No. 129 September 2026

AAINews

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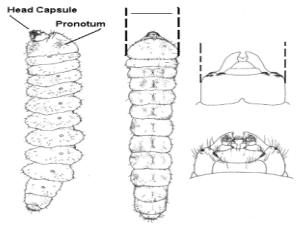
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The speciation of agricultural pest insects

The biological term "species"—a category that is also applied to agricultural pests— serves as the fundamental unit of biological classification, yet defining it is unexpectedly difficult. Generally, a species is understood as a reproductively isolated group (the biological species concept; Mayr, 1942); this means that viable offspring can only be reproduced through mating between individuals of the same species.

Here, a study (Niide et al., 2006) that investigated the possibility of speciation in this pest resulting from a shift in host plants is presented in this article.

It is not known how the Dextes stemborer (*D. texanus*), which attacks sunflowers (*H. annuus*) and utilizes plants in the same Asteraceae family including ragweed (*Ambrosia* spp.) and cocklebur (*X. strumarium*) as host plants, had came to adopt the legumenae soybean (*G. max*) as a host plant.



Measuring points on head capsule and pronotum

Growers in the U.S. Midwest frequently reported clear differences in adult size among individuals observed in the fields of their respective host crops, with those found in sunflower fields being larger.

If reproductive isolation (exactly speciation) has occurred due to morphological differences —such as body size— resulting from a shift in host plants, there may also be differences in their physiology and ecology (id.est, phenology), potentially necessitating distinct approaches for pest forecasting and control.

Therefore, the authors: 1) Collected a total of approximately 900 final-instar larvae from crop residues of their host plants —soybean and sunflower— in the U.S. Midwest; measured the widths of the larval head capsules and pronotum, as well as the body weights of the larvae, pupae, and adults, to confirm differences in body size associated with the host plant; and 2) Mated the resulting adults in four patterns—pairing males and females from the same host plant and pairing males and females from different host plants—to observe mating success rates between individuals from the same versus different host plants.

Significant differences were observed in the widths of the head capsules and pronotum of final-instar larvae derived from different host plants, and variations in body weight at specific developmental stages in larvar, pupae and adults (ranging from 186% to 212%) were also confirmed.



Oviposition bags on sunflowers

However, no significant difference was found in mating success rates (34.9% vs. 26.2%) between pairs sharing the same host plant and those derived from different host plants; consequently, based on the definition of a species cited earlier, the conclusion was reached that two populations derived from the different host plants of soybeans and sunflowers did not constitute distinct species.

Due to experimental constraints, all tested female specimens were placed to oviposit on sunflowers, regardless of the host plants from which they were originally collected. Consequently, it was not possible to adequately investigate factors such as: a. oviposition site preference (i.e., whether females that emerged on soybeans show a preference for laying eggs on soybeans); and b. the morphological compatibility of the ovipositor with the host plants (i.e., whether the ovipositor can penetrate the epidermis of different host plants with equal ease).

(May 2025, NIIDE)