

IMPORTANCE OF CONCOMITANT CULTURAL PRACTICES ON THE BIOLOGICAL POTENTIAL OF INSECTS IN CONSERVATION TILLAGE SYSTEMS

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In the southeastern United States, conservation tillage may be utilized in a variety of cropping systems for virtually all field crops. In developing knowledge of insect relationships in conservation tillage, it is important to specify the tillage method (e.g., plow tillage, surface tillage, no-tillage), as these all involve varying degrees of soil disturbance (American Soc. Agric. Engineers 1981). Also, it is essential to be aware that a variety of cropping methods are often used concomitantly with conservation tillage, and each method may influence insect populations. To fully evaluate insect ecology in conservation tillage, research should be designed to determine the overall effect of the system on insect(s) populations and to isolate the effect of individual cropping practices on insect biology. Study of the interaction of cropping practices on insect populations must be comprehensive and should be conducted using a variety of experiments on a long-term basis. A ten-year program utilized at the University of Georgia included the following procedures:

1. Sampling populations of selected insects and determining crop injury in large conservation tillage fields (often growers' fields) in several locations during several seasons.
2. Establishing experiments with conservation tillage and conventional tillage as randomized treatments. All cropping practices are the same except the tillage operations.
3. Establishing factorial experiments with split plot or split block experimental designs. Conservation tillage and conventional tillage are usually the main treatments and selected cropping practices are the split plots.
4. Isolate insects in specified conservation tillage conditions in greenhouse simulations or field microplots for detailed biology and behavior studies.

Conclusions from approximately 200 individual experiments that were conducted in conservation tillage cropping systems include the following:

1. Conservation tillage habitats have a profound influence on many insects. Their potential as crop pests can be increased, decreased, or apparently not influenced by conservation tillage conditions. Each insect species must be considered individually. No general conclusion concerning overall insect pest hazard in conservation tillage is possible.
2. Conservation tillage habitats have greatest influence on soil and litter insects.
3. Conservation tillage habitats present the highest pest hazard to crops in the first 30 to 45 days of growth (seedling stages).
4. Conservation tillage habitats are profoundly influenced by accompanying cropping practices, and pest potential may be greatly increased or decreased when these procedures are used.
5. Conservation tillage habitats can be manipulated so that insect problems are managed efficiently.

Recently All & Musick (1986) reviewed vertebrate and invertebrate relationships in conservation tillage and centered discussion on individual insects and other pests in these systems. This report will discuss examples of concomitant cropping practices used in Southeastern conservation tillage systems that influence insect/crop interactions.

Continuous and Intermittent Conservation Tillage Systems

The intensity of conservation tillage may be continuous season after season or intermittent. In areas of the midwestern and northern United States, corn has been planted continuously with