

## **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

In the past years both host-plant related and pheromonal chemical communication of this economically important beetle group was studied at our laboratory. As for host plant-related communication, first the species spectrum of flea beetles responding to allyl isothiocyanate was studied. This plant-derived compound has been described in the literature to attract *Phyllotreta cruciferae* and some other flea beetle species. In our field tests conducted in Hungary, Slovenia and Bulgaria, the attraction of *Ph. vittula*, *Ph. undulata*, *Ph. nigripes*, *Ph. nodicornis*, *Ph. balcanica*, *Ph. atra*, *Ph. procera*, *Ph. ochripes*, *Ph. diademata* and the closely related *Psylliodes chrysocephalus* (Coleoptera, Chrysomelidae, Halticinae) was demonstrated for the first time, while the attraction of *Ph. cruciferae* was strongly confirmed. These species include 6 important agricultural pests.

At all sites a great portion of the catch (ranging from ca 30 to 98%) was *Ph. cruciferae*, irrespective of the plant culture. The second most abundant species present at most sites was *Ph. vittula*, which damages not only Cruciferae, but also monocotyledonous plants like maize or cereals, and thus appears to be of outstanding economic importance. When studying several synthetic isothio- and thiocyanates, *Ph. vittula* responded much better to 3-butenyl isothiocyanate than to allyl isothiocyanate, while *Ph. cruciferae* catches were always greater in allyl isothiocyanate baited traps. This suggests that there are significant differences in host-plant related chemical communication of these two important flea beetle pests.

Several male-specific pheromone candidate compounds have recently been identified from North American populations of *Ph. cruciferae* by Bob Bartelt's team (Peoria, USA). In joint research with the Bartelt team we managed to show that traps baited with a mixture of these was only slightly active when presented alone, but it significantly increased catches when presented together with allyl isothiocyanate. In tests with optically pure synthetic compounds, a blend of the optically pure compounds present in the male beetles was as attractive as the blend of racemic compounds, but a blend of the opposite enantiomers was not active. Through subtraction tests it was found that the single compound, (6*R*,7*S*)-2,2,6,10-tetramethylbicyclo[5.4.0.]undeca-9,11-diene (compound A), had the same level of activity as the whole mixture, suggesting that this compound was a key pheromone component.

We demonstrated the presence of the same male-specific compounds in volatiles from European populations of *Ph. cruciferae*, from *Ph. vittula* and some other *Phyllotreta* spp. Catches of *Ph. vittula* in traps with 3-butenyl isothiocyanate were synergized by the addition of compound A in a similar way as those of *Ph. cruciferae* for allyl isothiocyanate baited traps.

It may be possible in the future by careful selection of isothiocyanates and pheromone compounds to produce baits which are tuned to the capture of a given *Phyllotreta* species, depending on need and pest importance.