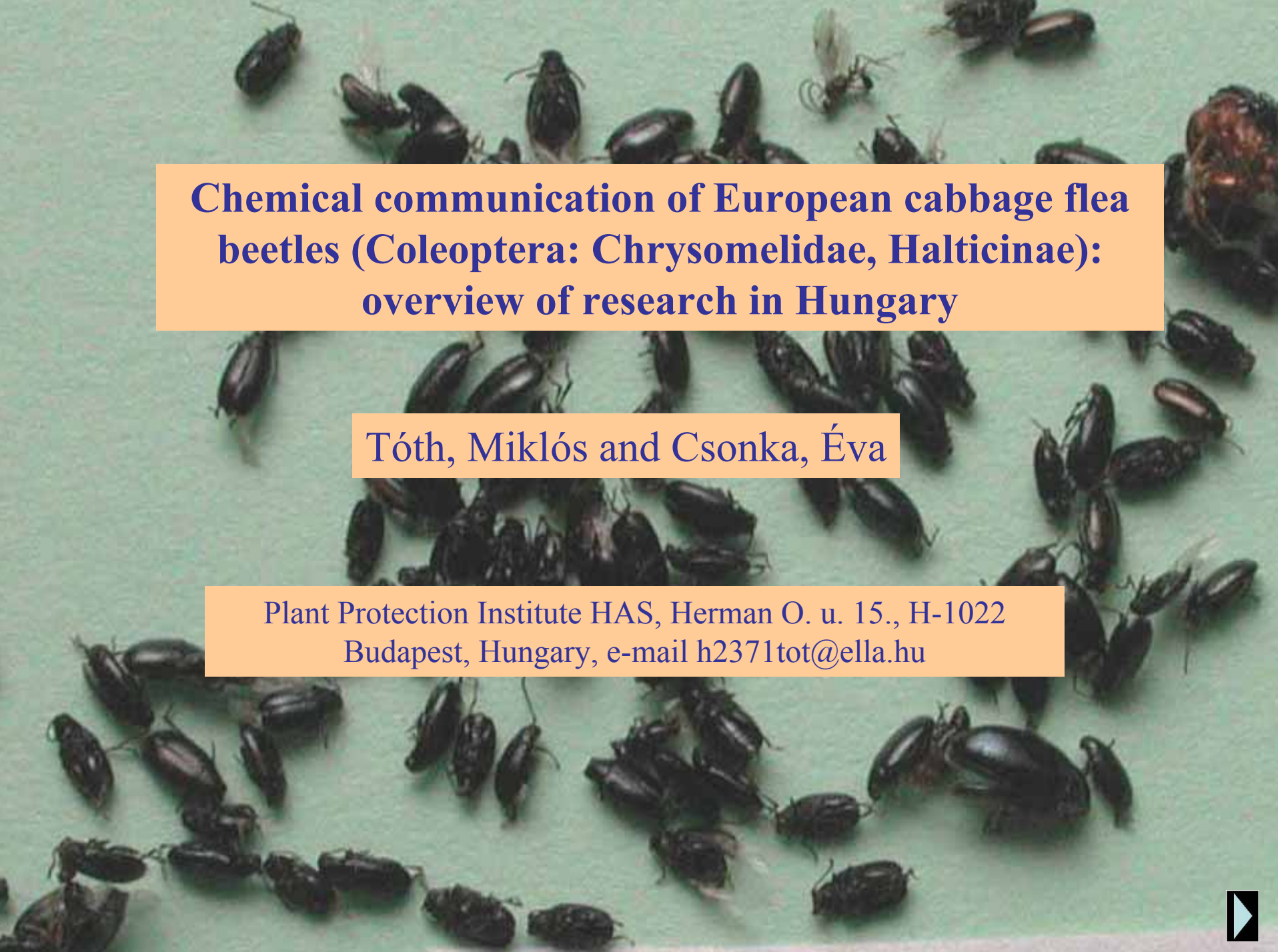
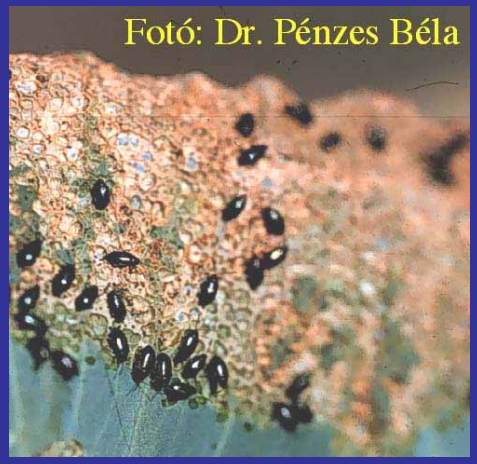


Chemical communication of European cabbage flea beetles (Coleoptera: Chrysomelidae, Halticinae): overview of research in Hungary

Tóth, Miklós and Csonka, Éva

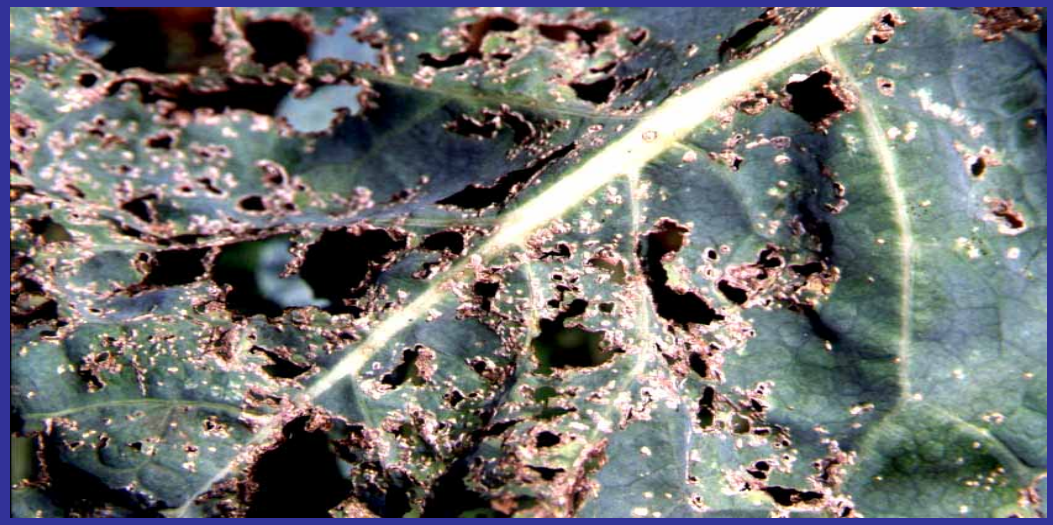
Plant Protection Institute HAS, Herman O. u. 15., H-1022 Budapest, Hungary, e-mail h2371tot@ella.hu

Importance of flea beetles



<u>chewing damage on seedlings</u>

- reduced growth
- uneven maturing



<u>Vectors</u>

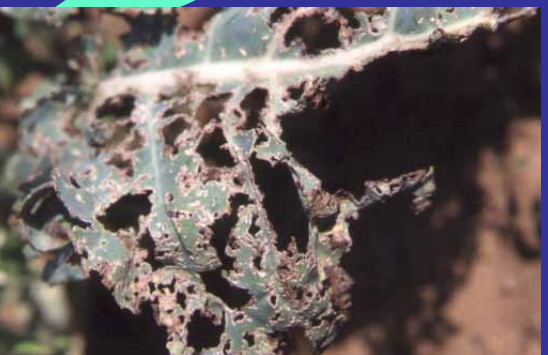
- radish mosaic virus (RMV)
- turnip yellow mosaic virus (TYMV)
- brome mosaic virus (BMV), etc.

Host plant - derived attractants of flea beetles

ISOTHIOCYANATES

myrosinase

GLUCOSINOLATES

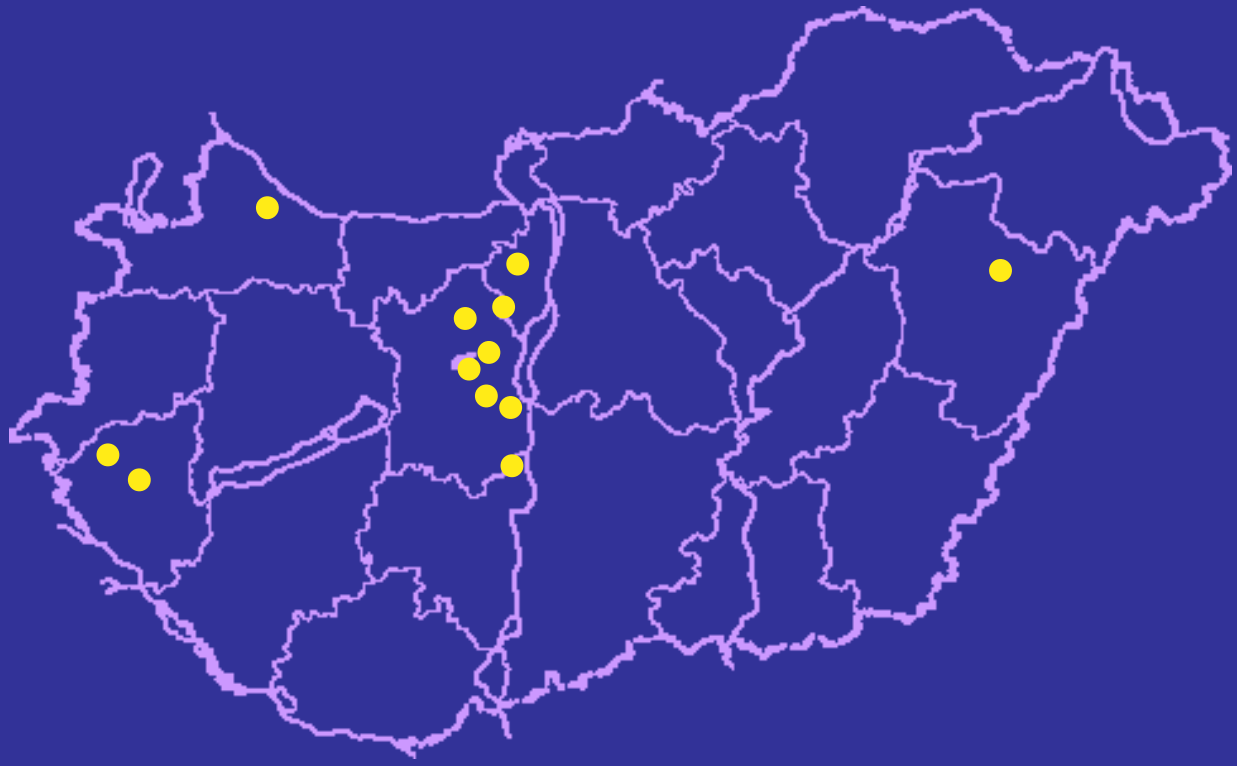


Allyl isothiocianate (allyl ITCN) as a described food attractant:

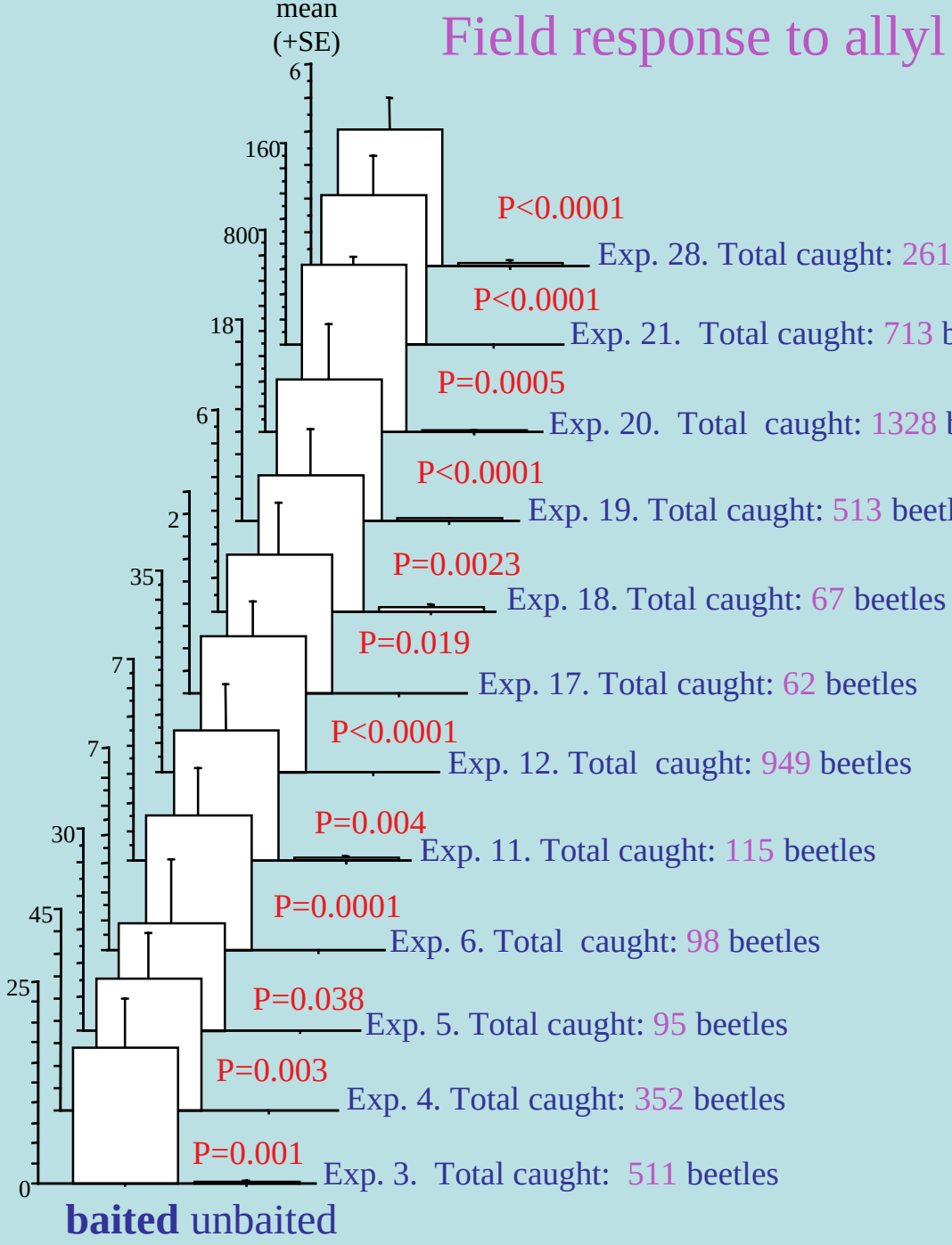
Phyllotreta	Reference
cruciferae	Görnitz, 1953, Feeny et al. 1970, Vincent & Stewart, 1984,
striolata	Pivnick et al. (1992)
pusilla	Pivnick et al. (1992)
bipustulata	Vincent & Stewart, 1984

Field response to allyl ITCN

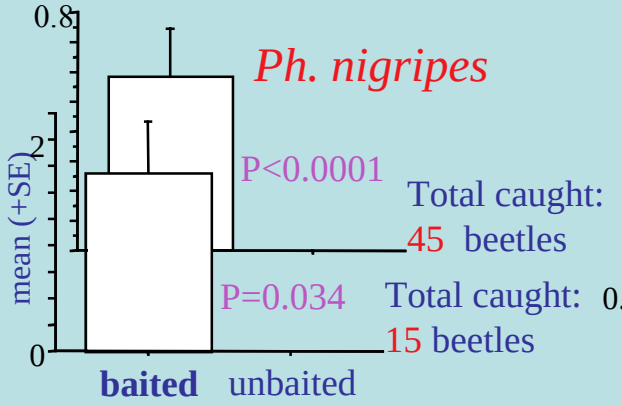
29 experiments conducted in:
Hungary (12 test sites)
Slovenia (1 test site)
Bulgaria (1 test site)

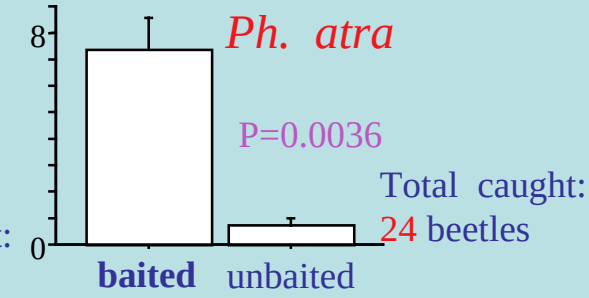


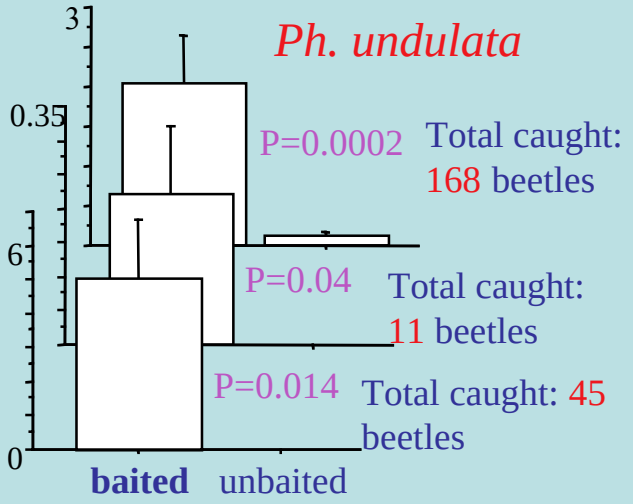
Field response to allyl ITCN: *Ph. vittula*

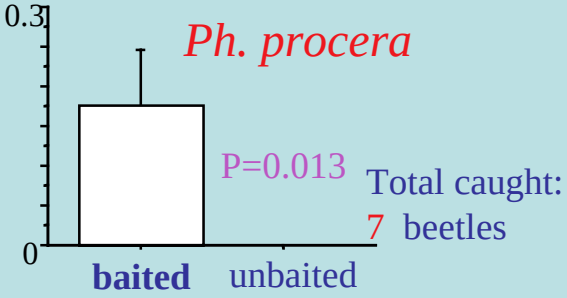


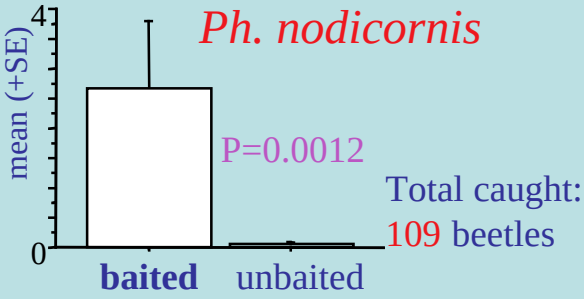
Field response to allyl ITCN: other spp.

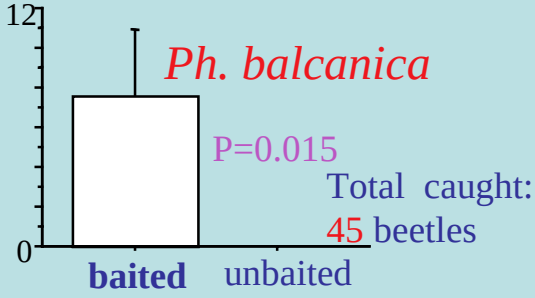


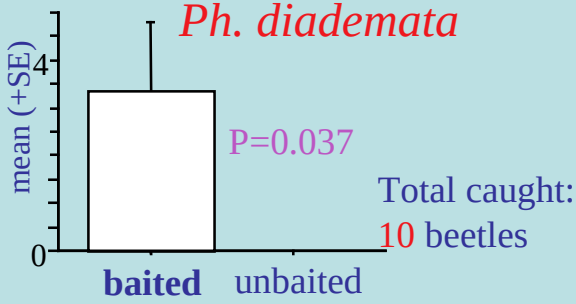


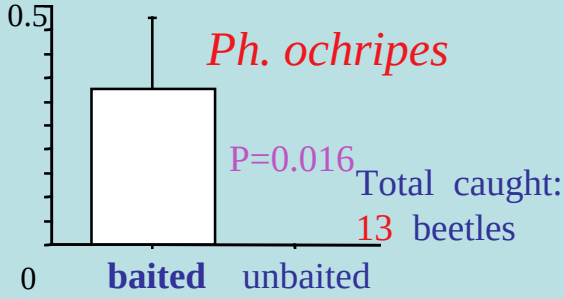


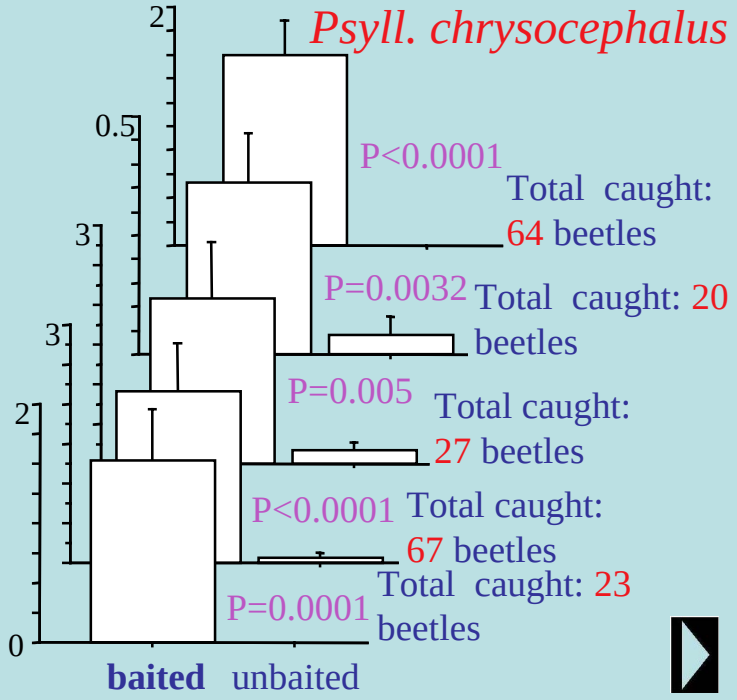


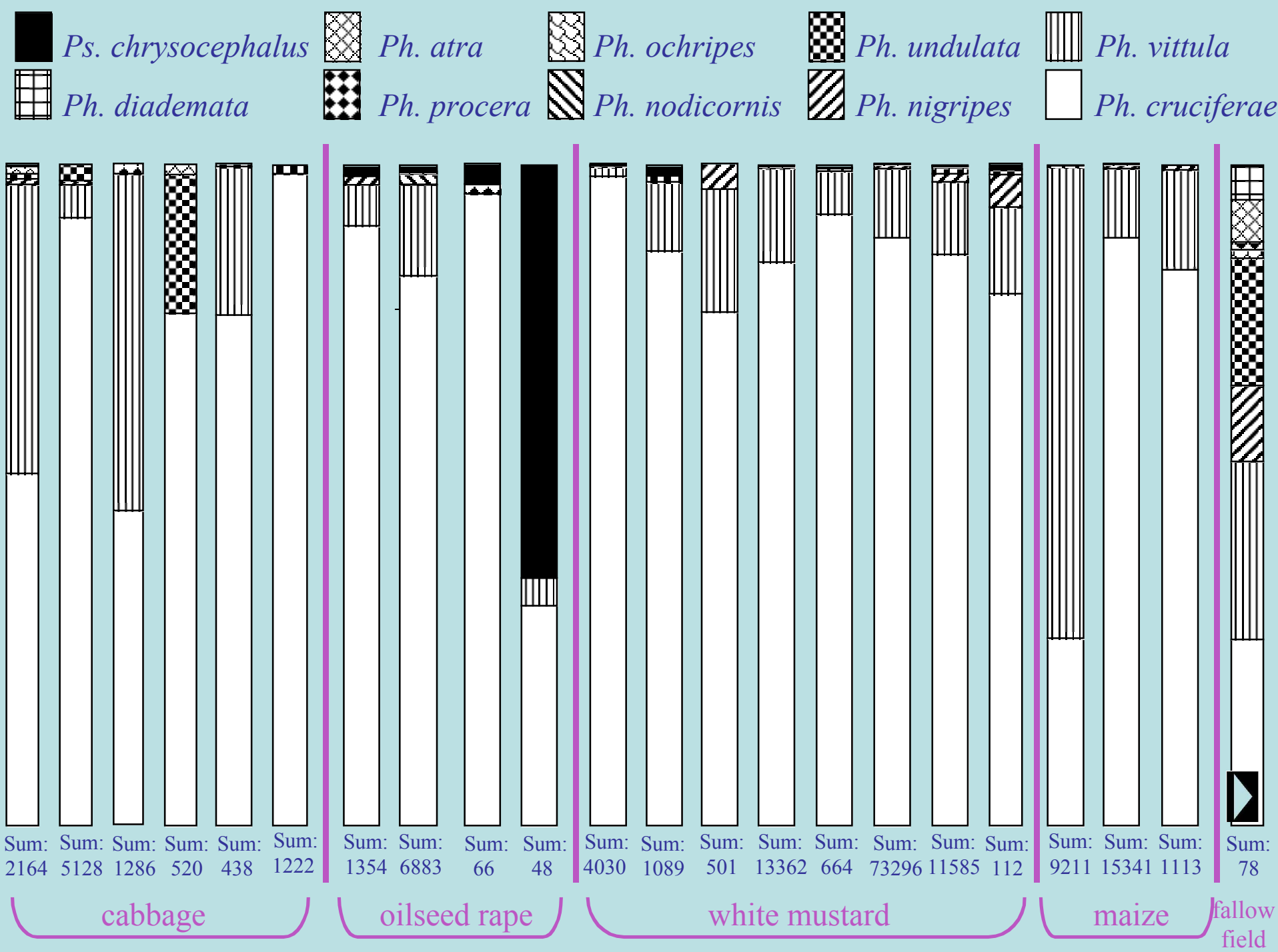






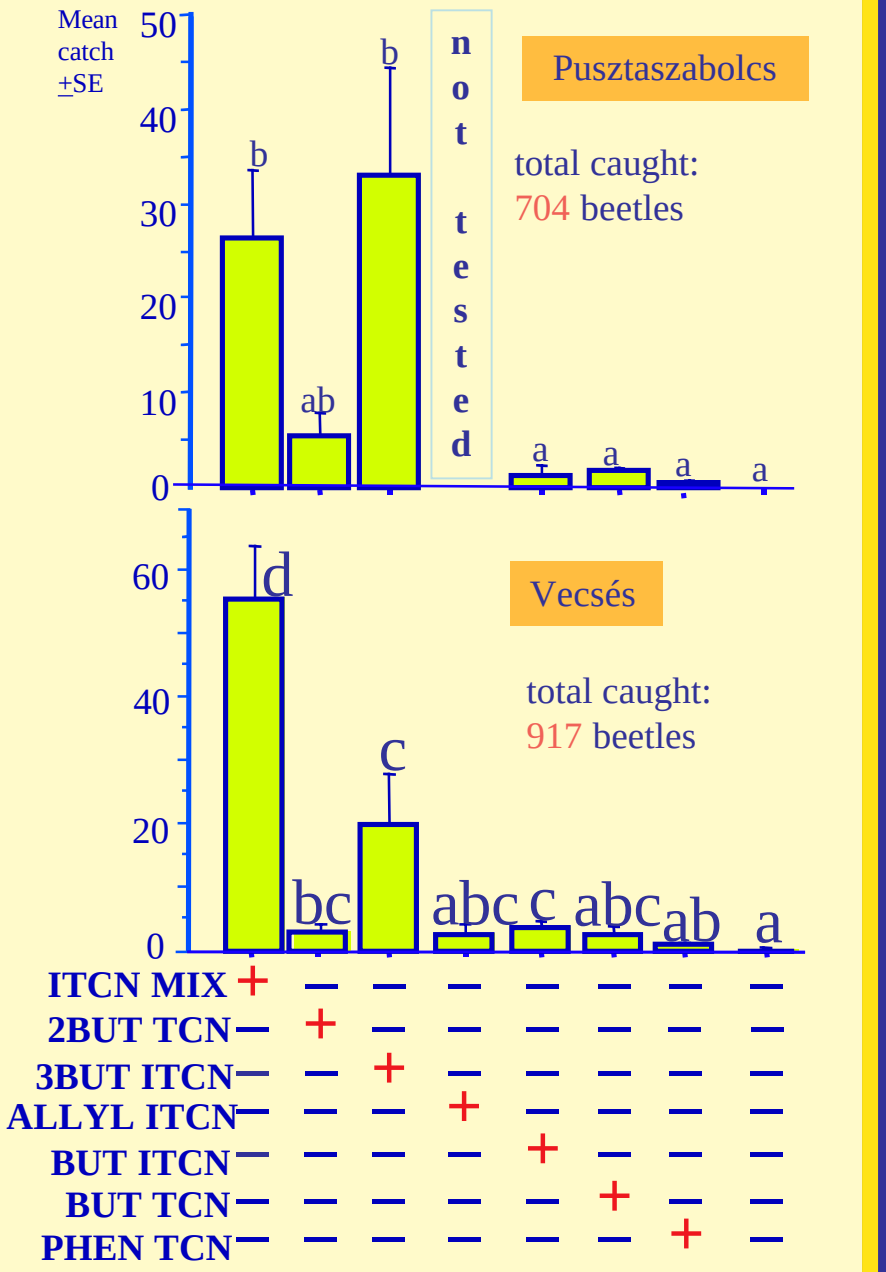





Ps. chrysocephalus
Ph. atra
Ph. ochripes
Ph. undulata
Ph. vittula
Ph. diademata
Ph. procera
Ph. nodicornis
Ph. nigripes
Ph. cruciferae
Sum: 2164
Sum: 5128
Sum: 1286
Sum: 520
Sum: 438
Sum: 1222
Sum: 1354
Sum: 6883
Sum: 66
Sum: 48
Sum: 4030
Sum: 1089
Sum: 501
Sum: 13362
Sum: 664
Sum: 73296
Sum: 11585
Sum: 112
Sum: 9211
Sum: 15341
Sum: 1113
Sum: 78
cabbage
oilseed rape
white mustard
maize
fallow field

Species captured:	Attractive activity of allyl ITCN:
Ph. cruciferae	has been known from literature; confirmed in this study
Ph. vittula	was discovered in this study
Ph. procera	was discovered in this study
Ph. nodicornis	was discovered in this study
Ph. balcanica	was discovered in this study
Ph. undulata	was discovered in this study;
Ph. nigripes	was discovered in this study;
Ph. atra	was discovered in this study;
Ph. diademata	was discovered in this study;
Ph. ochripes	was discovered in this study;
Psylliodes chrysocephala	was discovered in this study; electrophysiological activity has been known before

Ph. vittula



Activity of other ITCN-s: preliminary tests

Nadap, Fejér county, Hungary, oilseed rape, SEP 14- OCT 8, 2002.

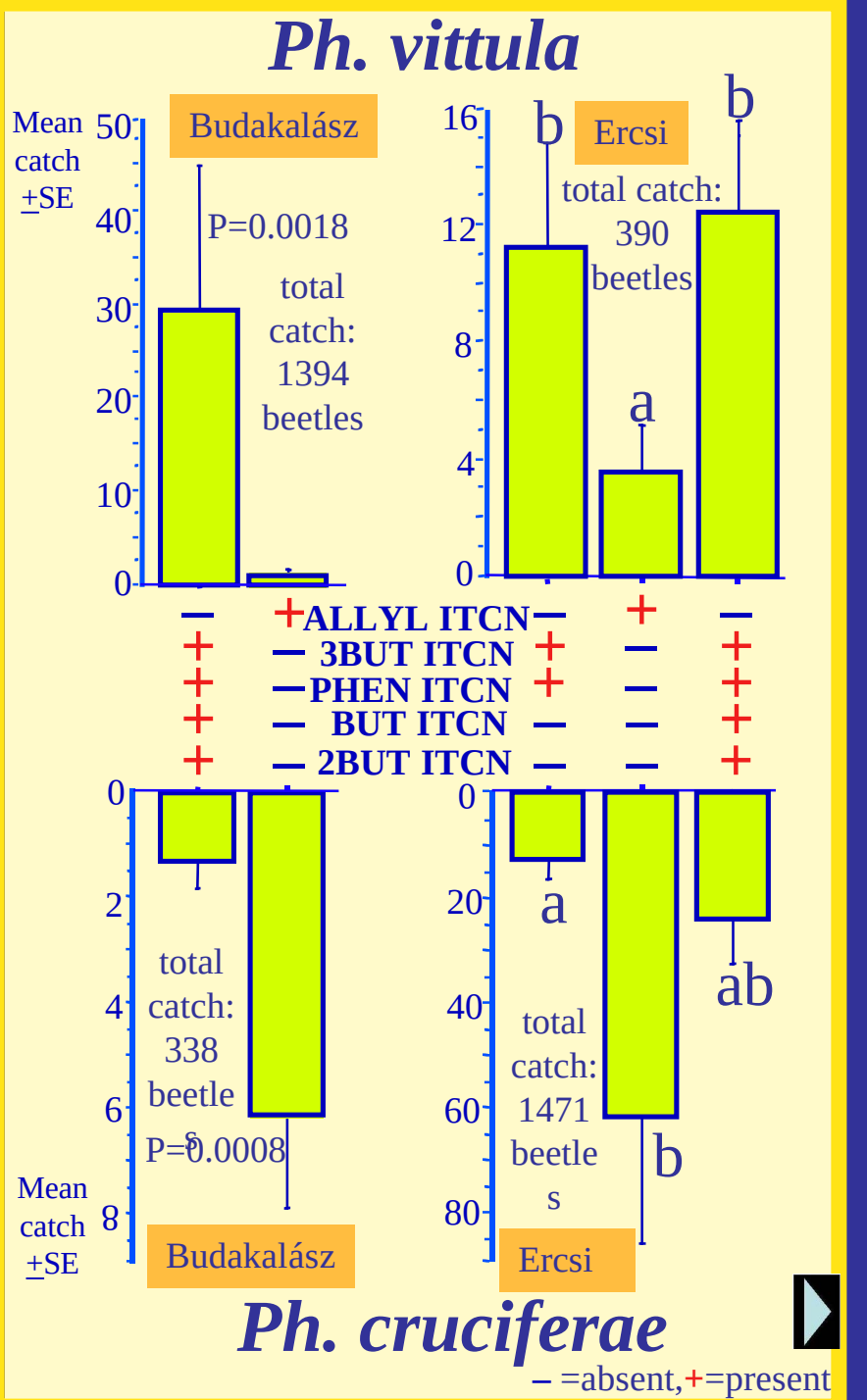
bait	total catch
ITCN MIX	418
3BUT ITCN	247
ALLYL ITCN	2
unbaited	2

Composition of ITCN mix: 2-butenyl-, phenethyl-, 3-butenyl- and butyl isothiocyanates

Activity of other ITCN-s:

Since numerically most *Ph. vittula* were caught with the ITCN MIX in the preliminary tests, we continued with comparison trials between combinations of components of ITCN MIX and ALLYL ITCN to see which components of ITCN MIX were important.

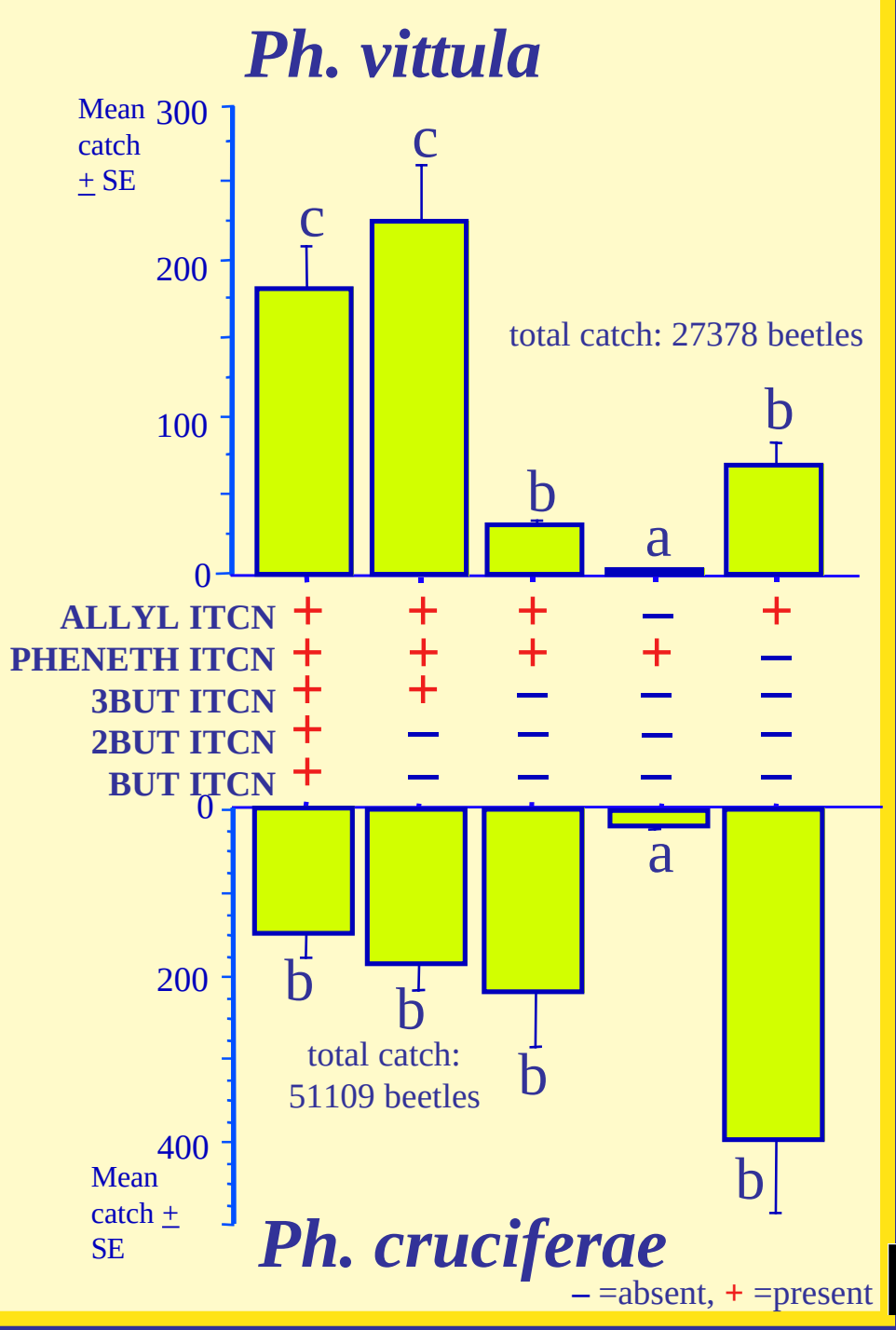
The omission of 2BUT ITCN and BUT ITCN was without effect.

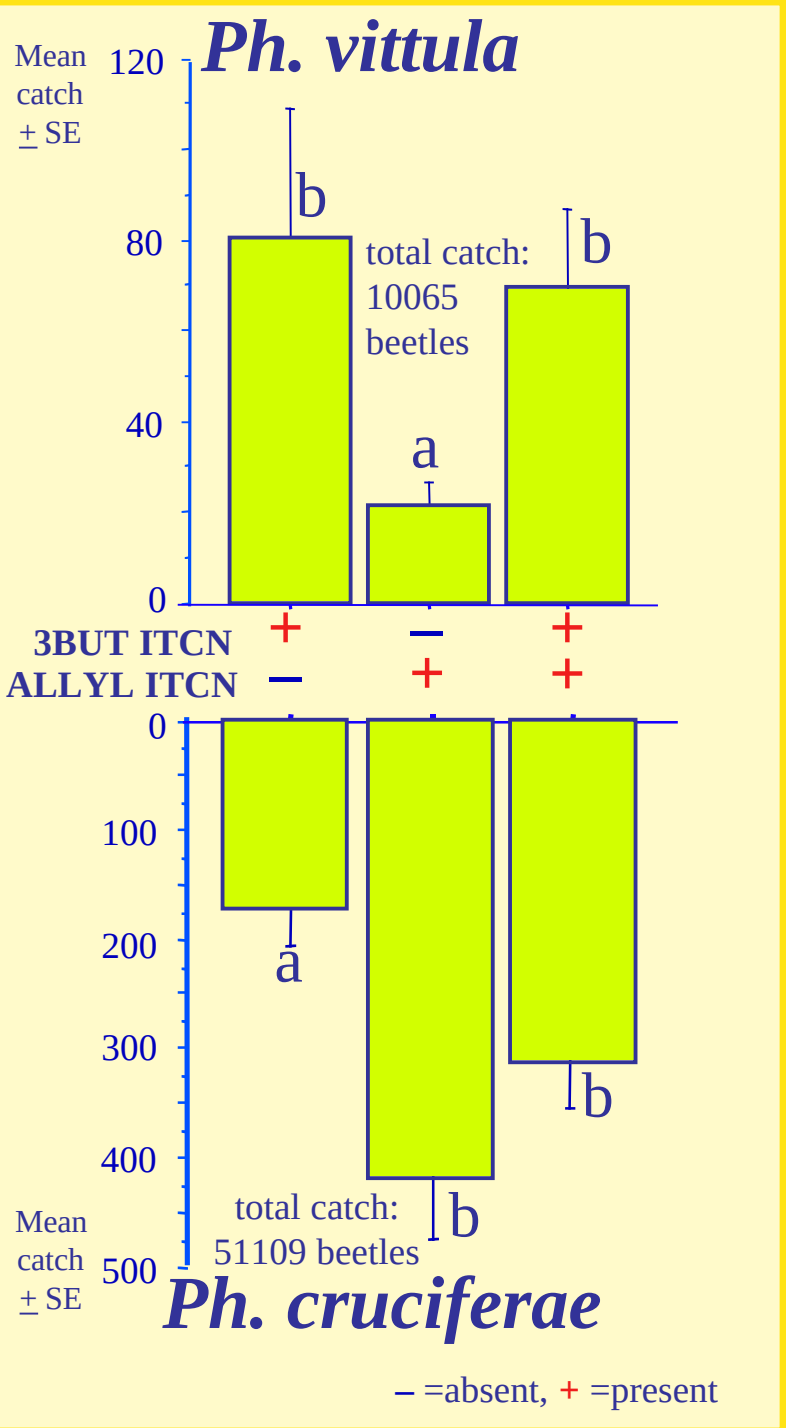


Activity of other ITCN-s:

Best *Ph. vittula* catches were obtained with multicomponent mixtures which contained 3BUT ITCN.

This suggested that only this compound carried activity in the ITCN MIX



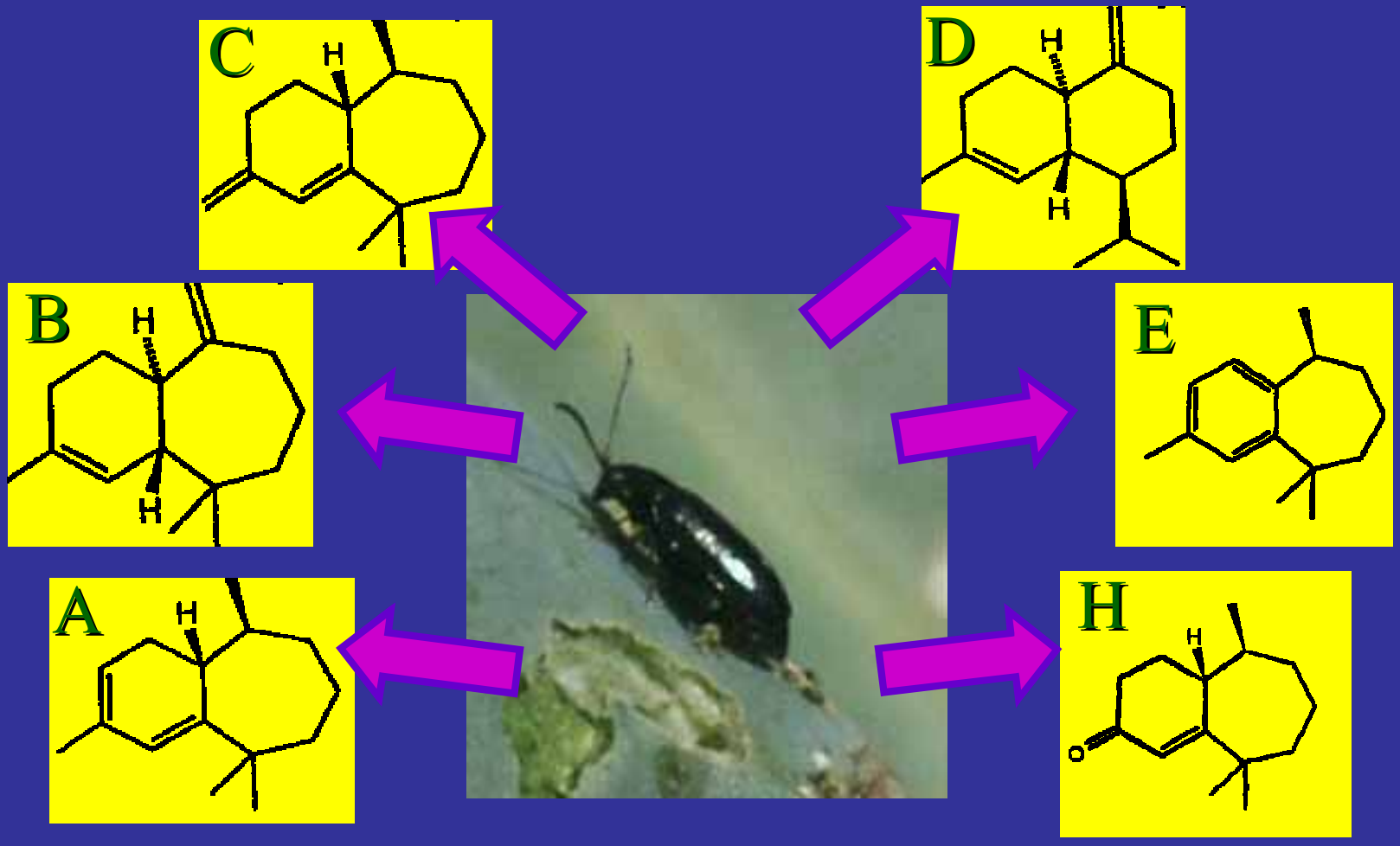


Activity of other ITCN-s:

The importance of 3BUT ITCN was corroborated in a final test where again highest *Ph. vittula* catches were observed in traps with baits containing 3BUT ITCN, while *Ph. cruciferae* responded best to baits containing ALLYL ITCN.

The binary blend caught similar numbers as the respective single compounds in both species.

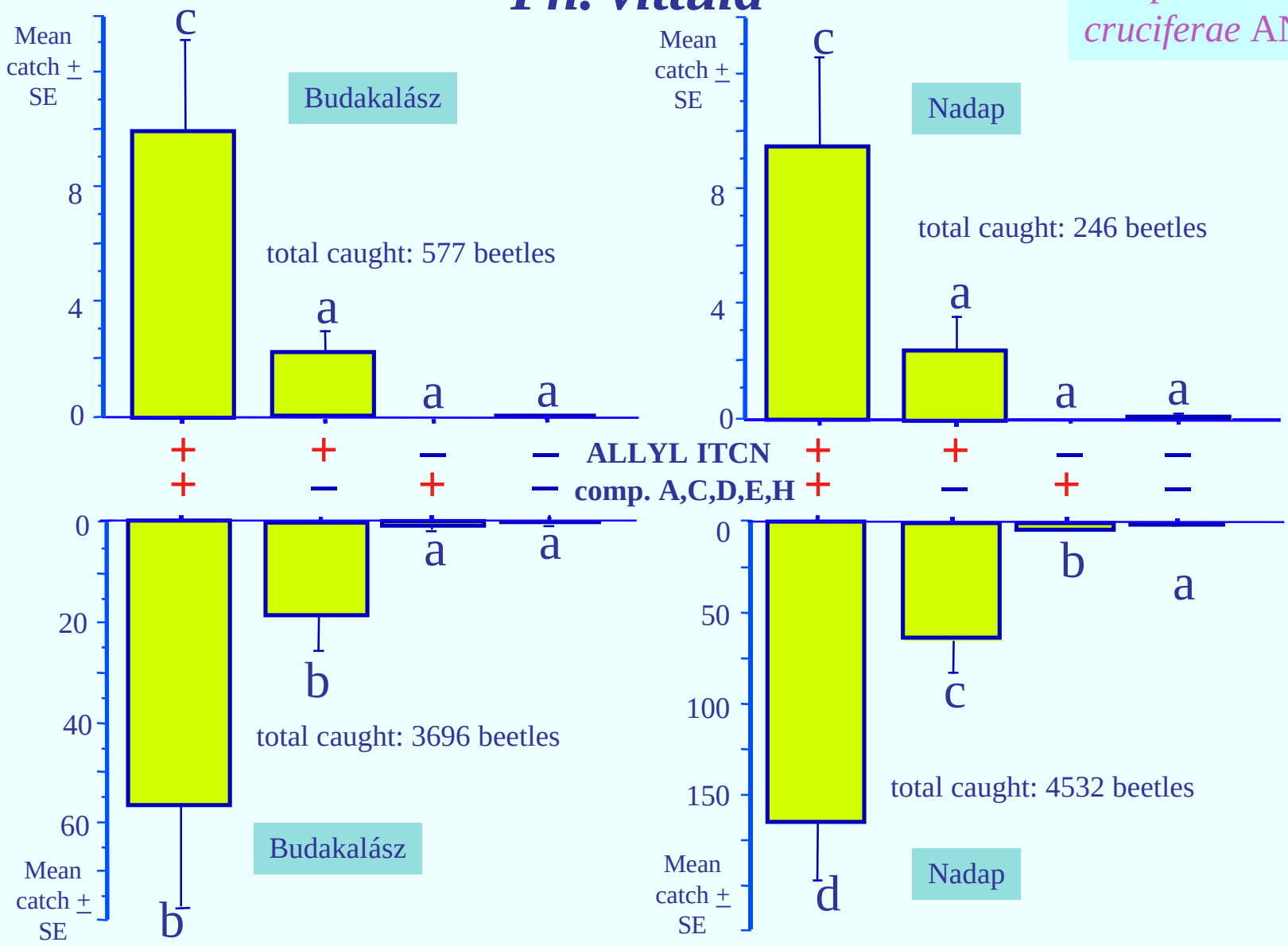
Male-specific pheromone candidate compounds (*Ph. cruciferae*)



Bartelt et al., (2001)

Mixture of male specific compounds active in *Ph. cruciferae* AND *vittula*

Ph. vittula



Ph. cruciferae

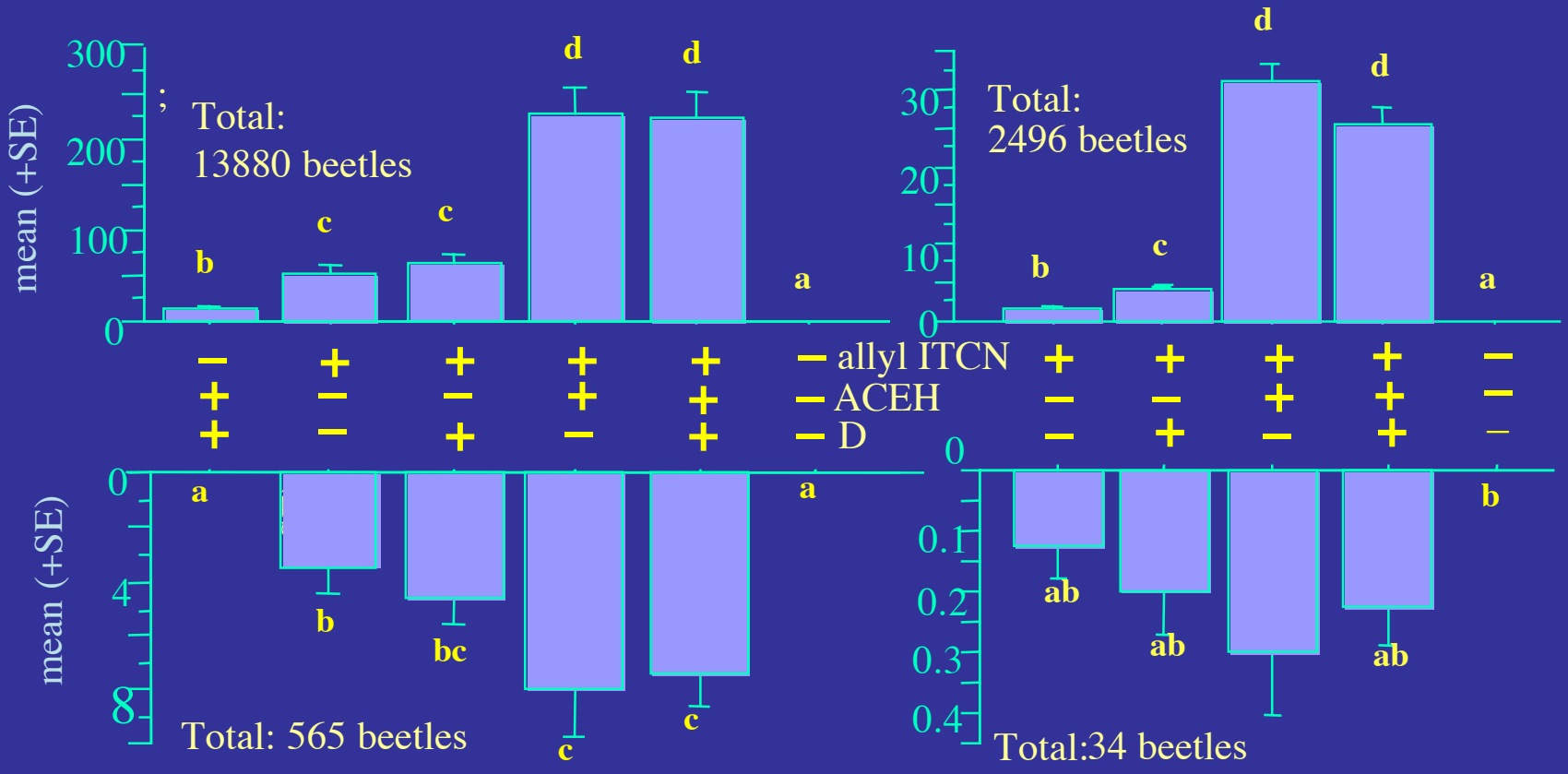
– =absent, + =present

Compound D has no effect

Pusztazámor,
2003 SEP. 10-19.

Phyllotreta cruciferae

Budakalász,
2003 AUG. 19-27.

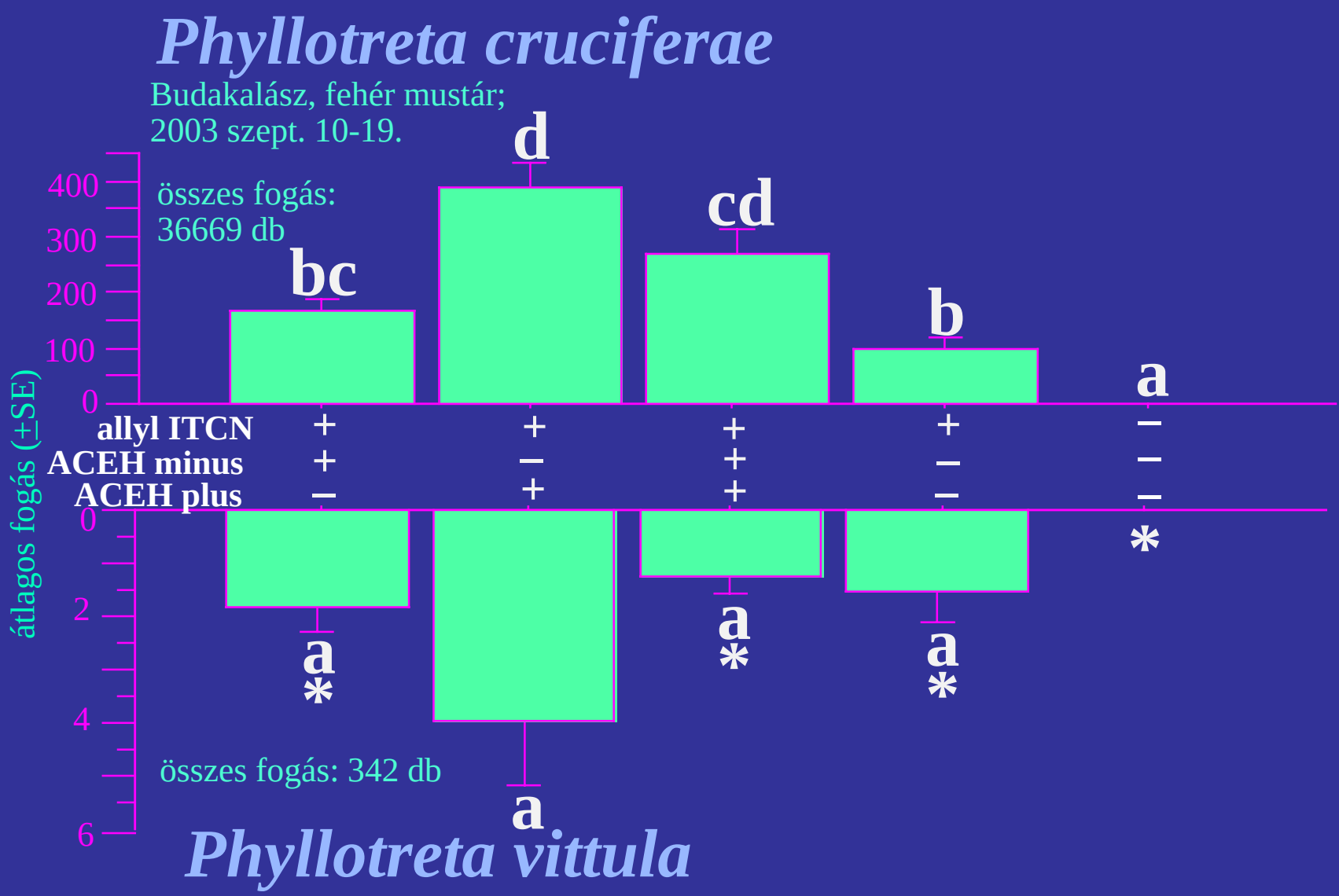


Pusztazámor,
2003 SEP. 10-19.

Phyllotreta vittula

Budakalász,
2003 AUG. 19-27.

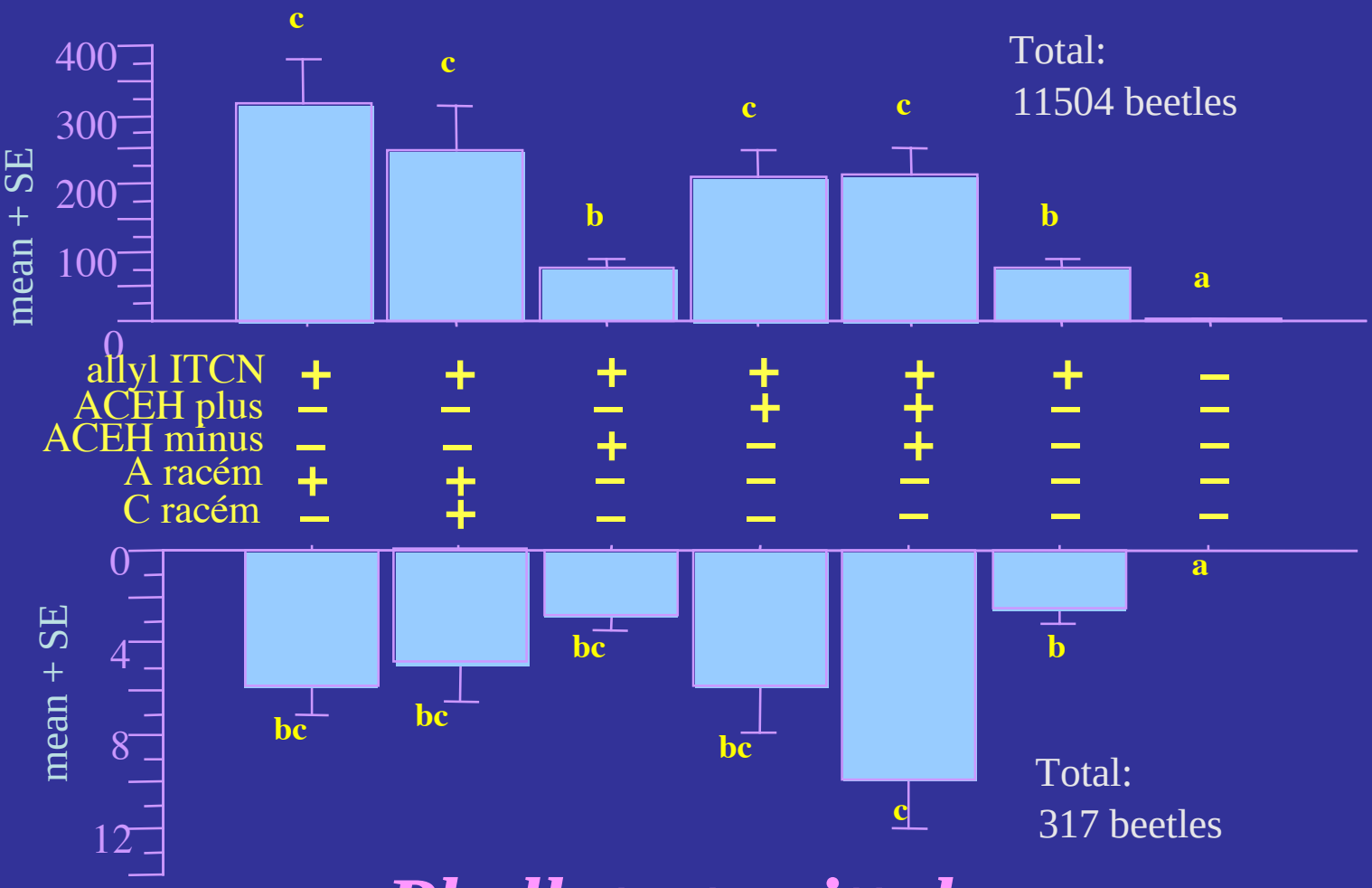
The PLUS (+) enantiomers are the active ones



The MINUS (–) enantiomers do not influence the activity; presence of comp. C, E, H not necessary

Phyllotreta cruciferae

Budakalász,
2004 ápr.4-19.

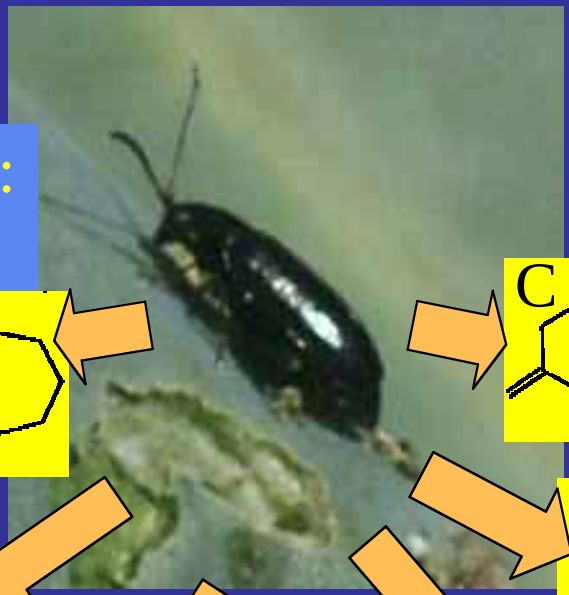


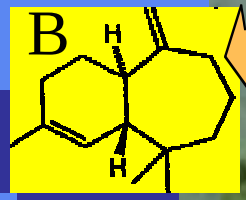
Phyllotreta vittula

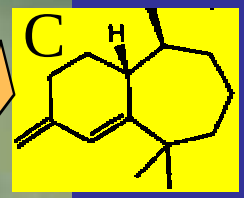
Relative importance of male specific compounds of *Ph. cruciferae*

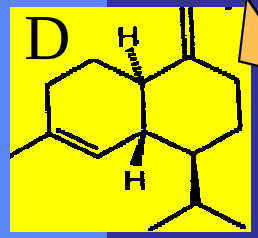
A himachalene-derivative: due to synthetic problems was not tested

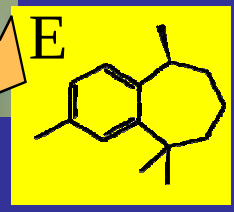
(+)-gamma-cadinene: Its omission from the blend had no effect

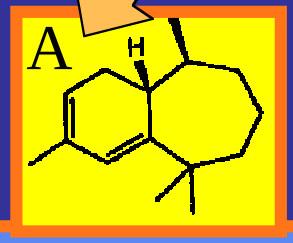


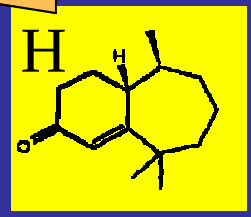






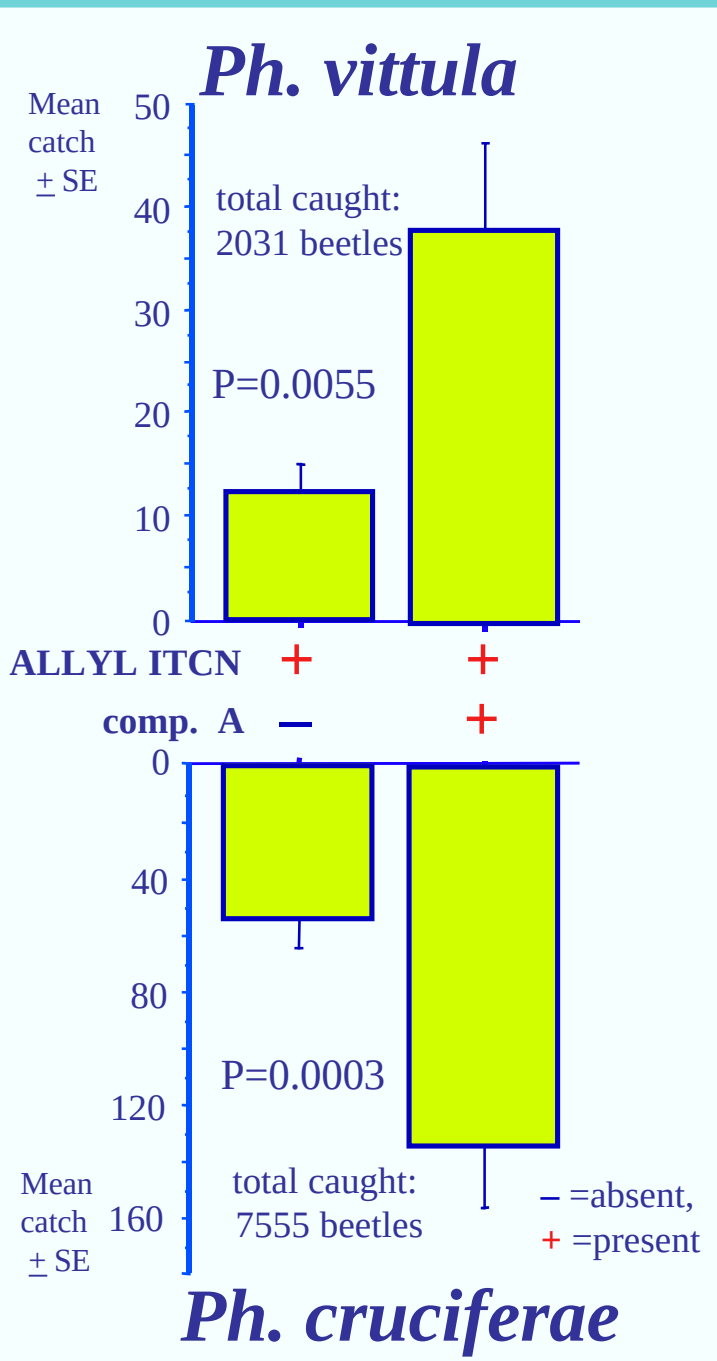






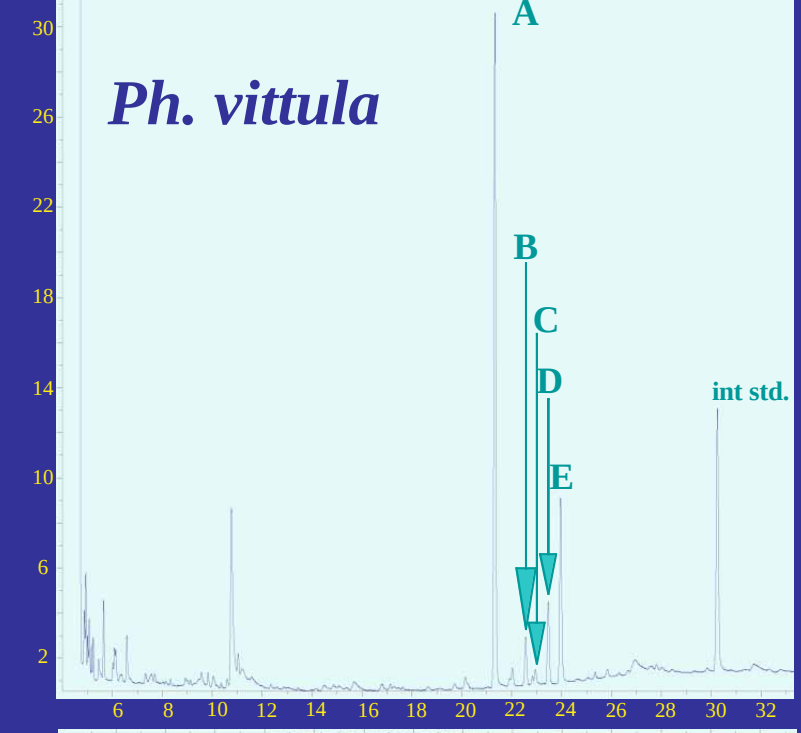
Himachalene dervatives present in lower quantities; their omission had no effect

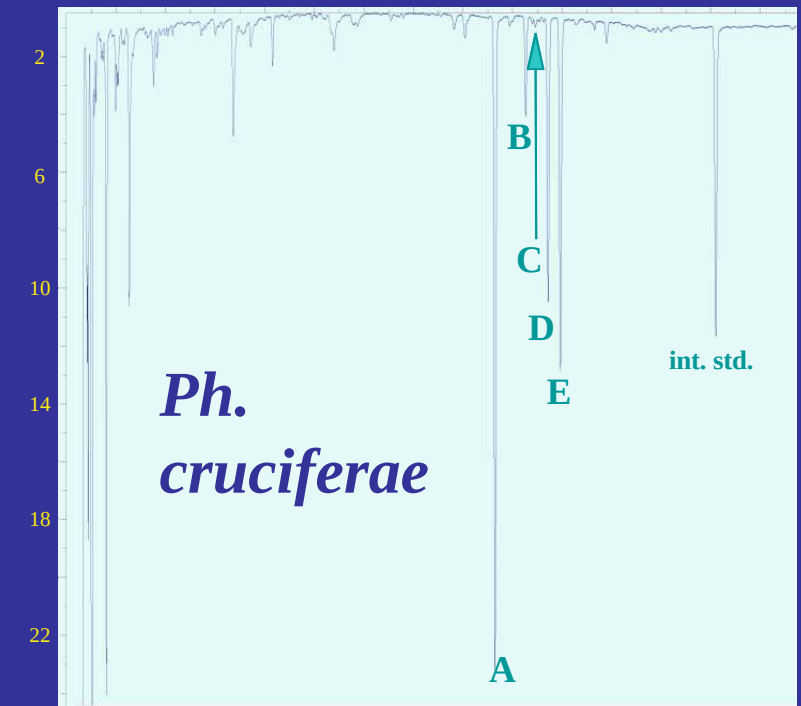
(10S,11S)-himachala-2,4-dién
the compound carrying behavioral activity



Compound **A** alone is active also in *Ph. vittula*,

which suggested that Compound **A** may be the key pheromone component also in this species





Same pheromone components in volatile collections from *Ph. vittula* and *Ph. cruciferae*

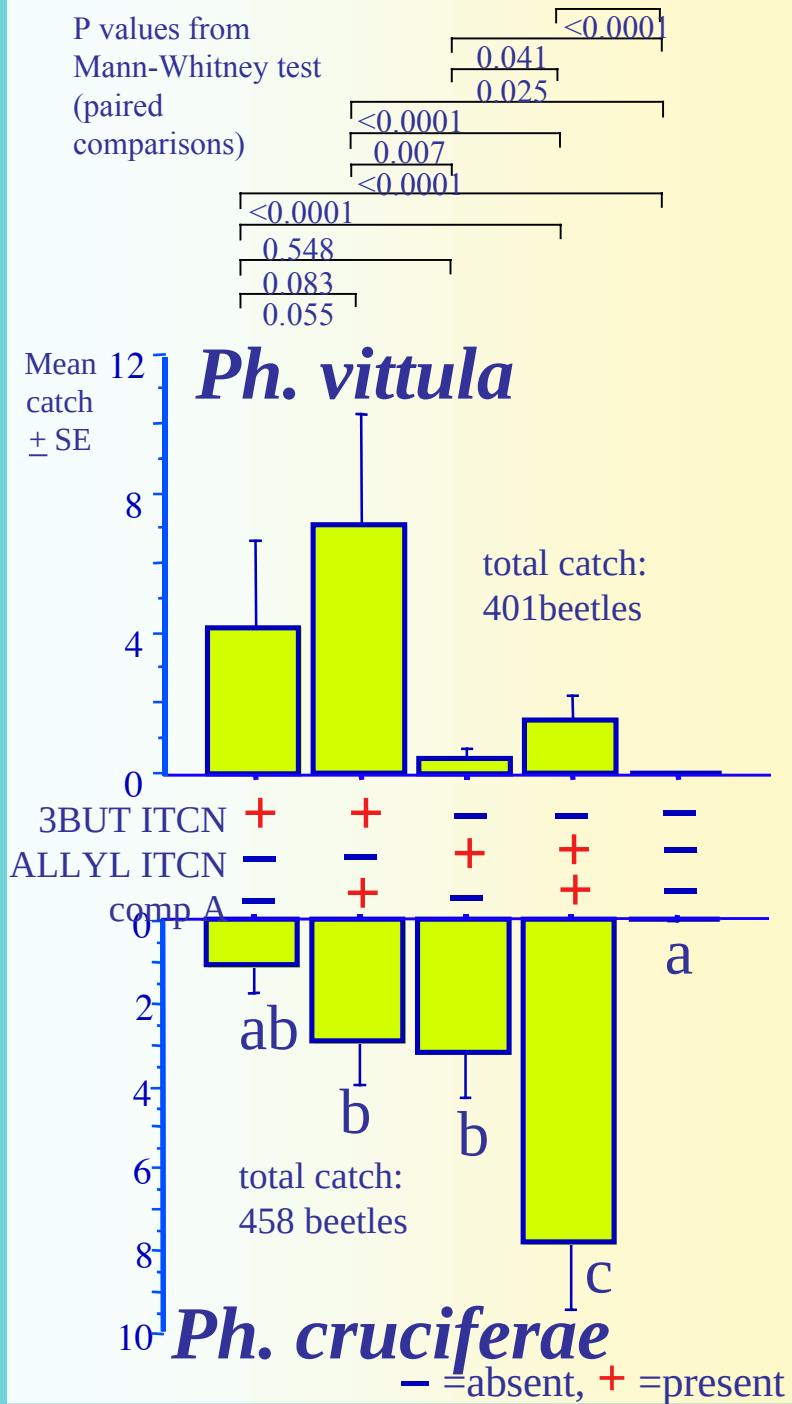
	Ratio in % of comp. A (Mean+SE)			
	comp. B	comp. C	comp. D	comp. E
Ph. vittula	7.9 +0.48 (n=6)	2.57+0.3 (n=3)	14.43+1.3 (n=6)	30.6 +4.8 (n=6)
Ph. cruciferae	21.9+3.9 (n=4)	1.87 (n=1)	61.03+7.5 (n=4)	46.3+8.1 (n=4)
P-value	0.002	not available	<0.0001	0.12

We recently identified these compounds also in volatiles from male

Ph. nigripes

Ph. undulata

Ph. nemorum



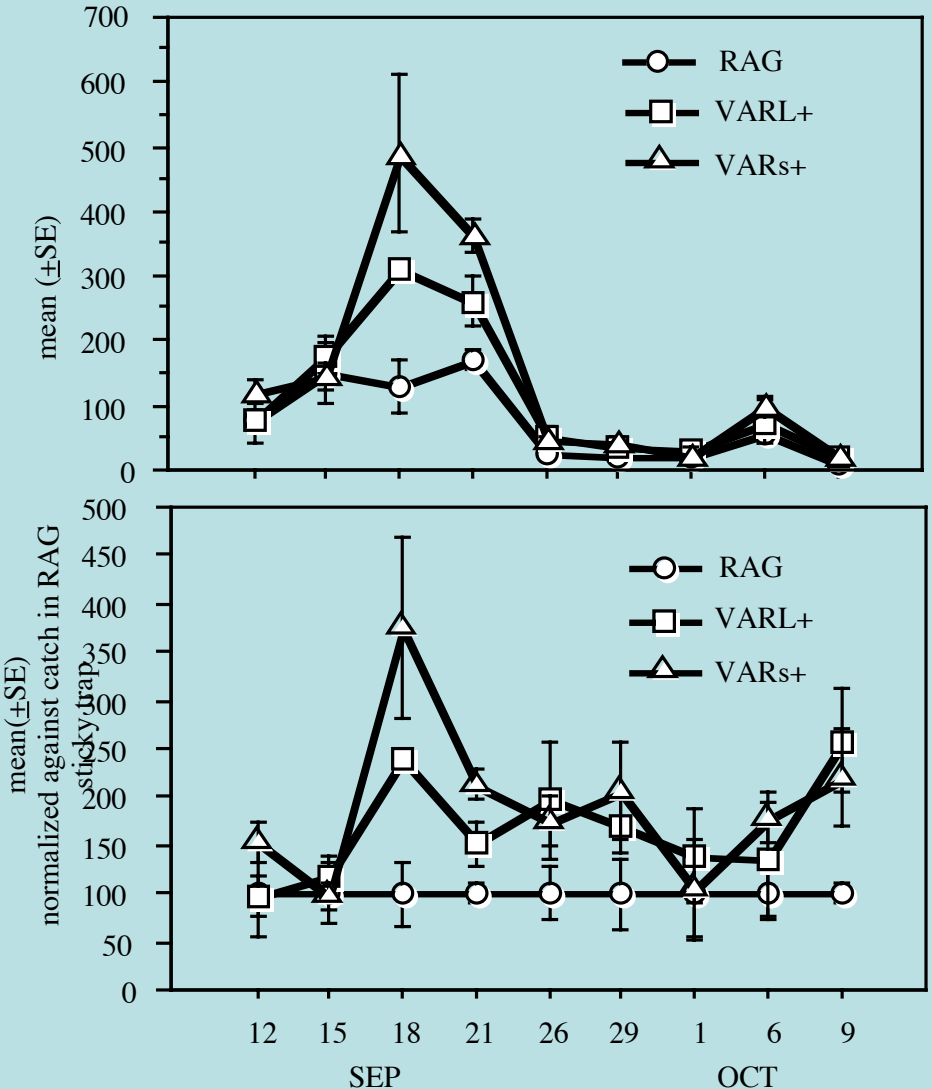
Highest catches in *Ph. cruciferae* with compound A plus allyl ITCN,

while in *Ph. vittula* with compound A plus 3BUT ITCN

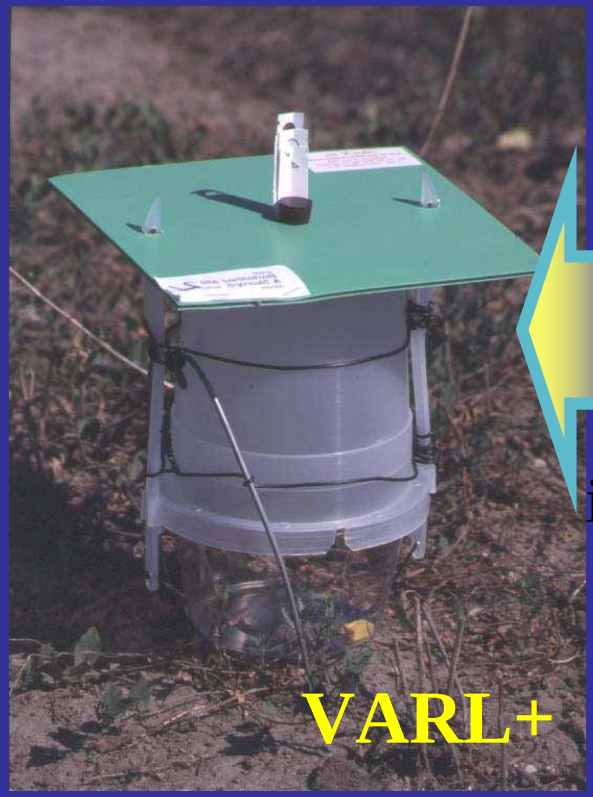
So these species show differing preferences in their host-plant related communication, but are very similar in their pheromonal communication

Optimal trap design

Preliminary comparison of funnel traps VARL+ and VARs+ with sticky delta (RAG) trap designs



Optimal trap design



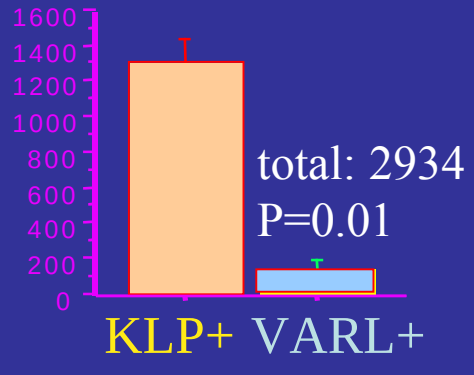
Comparison of VARL+ (funnel) vs. KLP+ („hat”) trap designs

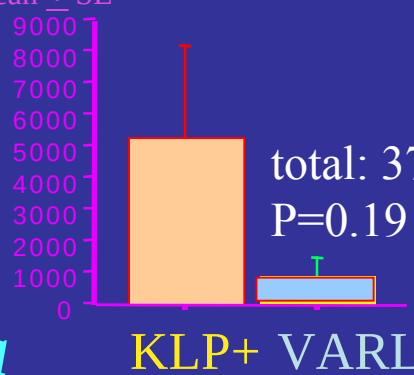
Preliminary results

Dunaföldvár,
2004 JUL 12-23.

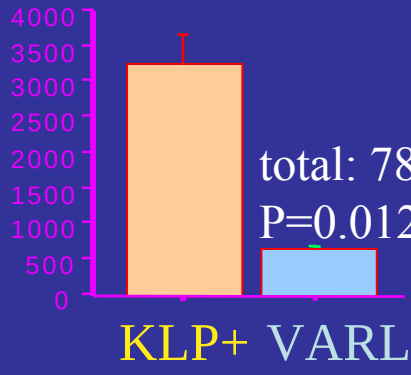
Ercsi,
2004 AUG. 2-SEP. 17

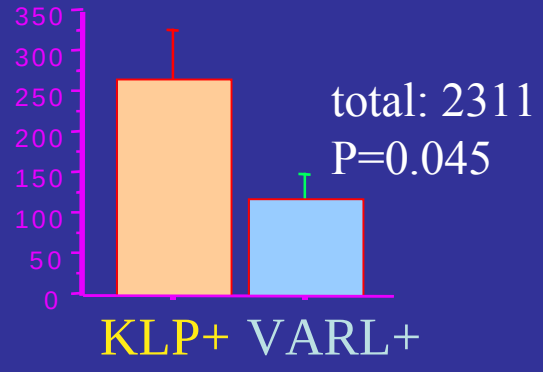
Phyllotreta cruciferae



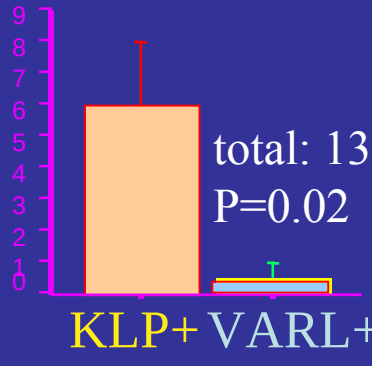


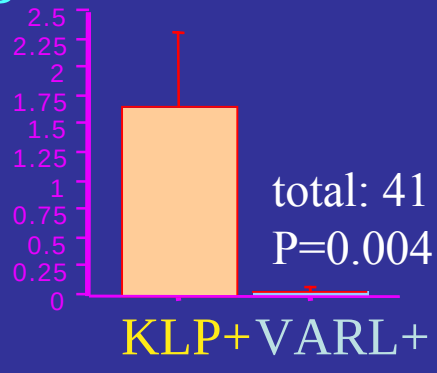
Phyllotreta vittula





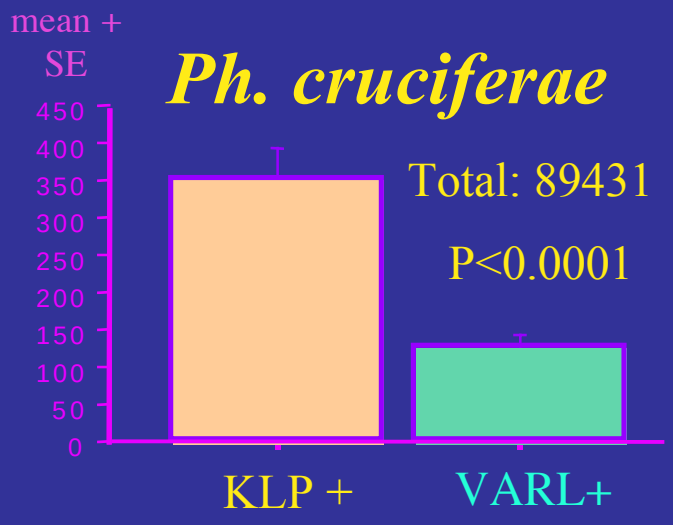
Phyllotreta nigripes

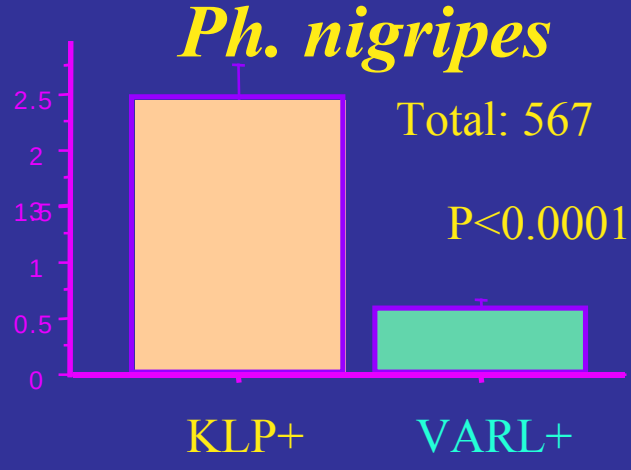


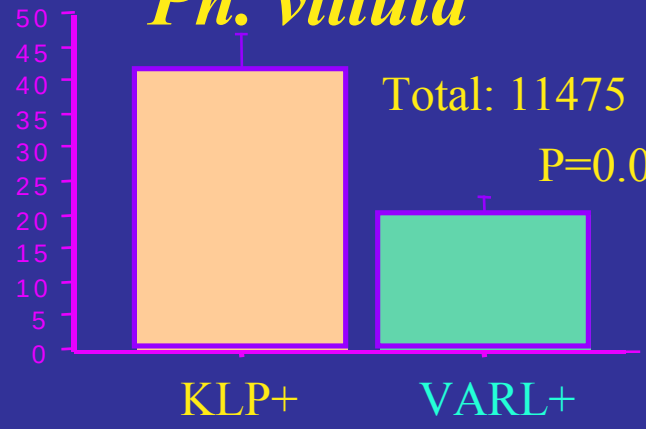


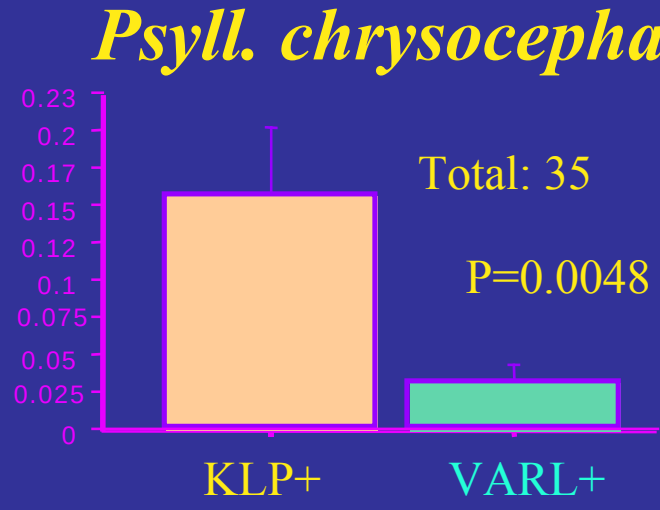
Season-long comparisons of VARL+ vs. KLP+

(Pusztazámor, 2005 MAR. 31- SEP. 2).









meanm+SE

Pusztazámor,
2005.

Phyllotreta cruciferae

total: 89431

3000
2500
2000
1500
1000
500
0

Phyllotreta vittula

total: 11475

350
300
250
200
150
100
50
0

KLP+

Phyllotreta nigripes

total: 567

18
16
14
12
10
8
6
4
2
0

VARL+

5 8 15 18 26 29 2 5 12 23 1 6 11 15 20 24 27 1 4 8 13 15 19 22 25 29 1 8 12 16 19 23 26 29 2 6 12 22

April May June July August September

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