SOME PHASES OF THE EUROPEAN CORN BORER CONTROL PROGRAM.

W. P. FLINT, ENTOMOLOGIST,

STATE NATURAL HISTORY SURVEY, URBANA.

The continued spread of the European Corn Borer into new territory makes it appear inevitable that the insect will within a few years become established in this State. In order to combat it at the least expense of money and labor it is necessary that we develop methods of control as far in advance of the actual establishment of the insect in this State as possible. The European Corn Borer has only been established in North America for approximately 20 years. Its presence has raised many questions which have been found impossible or very difficult to answer because of the lack of a sufficient amount of research data.

Studies of the European Corn Borer both in North America and Europe are bringing out more strongly the fact that this insect is much affected by different weather and climatic factors, and that it is not likely to be of equal importance in all parts of the corn belt, nor will it be of the same importance each year, even within areas where conditions generally are very favorable to it. We do not at present, however, have sufficient data to say under just what conditions or in what areas the insect will, or will not be destructive. At the present time we are greatly in need of further research to answer some of the following questions:

1. What is the best date for planting corn in different sections of Illinois?
2. What is the possible range of time over which corn can be planted and still produce a profitable crop?
3. What is the average wind movement and direction of the wind during the day and during the night in the corn belt counties of the State during June and July?
4. What are the average evening and night temperatures?
5. What is the average humidity during the day and night in Illinois corn fields and in the spring in Illinois stalk fields?
6. What parasitic insects are present within the corn belt which may adopt the corn borer as their host?

These and many other questions must be answered before we can tell with any degree of certainty just what the European Corn Borer may do to the corn crop of Illinois.

An attempt is now being made to answer some of these questions from the results of the research projects now under way by the Experiment Station and Natural History Survey. This paper is an attempt to briefly summarize some of the work that has already been done in Illinois on parasites of the European Corn Borer.

In 1919, studies of the parasites of native borers similar to the corn borer were started by some of the entomologists of the Natural History Survey. These studies were continued in 1920, 1921 and 1922. A special effort was made in 1920, to find the parasites of the native smartweed borer, *Pyrausta ainseli* Heinrich. Large collections of this insect were made at various points over the State, and in some areas it was found to be quite heavily parasitized. It was thought that possibly some of the native parasites of *Pyrausta ainseli* might parasitize the European Corn Borer, *Pyrausta nubilalis Hueb.*

In co-operation with the Federal Bureau of Entomology a number of these parasites were sent to the European Corn Borer parasite laboratory at Arlington, Massachusetts, where the European Corn Borer was exposed to them, but without favorable results. In 1921 and 1922 further attempts were made to find out to what extent these native parasites would attack the corn borer. A survey of a number of areas where the smartweed borer was abundant showed that in certain fields near Urbana this borer was quite heavily parasitized, in some cases parasitism reaching 20 to 25%. A number of barrels of heavily infested smartweeds containing both borers and parasites were shipped to the corn borer parasite laboratory at Arlington. Some several species of parasitic flies and a number of parasitic *Hymenoptera* were bred from this material and an attempt was made to get them to parasitize the European Corn Borer. While this work was carried on more or less intensively for two years, the results were rather discouraging. In a few cases the native parasites accepted the smartweed borer as their host, but did not thrive on the new host and the actual amount of parasitism achieved was very small. In fact, the results of this work were much the same as the results thus far obtained in all sections of the country. Studies to date have shown that we would expect

less than 1 percent of the corn borer larvae to be killed by the native parasitic insects now occurring in our corn belt.

As the native parasites did not seem to take readily to the newly imported insect, an attempt was made to reverse the process, and establish imported parasites known to attack the corn borer on some of our native insects, and in this way establish them throughout the State in advance of the time when the corn borer might reach Illinois. One of the imported parasites of the corn borer, *Microbracon brevicornis* Wesm. was known to be a general feeder and to readily accept the native smartweed borer as its host. In August, 1922, several hundred of these parasites newly brought in from France were sent by the Federal Bureau of Entomology to the Laboratory of the Natural History Survey in Urbana, and partly grown smartweed borers were exposed to them. The imported parasites readily accepted the smartweed borer as its host, and during the years 1923 and 1924 large numbers of these parasites were reared in the Survey Laboratory in Urbana and liberated at four points in the State, Aurora, Jacksonville, Centralia and Urbana. At the latter point in 1924 more than 3600 mated females of this species were put out in fields heavily infested by the smartweed borer. During the last year several lots of this same parasite have been liberated in Illinois corn fields along the east side of the State. To date, this parasite has not been recovered in the native smartweed borers in the State, but this does not necessarily mean that it has not become established. During the present season an attempt will be made to establish several other parasites of the European Corn Borer, and also to increase within the State the population of one of our general egg parasites, *Trichogramma minutum*, which is on the whole, the most effective parasite of the corn borer now known either in this country or in Europe.