



Female-targeted semiochemical baits for the western corn rootworm *Diabrotica v. virgifera* (Coleoptera: Chrysomelidae)

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In recent years emphasis of semiochemical research on the western corn rootworm (WCR) (*Diabrotica v. virgifera* LeConte, Coleoptera, Chrysomelidae) shifted towards the development of more female-specific lures.



Through identifying volatile compounds from maize silk, Hammack et al (J. Chem. Ecol. 27:1373-1390, 2001) claimed that some combinations of their newly identified compounds were more powerful in attracting females than the conventional floral baits (based on 4-methoxy cinnamaldehyde).



KLPfero+



KLPflor+

Recently we developed the KLP (“hat”) trap (introduced at the Bratislava Diabrotica conference in 2005), which is a non-sticky trap design and can be baited with pheromonal or floral bait.

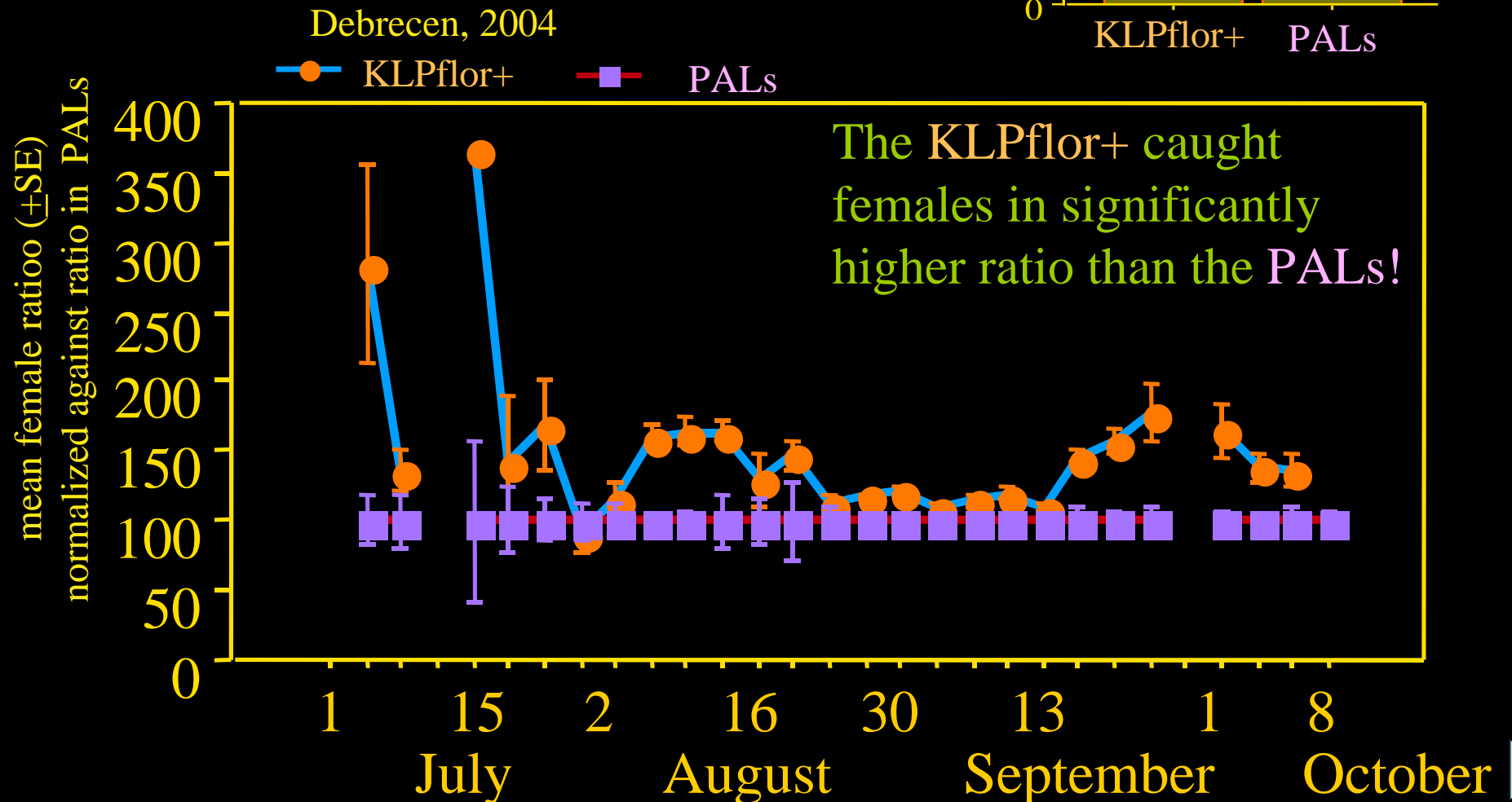
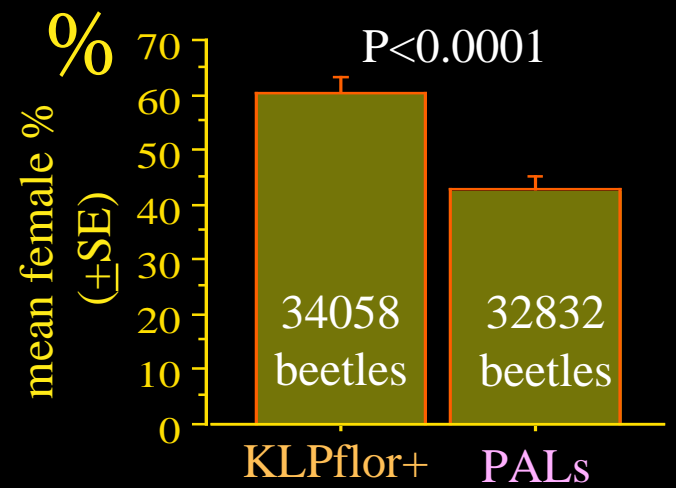


KLPfero+

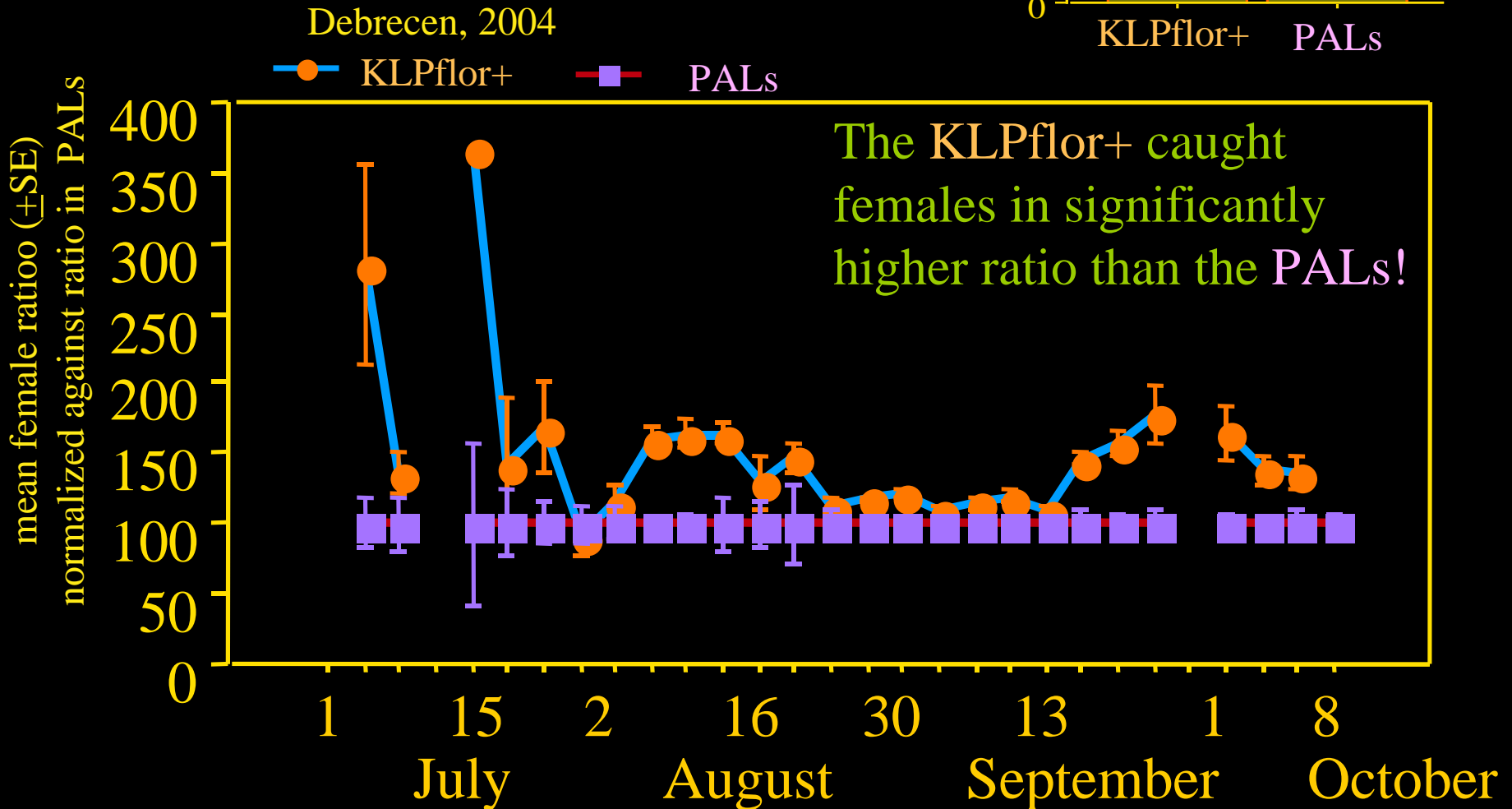
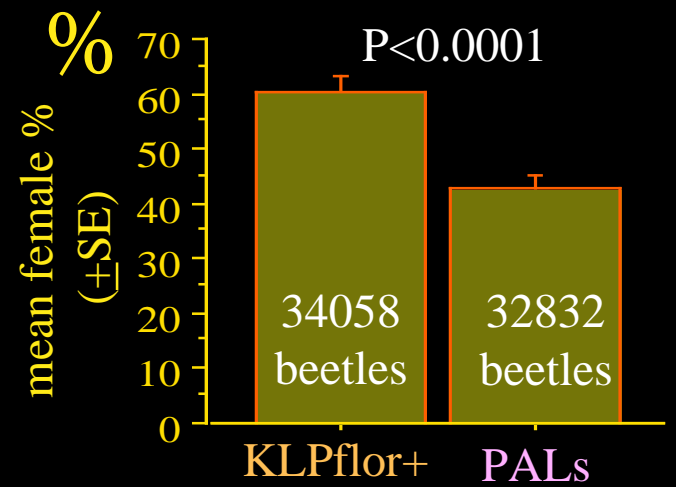


KLPflor+

As presented on the Bratislava conference, we found that the KLP trap when baited with the floral bait was especially suitable for the capture of female WCR.



KLPflor+ vs. PALs: female % in catch



Encouraged by this we set out to compare efficiency of female-targeted *Diabrotica* baits. The following treatments were tested:

”**FLORAL**” = 4-methoxy cinnamaldehyde + indole (floral bait in use for WCR – served as positive control);

”**HAMMACK**” = β -ionone + methyl salicylate + β -caryophyllene [According to Hammack et al. (2001) this combination attracted more females than the known floral WCR bait];

”**BARB**” = 4-methoxyphenethyl alcohol + cinnamaldehyde + (*E*)-anethole + indole (attractant used for *D. barberi* in North America);

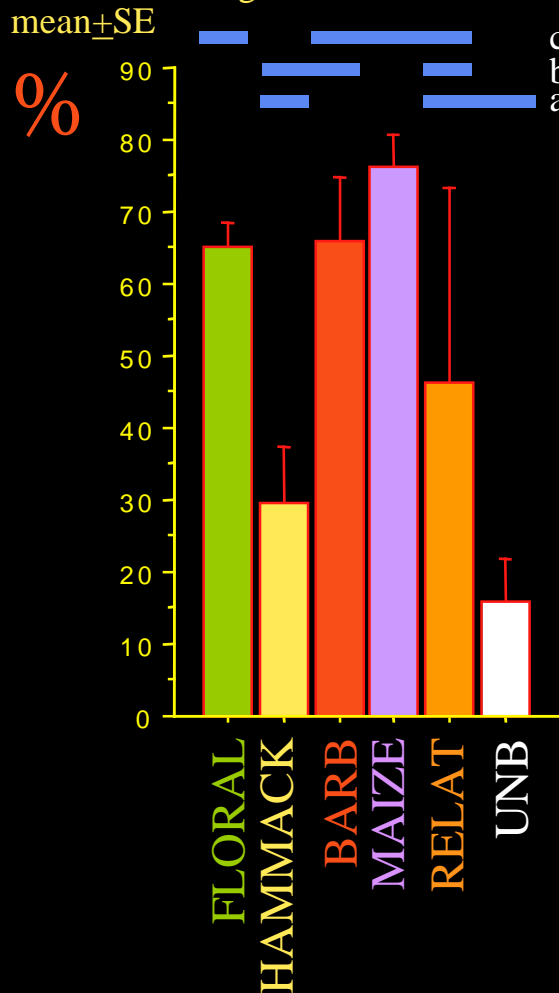
”**MAIZE**” = phenylacetaldehyde + 2-phenylethanol + methyl anthranilate + eugenol + benzaldehyde (compounds shown out from maize silk or tassels in previous studies)

”**RELAT**” = 1-phenylethanol + 3-methyl eugenol + benzyl alcohol + benzyl acetate + geraniol (floral compounds showing attraction to other beetles in previous studies);

”**UNB**” = unbaited traps – served as negative control

In trapping tests female % in catches was equally high in treatments **BARB, FLORAL, MAIZE** and **RELAT**.

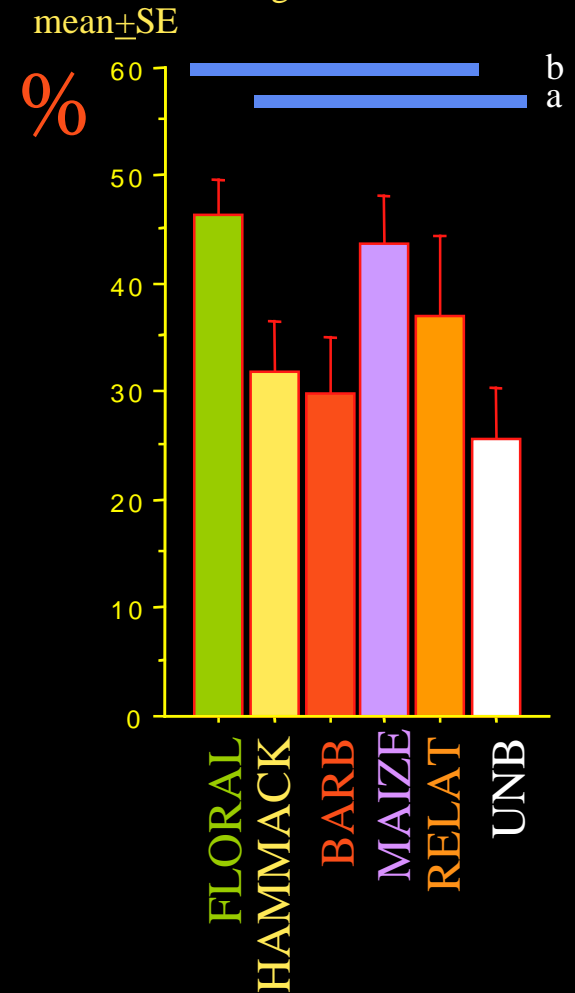
Hajdúböszörmény, 2005
July 7 - September 19. Total
caught: 10595 beetles



Debrecen, 2005 July 5 -
September 19. Total
caught: 67018 beetles

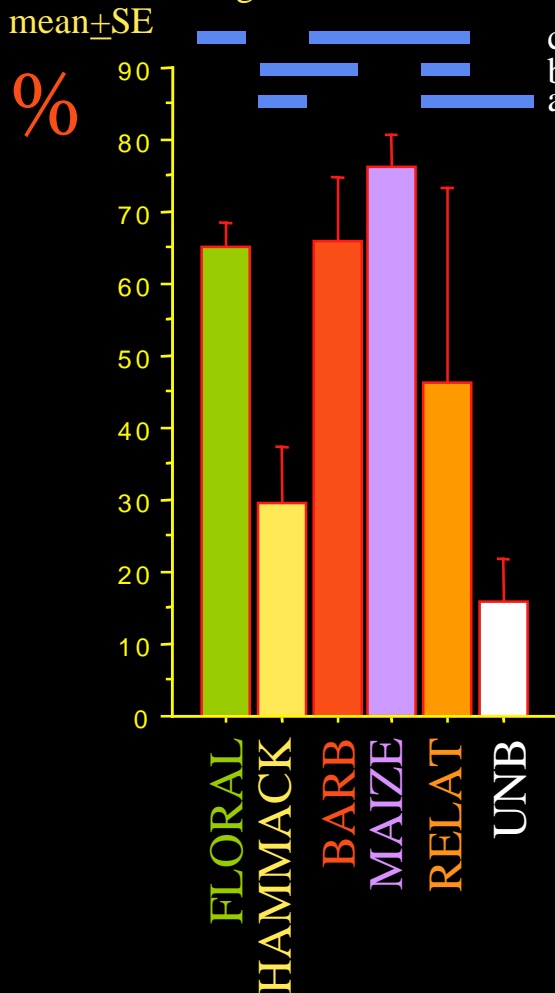


Pusztazámor, 2005
August 1 - 19. Total
caught: 19433 beetles



It was surprising that **HAMMACK** (which had been described as a strong female attractant by US scientists) was not more attractive for females than unbaited controls.

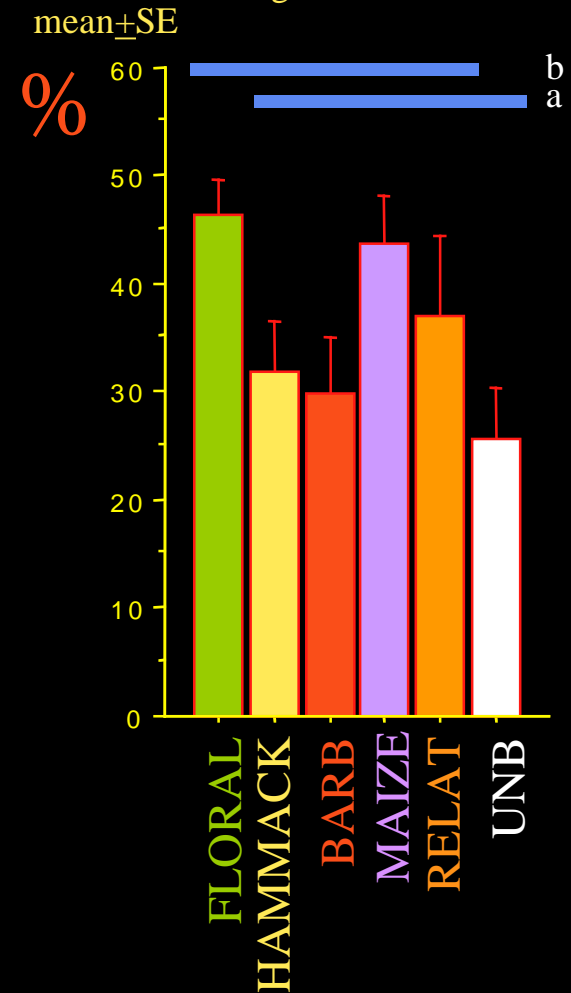
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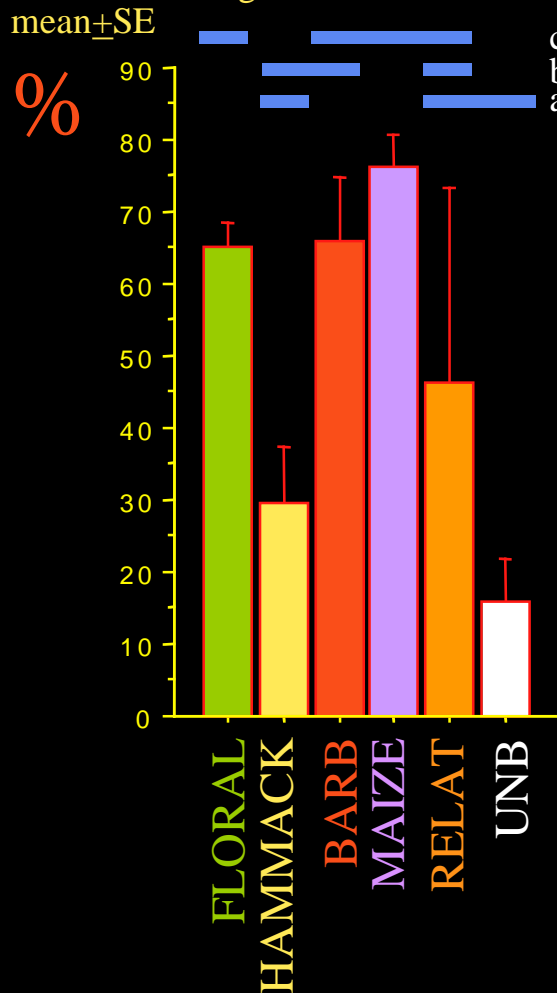


Pusztazámor, 2005
August 1 - 19. Total
caught : 19433 beetles

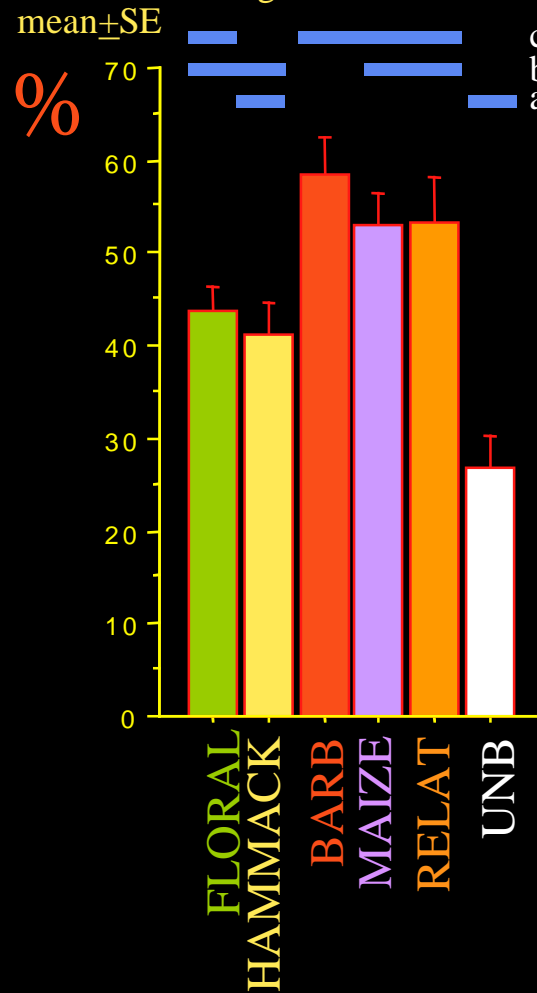


Among treatments more attractive for females, none produced significantly higher female percentages than **FLORAL**.

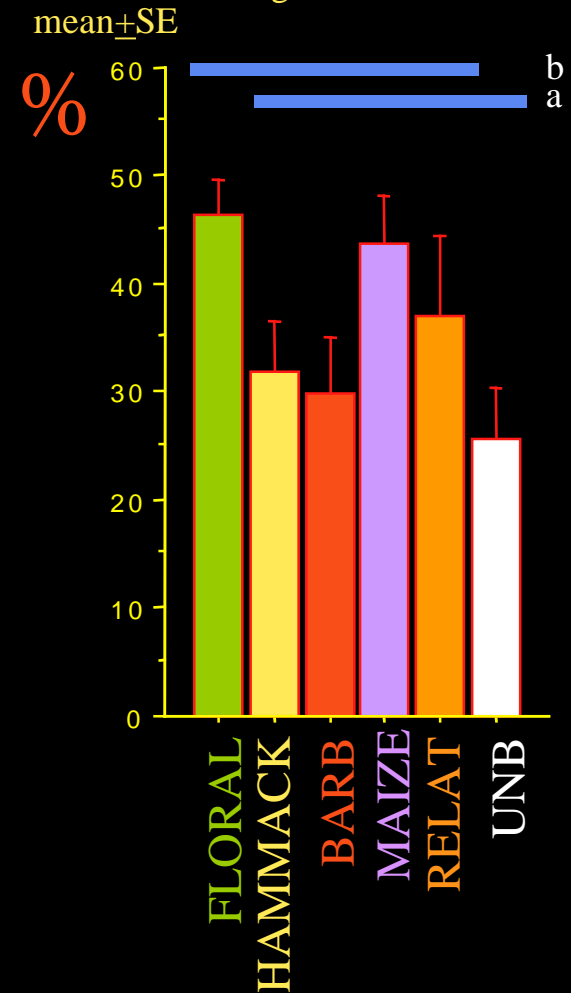
Hajdúböszörmény, 2005
July 7 - September 19. Total
caught: 10595 beetles



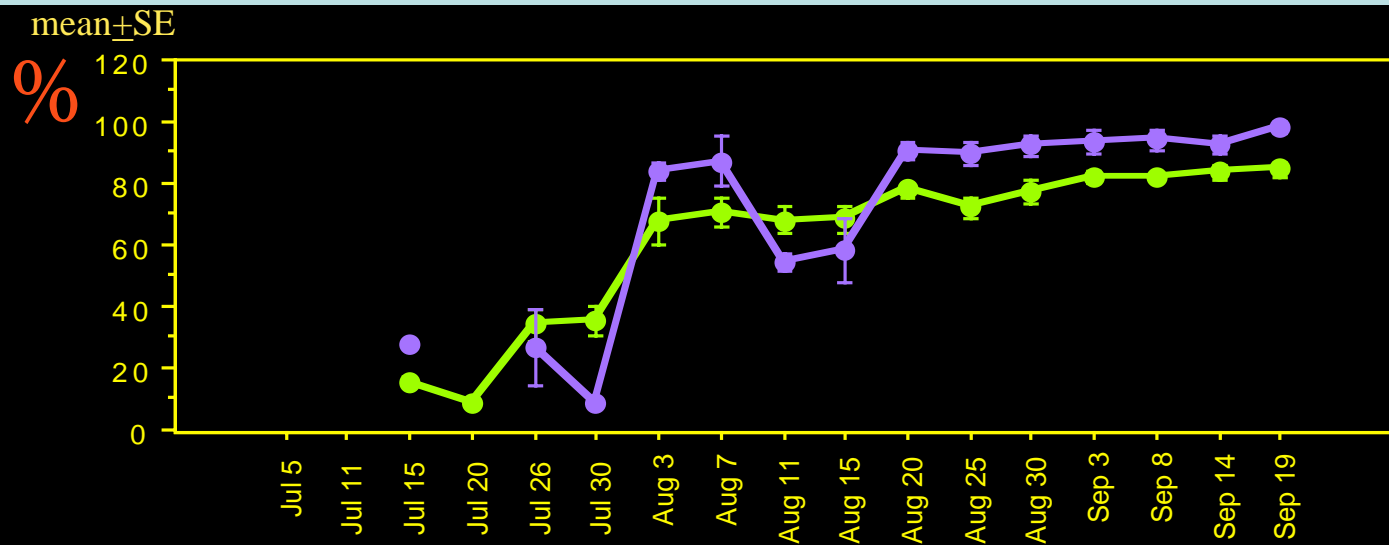
Debrecen, 2005 July 5 -
September 19. Total
caught: 67018 beetles



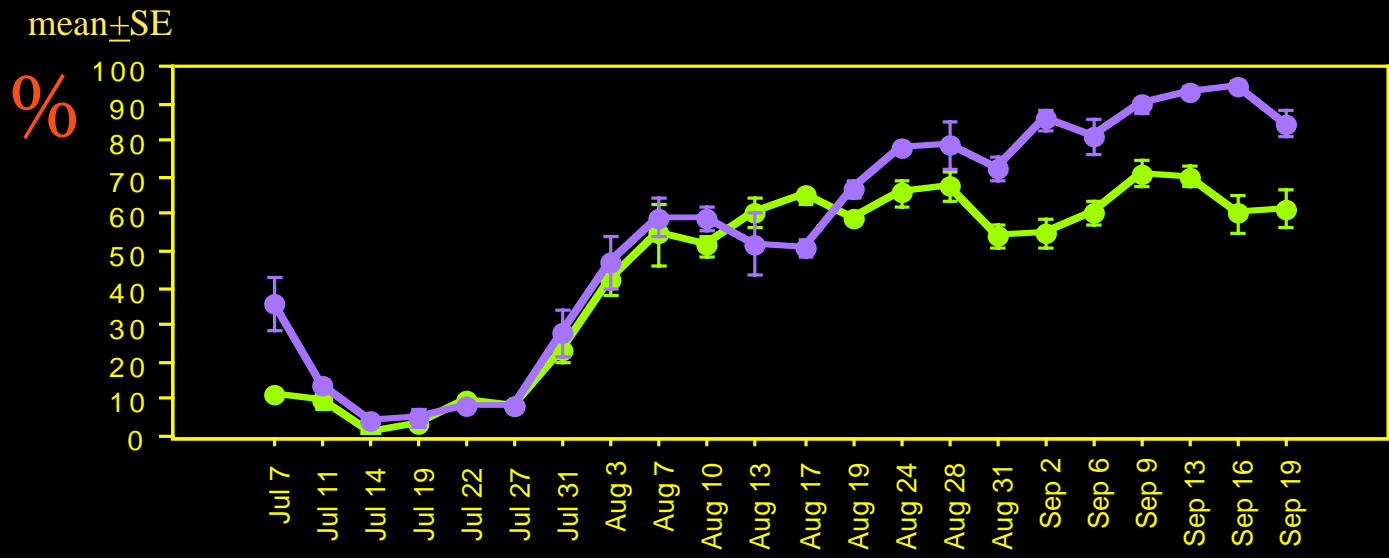
Pusztazámor, 2005
August 1 - 19. Total
caught : 19433 beetles



Seasonal pattern of female %-s for the two "best" baits suggested a slight (but not convincing) tendency of higher female ratios in MAIZE



Hajdúböszörmény,
2005 July 7 -
September 19. Total
catch: 9245 beetles



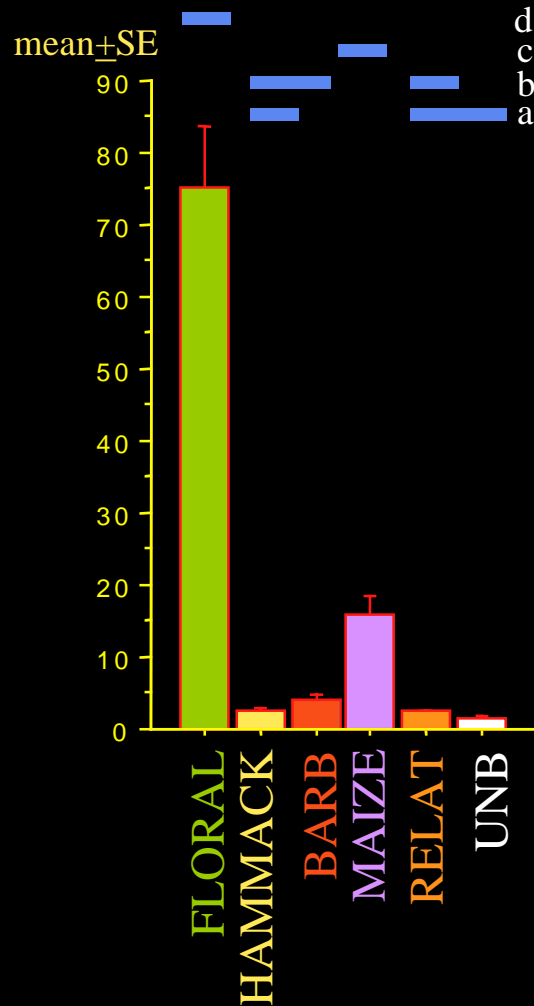
Debrecen, 2005 July 5 -
September 19. Total
catch: 53281 beetles

● FLORAL ● MAIZE

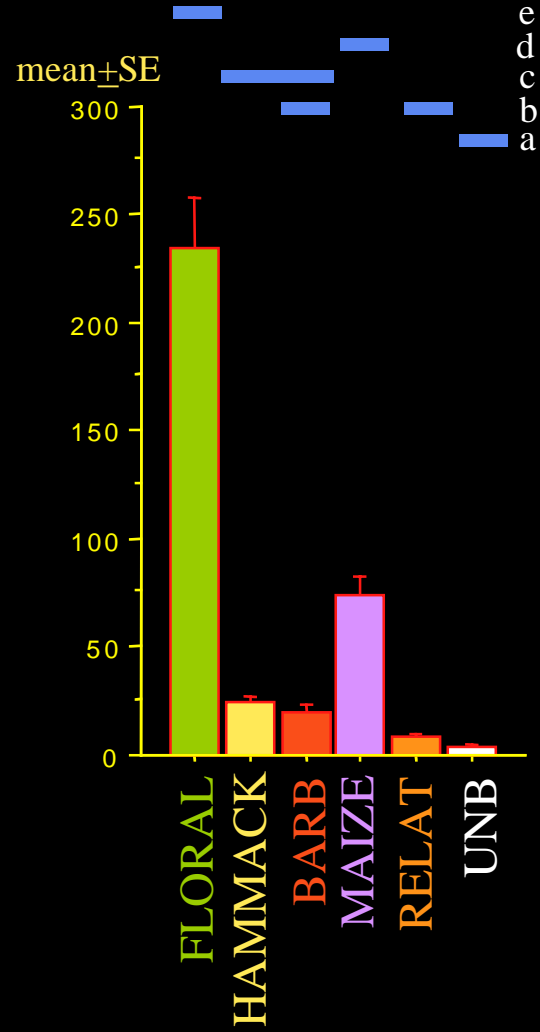


However, as far as mean numbers captured were concerned, **FLORAL** caught far more beetles than any of the other treatments.

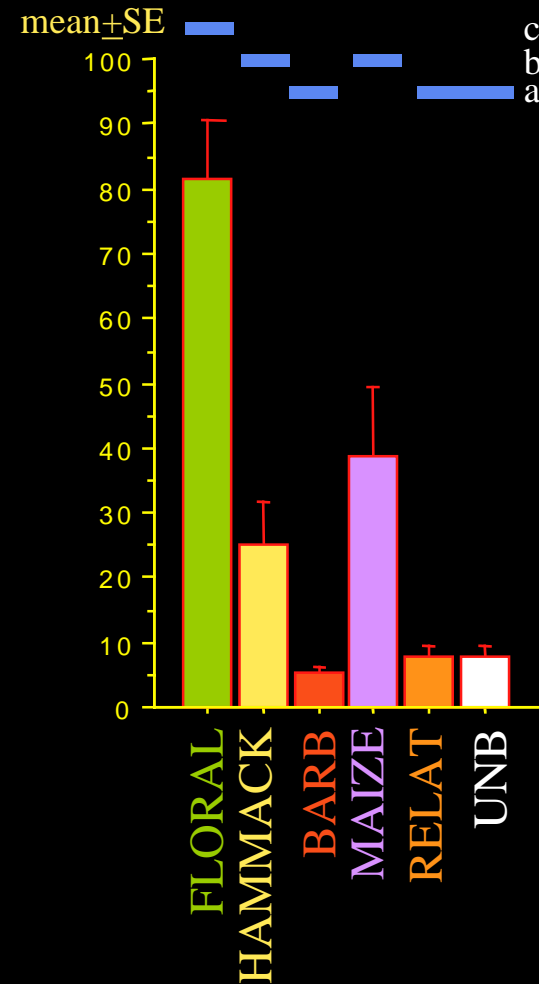
Hajdúböszörmény, 2005
July 7 - September 19. Total
catch: 6938 beetles



Debrecen, 2005 July 5 -
September 19. Total
catch: 32267 beetles



Pusztazámor, 2005
August 1 - 19. Total
catch: 2655 beetles



If female antennae would response better to a given compound, this chemical would show perspective to be tested for a female-targeted bait

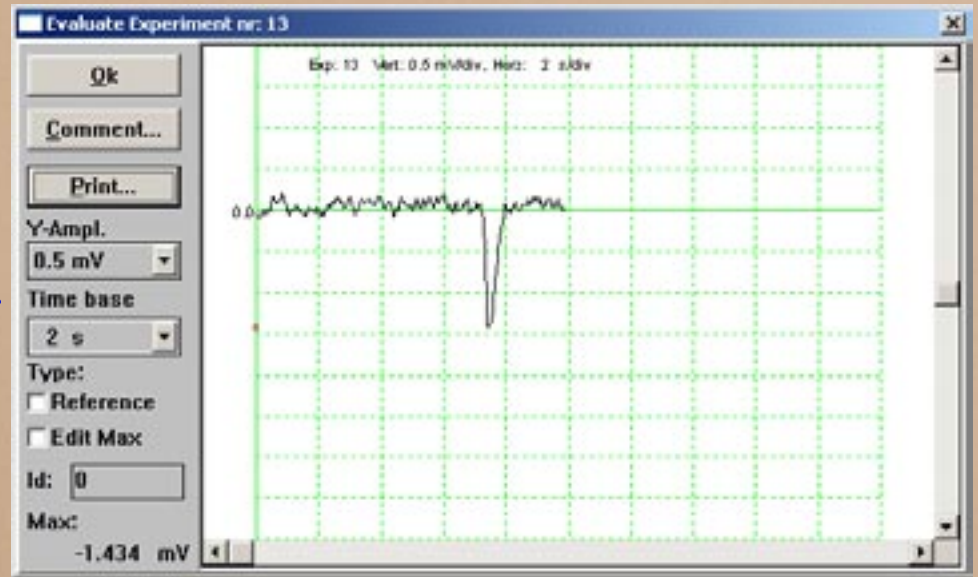
Consequently, antennal responses of WCR were recorded by an EAG apparatus

← air flow with stimulus

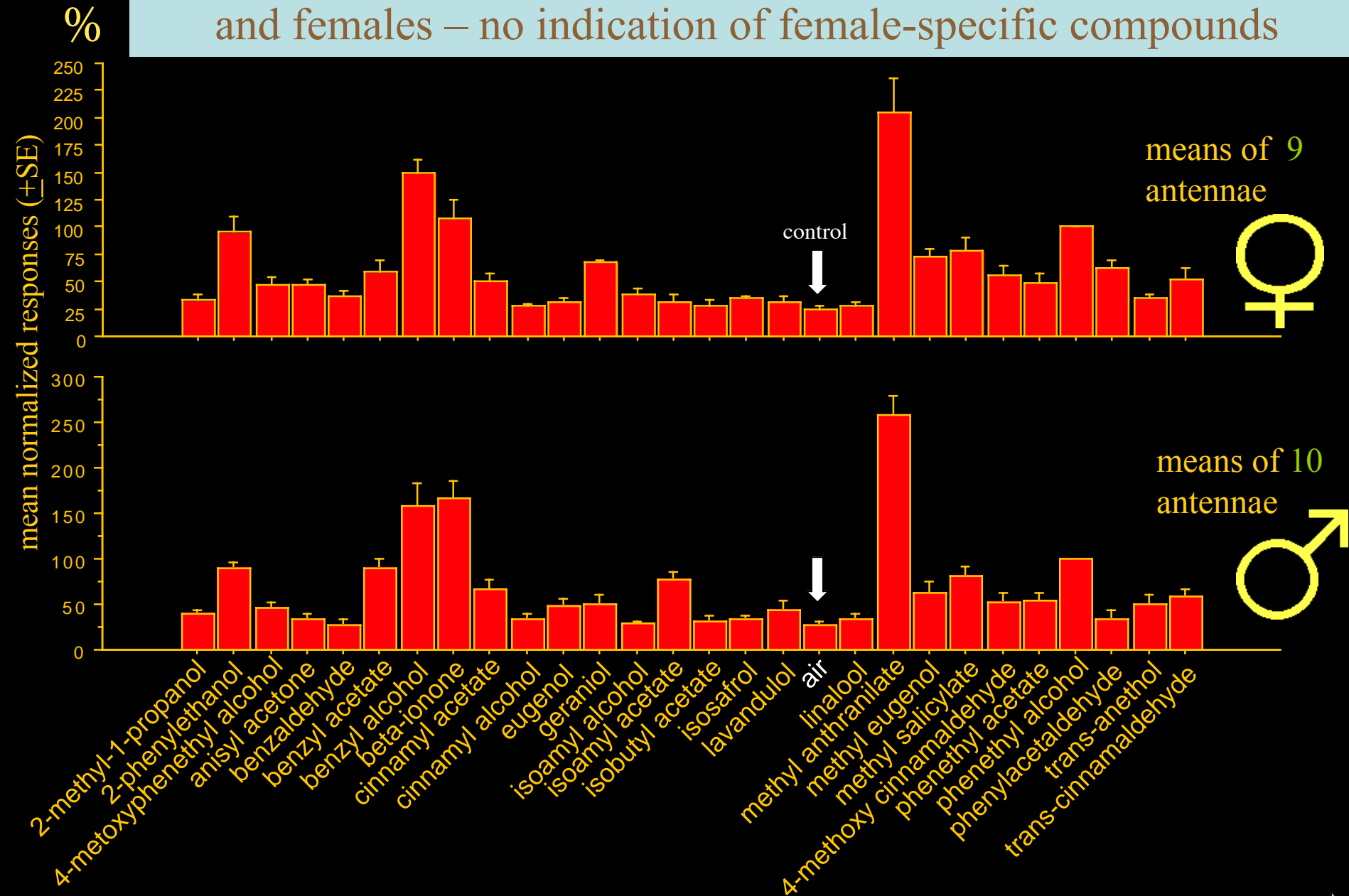
insect antenna

glass capillary electrodes

Sample EAG response elicited by methyl-anthranilate



No difference was found in EAG response spectra between males and females – no indication of female-specific compounds



In conclusion, so far the most efficient female-targeted trap-bait combination for WCR is the conventional floral attractant applied in KLPflor+ traps.



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