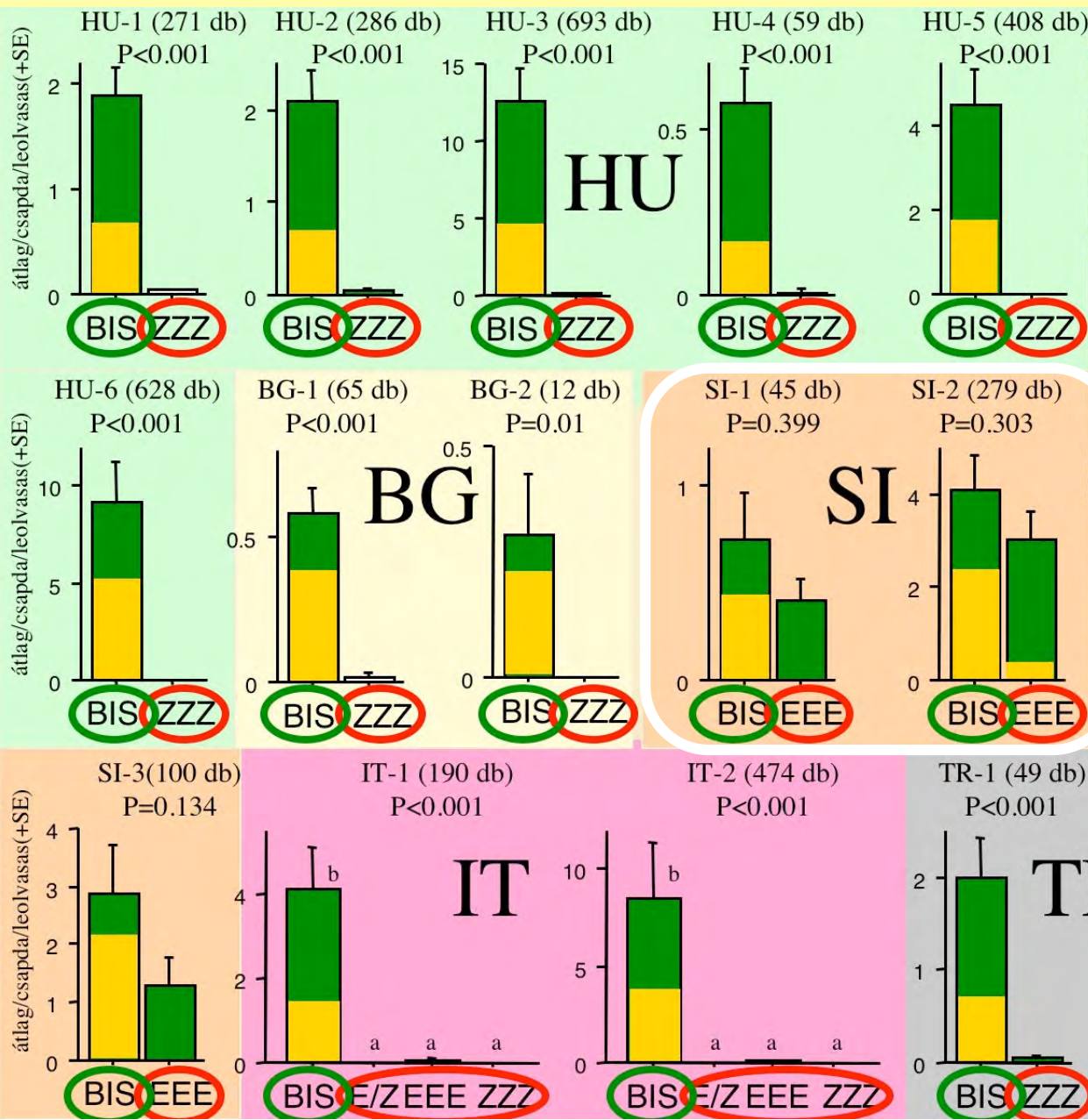
The Slovenian discrepancy cannot be due to different responses of the *Z* and *E* strains – since also in Italy tests were run on an *E* strain site



BIS = bisexual lure
 ZZZ = Z strain pher.
 EEE = E strain pher.
 E/Z = Hybrid pher.



The Slovenian discrepancy cannot be due to different responses of populations living on different host plants – maize or hops.

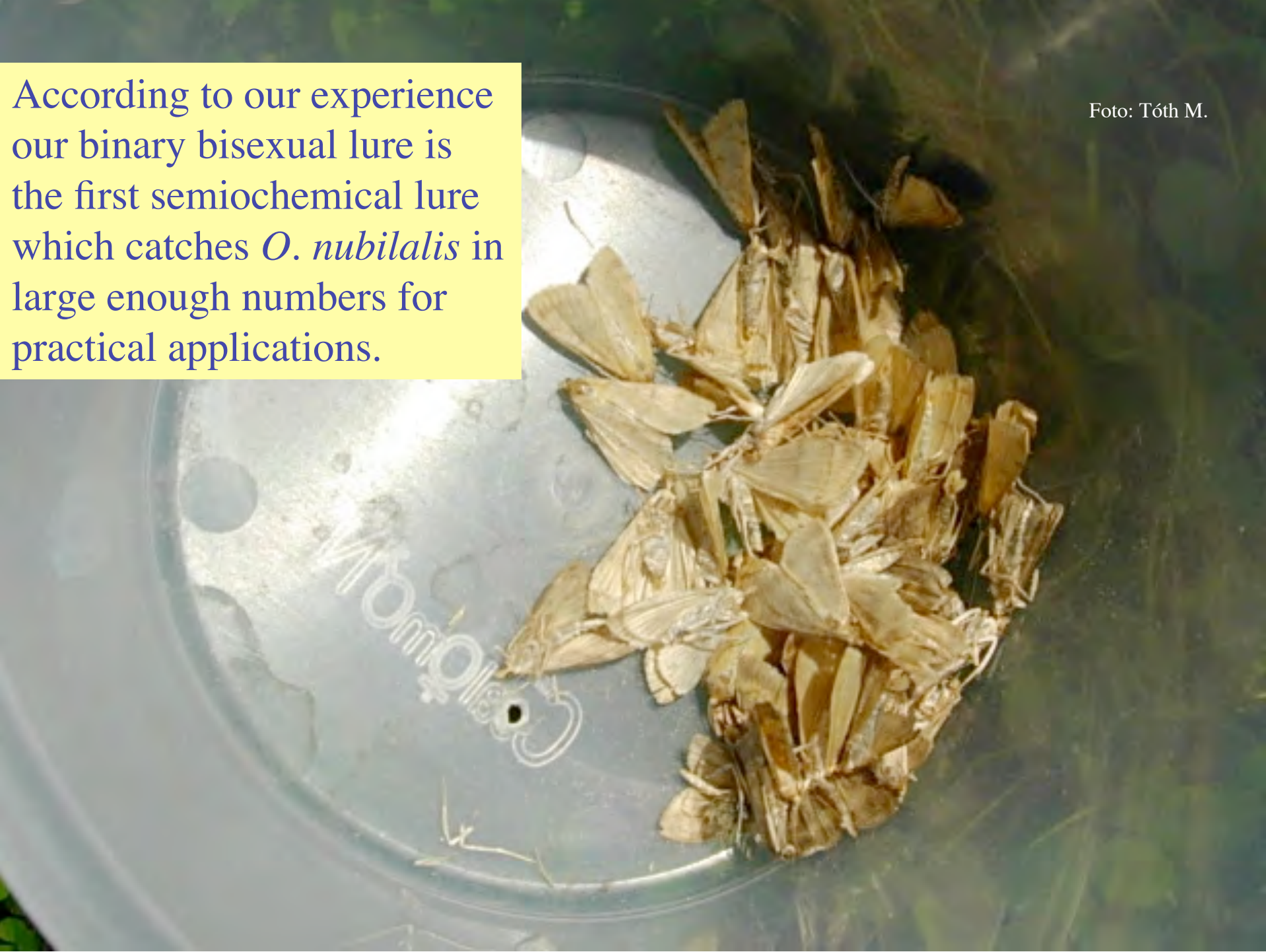


BIS = bisexual lure
 ZZZ = Z strain pher.
 EEE = E strain pher.
 E/Z = Hybrid pher.

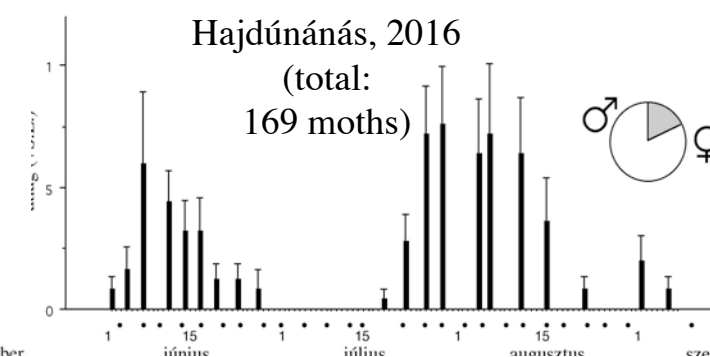
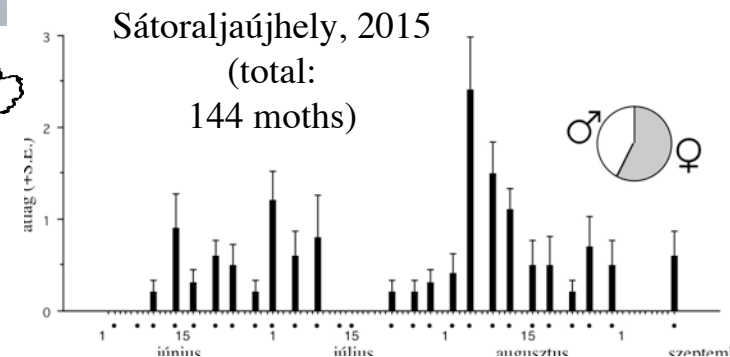
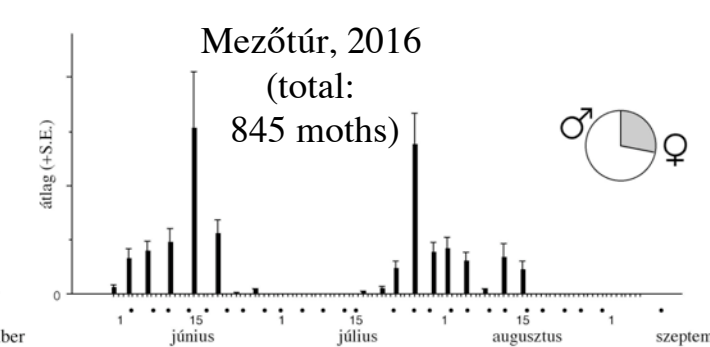
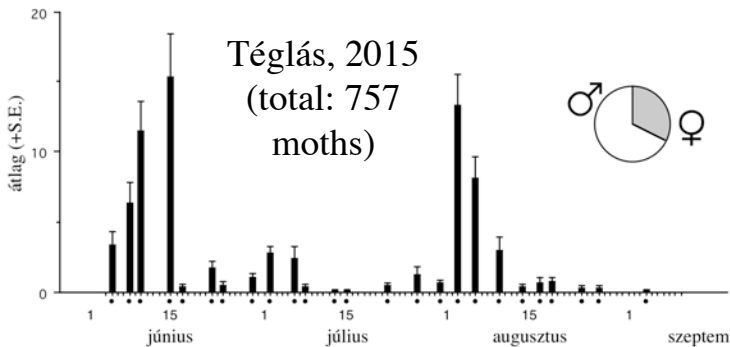
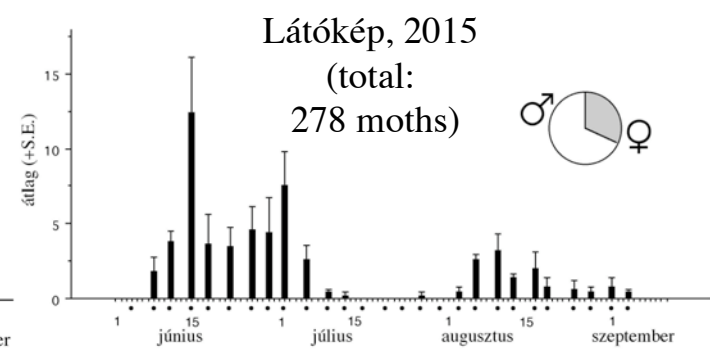
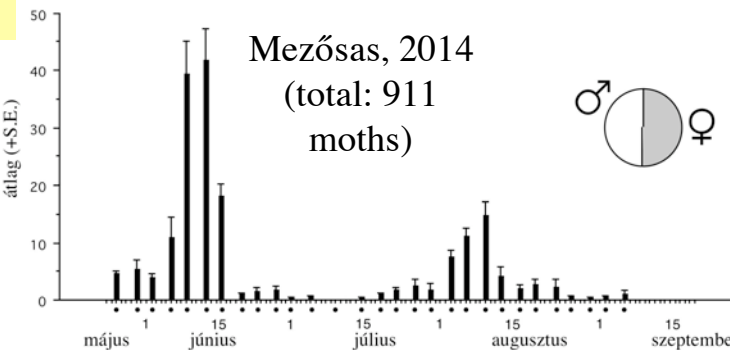
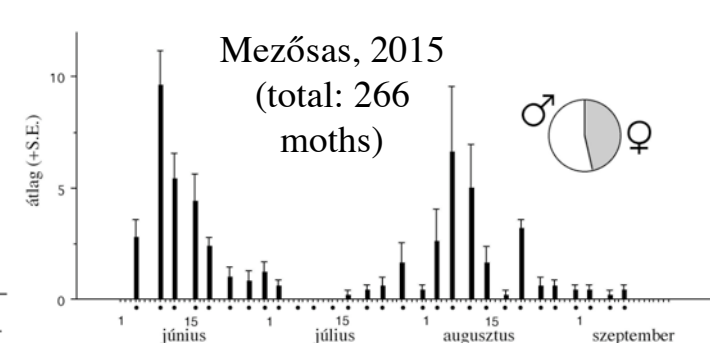
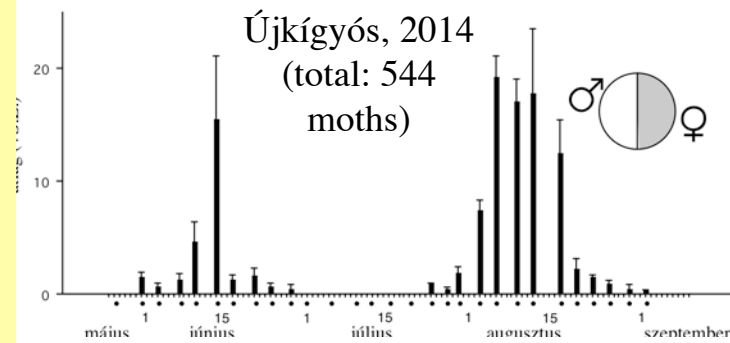
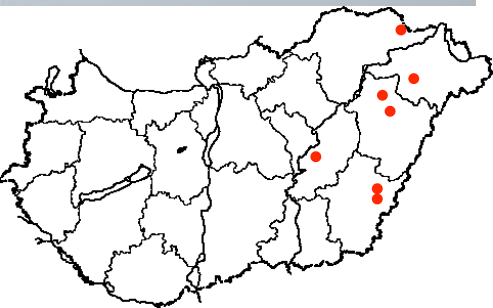


According to our experience our binary bisexual lure is the first semiochemical lure which catches *O. nubilalis* in large enough numbers for practical applications.

Foto: Tóth M.



Monitoring of the flight pattern: two distinct generations in Hungary



Autographa gamma

The bisexual lure
attracts other moths
as well, i.e. noctuids:

MacDunnoughia confusa

Autographa gamma

The bisexual lure
attracts other moths
as well, i.e. noctuids:

Abrostola sp.

The bisexual lure
attracts other moths
as well, i.e. noctuids:

*Helicoverpa
armigera*

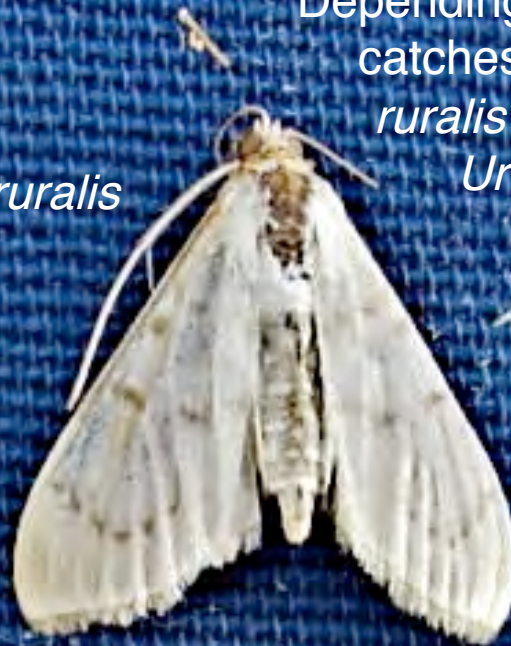


Foto: Tóth M.

© MTA NKI 2016

Depending on locality
catches of *Haritala*
ruralis (host plant:
Urtica) can be
observed

Haritala ruralis



Ostrinia nubilalis

