

The leaf beetle *Diabrotica virgifera virgifera* LeConte: A merciless entomological challenge for agriculture

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Carl Linnaeus is most famous for his taxonomic system. In his daydreams he may have imagined to distinguish species by properties other than their morphological appearance. Combining his taxonomic experience with ecological, chemical, and genetic knowledge of today, he would have come across insect types such as the Western corn rootworm, *Diabrotica virgifera virgifera* LeConte (Coleoptera:Chrysomelidae), a small, agile leaf beetle. It is doing quite well in the company of *Homo sapiens*, its fiercest competitor, and excels with its immense biotic potential. As a pest, it is valued by R.L.Metcalf (1986) at one billion dollars annually for the US alone and ranks among the dozen most destructive insect pests in world agriculture.

Our recent interest is focussing on innovative biotechnical monitoring and control by pheromones and plant kairomones. A second interest is on host selection and the recently discovered ability of *D.v.virgifera* to conquer new host plants not listed in its commonly known European portfolio.

Significantly, our searches in Southern Europe during 2006 produced first evidence of *D.v.virgifera* attacking blossoms of the oil pumpkin *C. pepo* in Eastern Slovenia near the village of Gaberje. During seven previous years similar attempts of locating *D.v.virgifera* on *C. pepo* had been unsuccessful, in spite of careful searching in Hungary (1999-2003), Slovenia (2004-2006) and Southern Switzerland (Ticino, 2003-2006).

The number of beetles accepting *C.pepo* is still quite low (0.1 % of the blossoms are occupied; see Hummel et al. 2007, Hummel 2007) compared to their number in neighboring *Zea mays* fields where pheromone traps of the Metcalf sticky cone type catch dozens of beetles per night. This marginal positive evidence of a gradual shift to alternative hosts can nevertheless be seen as a disaster for the future value of crop rotation as a cheap and mostly successful cultural management strategy. Of similar destructive potential for agriculture is *D.v.virgifera*'s new affinity for the alternative host *Glycine max* in Illinois (Spencer et al. 2005). In Europe, the pumpkin *C.maxima* has recently been under some attack in Serbia (Baca, personal communication 2007) and southern Hungary (Moeser and Vidal, 2001). The latter authors also report occasional attacks on sunflowers, *Amaranthus*, *Chenopodium*, and *Ambrosia* in Hungary.

In Illinois, the first author saw blossoms and developing fruit of many *Cucurbita spp.* consumed by *D.v.virgifera*, *D.undecimpunctata howardi* and *Acalymma vittatum* which was the rule rather than the exception in the 1970s (Rhodes et al.1980). But European *Cucurbita* species and cultivars until just recently seemed to be free from attack. Is *D.v.virgifera*, as it may seem, learning by trial and error, or is there, as R.L.Metcalf 1979 argued, a hidden memory of ancient times when members of the *Cucurbita* family were the preferred hosts in the beetles' original South America habitat, while members of the *Poaceae* family later became secondary hosts? Have unintentional selective processes such as monocultural practices helped in speeding up selection? Is *H.sapiens* thus himself the driving force behind this alarming development? Answers to these questions may provide keys for future pest management decisions.

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