

The Introduction of Exotic Species of European Corn Borer Parasites in Indiana

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It has long been known that the natural enemies of our major pests play a significant role in control. In an attempt to increase natural control, workers of the Bureau of Entomology and Plant Quarantine studied the biological control of the corn borer in its natural habitat in Europe. Before introducing a species to a new environment it is necessary to ascertain all the facts of its biology. Misjudgment in this matter can be catastrophic. It must be certain before introducing a new species that there will be no way in which it could possibly get out of hand in its new environment. The habits of the insect must be known as well as the climatic and environmental factors which influence its development. Above all the species to be introduced must be specific in its host selection. Yet, it is desirable for the parasite to have a secondary host which is a related species to the primary host so that it may survive through seasons when the primary host population is low.

After determining those natural enemies which were specific to the corn borer in Europe the more promising species were brought to America and colonized at the federal parasite laboratory in Moorestown, New Jersey. From there they have been distributed to Indiana and other corn borer infested states.

During the past five years the Purdue University Agricultural Experiment Station has received the following species of corn borer parasites for liberation in Indiana: *Lydella grisescens*, *Macrocentrus gifuensis*, *Horogenes punctorius*, and *Chelonus annulipes*.

Lydella grisescens R. and D. is a Tachinid fly. Oviposited near borer tunnels, the egg hatches immediately and the young maggot searches out the host larva. It succeeds best against the older instar borers but due to the long preoviposition period, it is necessary to release the adult parasites when the host larvae are very small.

Probably the most easily established of our exotic corn borer parasites this Tachinid fly seems to increase very rapidly and has been known to parasitize the borer to the extent of 50 percent or higher within two or three seasons. It was first introduced in Indiana in Tipton County where it destroyed 30 percent of the corn borers last season. It was found that it had also established itself in a number of other counties and promises to become a factor in the control of the corn borer.

Macrocentrus gifuensis is a polyembryonic species. It deposits its eggs directly within the host larva attacking the younger stages of the borer. From five to forty parasites may be obtained from a single host.

More difficult to establish than *Lydella grisescens* this braconid increases and disperses more slowly during the first few years following establishment. However, in some localities, particularly in Southern New England, it has finally surpassed all other parasites combined. *Macrocentrus* has been extensively released in Indiana but has never been recovered. Colonies released this year were concentrated in the northern counties, LaPorte and Steuben. It is believed that these counties have a cooler season more comparable to that of New England than counties further south. It is hoped that they may gain a foothold there and then gradually work south throughout the state.

Horogenes punctorius, an ichneumonid, attacks the mid-instar borers. It has become established in some localities where other parasites have failed. It was released in Marshall and Jasper counties in Indiana but has not been recovered. When once established it is known to be quite persistent and remarkably stable after reaching equilibrium.

Chelonus annulipes Wesm. is a braconid which first attacks the corn borer in the egg stage. The parasite oviposits in the corn borer egg, but does not kill the borer until it is nearly full grown. It has never become abundant in the United States. In Indiana it was released in Tipton County and has been recovered once. It is believed that it may be effective in some very restricted localities. It is abundant in Europe in only one region, the Po River Valley in Italy.

Parasites have been released in 31 counties as follows: Adams, Benton, Blackford, Boone, Clay, Carroll, Cass, Clinton, Fayette, Fountain, Fulton, Grant, Hamilton, Hendricks, Henry, Jasper, Kosciusko, LaPorte, Marshall, Marion, Miami, Newton, Putnam, Porter, St. Joseph, Switzerland, Tipton, Tippecanoe, Vermillion, Warren, and White.

TABLE I. *Lydella grisescens* Recovery in Indiana in 1947.

County	No. of Collections	No. of Borers Observed	Number Parasitized	Percent Parasitized
Benton	5	57	4	7.0
Blackford	3	30	3	10.0
Clay	2	3	2	66.7
Hamilton	5	38	11	28.9
Henry	5	73	3	4.1
Jasper	19	377	48	12.7
St. Joseph	5	59	4	6.8
Tipton	25	560	168	30.0

When introduced into a new environment, parasites encounter obstacles such as differences in climate, abundance of host, etc., to which they must adapt themselves if they are to survive. To determine the degree of success met by these parasites in establishing themselves a survey was made during the fall of 1947 and another is being planned this fall. Corn borer larvae were collected in the various counties where parasites had been liberated. These were shipped to the Moorestown laboratory where they were processed by placing them in rearing cages to determine the parasites which emerged. Collections were of necessity small in some counties due to the low population of corn borers. *Lydella grisescens* was the only species recovered. The following table shows the number and percent of borers parasitized.

Although the number of parasites recovered was quite low in most of these counties the data are indicative that *Lydella* has become established and should eventually increase and spread over Indiana.