

7-1-1966

## Incidence of parasitic insects on the bollworm in Mississippi

W. J. Lewis

J. R. Brazzel

Follow this and additional works at: <https://scholarsjunction.msstate.edu/mafes-bulletins>

---

### Recommended Citation

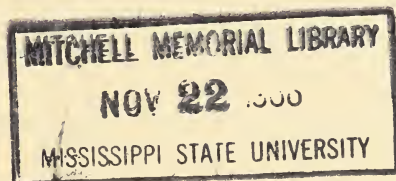
Lewis, W. J. and Brazzel, J. R., "Incidence of parasitic insects on the bollworm in Mississippi" (1966).  
*Bulletins*. 64.

<https://scholarsjunction.msstate.edu/mafes-bulletins/64>

This Text is brought to you for free and open access by the Mississippi Agricultural and Forestry Experiment Station (MAFES) at Scholars Junction. It has been accepted for inclusion in Bulletins by an authorized administrator of Scholars Junction. For more information, please contact [jshedd@library.msstate.edu](mailto:jshedd@library.msstate.edu).

# **Incidence Of Parasitic Insects On The Bollworm In Mississippi**

By W. J. LEWIS and J. R. BRAZZEL



**Mississippi State University  
AGRICULTURAL EXPERIMENT STATION**

**HENRY H. LEVECK, Director**

### Conclusions

Significant natural control of the bollworm was derived from parasitic insects on all host plants except corn. The parasites provided a very high percent of control on cranesbill, tomato, and spiderflower. Parasitism of bollworm on crimson clover was low in the 1964 season but became more significant in the 1965 season. Parasitism of bollworms on cotton varied in different fields and at various times in the season. Parasites were, however, an important economic factor on this crop and can be of increased importance when properly utilized under a carefully applied integrated control program.

# INCIDENCE OF PARASITIC INSECTS OF THE BOLLWORM IN MISSISSIPPI

By W. J. LEWIS and J. R. BRAZZEL

In recent years the two species of bollworm—the tobacco budworm<sup>1</sup> and the cotton bollworm<sup>2</sup>—have increased in importance as pests of cotton in the Southeastern United States. Insecticide resistance in these pests and the growing concern over residue problems have emphasized the need for additional means to aid in control of the bollworm and other cotton pests and minimize the use of insecticides.

In Mississippi many are finding a properly applied biological control program for cotton pests to be efficient and economical. Such a program necessitates a good understanding of the many factors that affect the abundance of the cotton pests.

A study was undertaken during the 1964 and 1965 seasons to determine what parasitic insects attack bollworm larvae in Mississippi and how much natural control is obtained from these parasites. Bollworm larvae were collected from cotton and major alternate host plants throughout Mississippi. The collected larvae were placed in vials on artificial diet, brought to the laboratory and identified as to the species of bollworm, and then held in the laboratory to determine how many were parasitized and by what kind of parasites.

A bollworm which was parasitized would eventually succumb to the parasite and the fully developed larval stage of the parasite would eat its way from the bollworm. These parasite larvae were reared to the adult stage and identified as to the kind of parasite.

The following information was recorded for each species of the bollworm: host plant from which they were collected,

location of host plant, date collected, number parasitized, kind of parasites, and number of bollworms that died from causes other than parasitic insects (disease, injury, etc.). The percent of each of these collections of larvae dying from parasitism was calculated from these data.

The percent parasitism was calculated from a corrected total obtained by subtracting those that died from causes other than parasitic insects. These larvae were subtracted because surely they included some parasitized larvae. These data indicate the amount of natural control that was being derived on these dates by parasitic insects alone. Control by predaceous insects and other means are not represented in these figures.

Findings for each of the host plants will be discussed separately. Also results for each species of bollworm are presented separately. Throughout both seasons, the most commonly occurring parasites were two small wasps, *Microplitis croceipes* (Cress.) and *Cardiochiles nigriceps* Vierick. Interestingly the latter species has been found to successfully parasitize only the tobacco budworm.

## Parasitism on Alternate Hosts (Table 1)

Parasitism of bollworms collected from crimson clover in 1964 was low. The larvae were collected during the latter part of April and early May and were at a ratio of about 5 cotton bollworms to 1 tobacco budworm. None of the tobacco budworms were parasitized. Parasitism of the cotton bollworms averaged about 10%.

Collections were made from crimson clover on April 28 and May 4 in the 1965 season. One unparasitized tobacco budworm was collected on May 4. All the other collected larvae were the cotton bollworm. Of the total 156 cotton bollworms collected, 25% were parasitized.

<sup>1</sup>*Heliothis virescens* (F.)

<sup>2</sup>*Heliothis zea* (Boddie)

Table 1. Parasitism of bollworms on the indicated major alternate host plants.

| Date collected             | Number larvae collected | Dead: Disease and injury | Corrected total larvae | Number parasitized | Number pupated | Percent parasitism |
|----------------------------|-------------------------|--------------------------|------------------------|--------------------|----------------|--------------------|
| <b>From Crimson Clover</b> |                         |                          |                        |                    |                |                    |
| 1964                       |                         |                          |                        |                    |                |                    |
|                            |                         |                          | Cotton bollworms       |                    |                |                    |
| 4/24                       | 6                       | 2                        | 4                      | 0                  | 4              | 0.0                |
| 4/29                       | 16                      | 3                        | 13                     | 1                  | 12             | 7.9                |
| 5/5                        | 69                      | 35                       | 34                     | 3                  | 31             | 8.8                |
| 5/11                       | 8                       | 4                        | 4                      | 1                  | 3              | 25.0               |
| 5/14                       | 2                       | 1                        | 1                      | 0                  | 1              | 0.0                |
| 1964                       |                         |                          |                        |                    |                |                    |
|                            |                         |                          | Tobacco budworms       |                    |                |                    |
| 4/29                       | 1                       | 0                        | 1                      | 0                  | 1              | 0.0                |
| 5/5                        | 11                      | 1                        | 10                     | 0                  | 10             | 0.0                |
| 5/11                       | 3                       | 1                        | 2                      | 0                  | 2              | 0.0                |
| 5/14                       | 3                       | 2                        | 1                      | 0                  | 1              | 0.0                |
| 1965                       |                         |                          |                        |                    |                |                    |
|                            |                         |                          | Cotton bollworms       |                    |                |                    |
| 4/28                       | 82                      | 2                        | 80                     | 20                 | 60             | 25.0               |
| 5/4                        | 74                      | 6                        | 68                     | 17                 | 51             | 25.0               |
| <b>From Cranesbill</b>     |                         |                          |                        |                    |                |                    |
| 1964                       |                         |                          |                        |                    |                |                    |
|                            |                         |                          | Cotton bollworms       |                    |                |                    |
| 4/29                       | 4                       | 1                        | 3                      | 3                  | 0              | 100.0              |
| 5/11                       | 8                       | 4                        | 4                      | 4                  | 0              | 100.0              |
| 5/13                       | 12                      | 4                        | 8                      | 4                  | 4              | 50.0               |
| 5/18                       | 7                       | 0                        | 7                      | 7                  | 0              | 100.0              |
| 1965                       |                         |                          |                        |                    |                |                    |
|                            |                         |                          | Tobacco budworms       |                    |                |                    |
| 5/11                       | 5                       | 4                        | 1                      | 1                  | 0              | 100.0              |
| 5/14                       | 23                      | 12                       | 11                     | 9                  | 2              | 81.8               |
| 5/18                       | 11                      | 2                        | 9                      | 7                  | 2              | 77.7               |
| 5/28                       | 8                       | 7                        | 1                      | 1                  | 0              | 100.0              |
| 1965                       |                         |                          |                        |                    |                |                    |
|                            |                         |                          | Cotton bollworms       |                    |                |                    |
| 4/28                       | 4                       | 0                        | 4                      | 0                  | 4              | 0.0                |
| 5/4                        | 14                      | 0                        | 14                     | 9                  | 5              | 64.2               |
| 5/13                       | 22                      | 10                       | 12                     | 2                  | 10             | 9.1                |
| <b>From Tomato</b>         |                         |                          |                        |                    |                |                    |
| 1964                       |                         |                          |                        |                    |                |                    |
|                            |                         |                          | Cotton bollworms       |                    |                |                    |
| 5/22                       | 14                      | 3                        | 11                     | 7                  | 4              | 63.6               |
| 6/2                        | 14                      | 0                        | 14                     | 12                 | 2              | 85.7               |
| <b>From Spider Flower</b>  |                         |                          |                        |                    |                |                    |
| 1964                       |                         |                          |                        |                    |                |                    |
|                            |                         |                          | Tobacco budworms       |                    |                |                    |
| 6/20                       | 47                      | 25                       | 22                     | 17                 | 5              | 84.6               |
| 6/25                       | 11                      | 0                        | 11                     | 11                 | 0              | 100.0              |

Bollworm larvae were collected from cranesbill in 1964 during the latter part of April and during May. The tobacco budworm and cotton bollworm larvae were collected in about equal numbers. The parasitism on both of the species ranged from 50 to 100%.

In 1965 bollworm larvae were collected from cranesbill on April 28, May 4, and May 13. The majority of these larvae were the cotton bollworm. One unparasitized tobacco budworm was collected on April 28. Two tobacco budworms were

collected on May 13. One of these larvae succumbed to a parasite. Parasitism of the cotton bollworm ran from 0% on April 28 to 64.2% on May 4 and dropped back to 9.1% on May 13.

Extensive collections were made from corn throughout the 1964 season. All of the larvae collected were the cotton bollworm (or corn earworm) as the tobacco budworm does not attack corn in the United States. Parasitic insects of the bollworm larvae on corn were found to be of little importance as parasitized lar-

vae were very rarely found. This is probably due to the fact that the larvae are well protected from parasitic insects due to their feeding habits on corn.

Two collections were made from tomato in the 1964 season. All the collected larvae were the cotton bollworm (or tomato fruitworm). Fourteen larvae were collected on May 22 and 14 were collected on June 2. A high percentage of the larvae in both collections were parasitized, 63.6% and 85.7%, respectively.

Bollworm larvae were collected from spiderflower (an ornamental) on June 20 and 25 of the 1964 season. All of them were the tobacco budworm. The larvae of the two collections were heavily parasitized, 84.6% and 100%, respectively.

The high percent of parasitism of bollworms attacking cranesbill, tomato, and spider flower could have a profound bearing on the importance of these host plants in the build-up of bollworm and parasite populations in early season.

#### Parasitism of Bollworms on Cotton (Table 2)

Bollworm larvae were collected from cotton from late May until November of the 1964 season. The data presented in the tables consist of recordings from many scattered places throughout the Delta and North Hills area of Mississippi. The percentages of parasitism varied throughout the season on both species of bollworm. However, the data show that parasitic insects were an important natural control on cotton. The percentages of parasitism were often in the range from 30 to 60 percent. The percentages were steadily higher on the tobacco budworm than on the cotton bollworm.

During the 1965 season bollworm larvae were collected from cotton from early June until early September. The collections were not as extensive and regu-

lar as those in the 1964 season but were made in the same areas. Parasitism was low on the cotton bollworm in early season. However, the tobacco budworm was of higher incidence at this time and the parasitism was rather high on this species. As the season progressed the parasitism held steadily above 20% on the tobacco budworm and became increasingly important on the cotton bollworm.

In the 1964 season, records for larvae collected from cotton that had not been treated with insecticides were kept separate from those of larvae found on untreated cotton. In general the parasitism of larvae from the untreated cotton was several times as high as that of larvae collected from treated cotton (Table 3). This comparison holds true in all three cases, (Greenwood and Rolling Fork for the cotton bollworm and the Greenwood area for the tobacco budworm) where the larvae were collected from treated and untreated cotton in the same area. The cotton bollworms collected from Holly Springs and the tobacco budworms collected from Wayside and Holly Springs (only 8 larvae) were the only larvae from treated fields with a percent parasitism comparable to that of the larvae from untreated fields.

Parasites seemed to be relatively abundant in the earlier part of the cotton season. This appeared especially clear in the 1964 June and July larval collections (Table 2.) These parasitized larvae probably represented adult parasites that had moved in from alternate early season host plants where they had become established in April and May. These early season adult parasites in the cotton are probably a very crucial part of the parasite population and need to be protected so as to allow the parasite population to become well established in the cotton field.



Table 2. Parasitism of the bollworms collected from cotton.

| Date collected | Number larvae collected | Dead: Disease and injury | Corrected total larvae | Number parasitized | Number pupated | Percent parasitism |
|----------------|-------------------------|--------------------------|------------------------|--------------------|----------------|--------------------|
| 1964           |                         |                          | Tobacco budworm        |                    |                |                    |
| 6/24           | 56                      | 32                       | 24                     | 10                 | 14             | 41.7               |
| 6/29           | 39                      | 18                       | 21                     | 7                  | 14             | 33.3               |
| 7/1            | 97                      | 43                       | 54                     | 28                 | 26             | 51.9               |
| 7/17           | 2                       | 1                        | 1                      | 1                  | 0              | 100.0              |
| 7/24           | 39                      | 15                       | 24                     | 6                  | 18             | 25.0               |
| 7/28           | 71                      | 46                       | 25                     | 8                  | 17             | 32.0               |
| 8/4            | 51                      | 18                       | 33                     | 6                  | 27             | 18.2               |
| 8/19           | 20                      | 7                        | 13                     | 4                  | 9              | 30.8               |
| 8/26           | 70                      | 19                       | 51                     | 11                 | 40             | 21.6               |
| 9/2            | 184                     | 37                       | 147                    | 24                 | 123            | 16.3               |
| 9/8            | 139                     | 54                       | 85                     | 6                  | 79             | 7.1                |
| 9/16           | 45                      | 28                       | 17                     | 0                  | 17             | 0.0                |
| 9/26           | 66                      | 21                       | 45                     | 20                 | 25             | 44.4               |
| 10/7           | 13                      | 3                        | 10                     | 3                  | 7              | 30.0               |
| 10/12          | 11                      | 10                       | 1                      | 1                  | 0              | 100.0              |
| 10/23          | 1                       | 0                        | 1                      | 1                  | 0              | 100.0              |
| 11/10          | 8                       | 3                        | 5                      | 2                  | 3              | 66.6               |
| 11/16          | 8                       | 5                        | 3                      | 1                  | 2              | 33.3               |
| 1964           |                         |                          | Cotton bollworm        |                    |                |                    |
| 5/26           | 8                       | 1                        | 7                      | 2                  | 5              | 28.6               |
| 6/2            | 5                       | 2                        | 3                      | 1                  | 2              | 33.3               |
| 6/16           | 10                      | 4                        | 6                      | 1                  | 5              | 16.6               |
| 6/24           | 8                       | 1                        | 7                      | 1                  | 6              | 14.3               |
| 6/29           | 45                      | 7                        | 38                     | 6                  | 38             | 13.5               |
| 7/1            | 101                     | 26                       | 75                     | 12                 | 63             | 16.0               |
| 7/24           | 25                      | 4                        | 21                     | 5                  | 16             | 22.7               |
| 7/28           | 62                      | 37                       | 25                     | 9                  | 16             | 36.0               |
| 8/4            | 15                      | 0                        | 15                     | 0                  | 15             | 0.0                |
| 8/12           | 22                      | 3                        | 19                     | 6                  | 13             | 21.6               |
| 8/19           | 33                      | 4                        | 29                     | 2                  | 27             | 6.9                |
| 8/26           | 172                     | 25                       | 147                    | 15                 | 132            | 10.2               |
| 9/1            | 129                     | 48                       | 81                     | 15                 | 66             | 18.5               |
| 9/8            | 87                      | 36                       | 51                     | 2                  | 49             | 3.9                |
| 9/16           | 22                      | 11                       | 11                     | 0                  | 11             | 0.0                |
| 9/27           | 249                     | 74                       | 175                    | 11                 | 164            | 6.3                |
| 10/7           | 21                      | 11                       | 10                     | 0                  | 10             | 0.0                |
| 11/10          | 87                      | 19                       | 68                     | 11                 | 57             | 16.2               |
| 11/12          | 78                      | 54                       | 24                     | 9                  | 15             | 37.5               |
| 11/16          | 215                     | 107                      | 108                    | 51                 | 57             | 47.2               |
| 1965           |                         |                          | Tobacco budworm        |                    |                |                    |
| 6/11           | 9                       | 0                        | 9                      | 0                  | 9              | 0.0                |
| 6/18           | 3                       | 0                        | 3                      | 0                  | 3              | 0.0                |
| 6/23           | 175                     | 57                       | 118                    | 24                 | 94             | 20.3               |
| 6/30           | 15                      | 8                        | 7                      | 5                  | 2              | 71.4               |
| 7/22           | 5                       | 1                        | 4                      | 0                  | 4              | 0.0                |
| 7/29           | 4                       | 0                        | 4                      | 1                  | 3              | 25.0               |
| 8/18           | 26                      | 1                        | 25                     | 6                  | 19             | 24.0               |
| 8/25           | 81                      | 9                        | 72                     | 23                 | 49             | 31.9               |
| 9/4            | 136                     | 18                       | 111                    | 18                 | 93             | 16.2               |
| 9/8            | 24                      | 1                        | 23                     | 11                 | 12             | 47.8               |
| 1965           |                         |                          | Cotton bollworm        |                    |                |                    |
| 6/11           | 8                       | 0                        | 8                      | 0                  | 8              | 0.0                |
| 6/18           | 0                       | 0                        | 2                      | 0                  | 2              | 0.0                |
| 6/23           | 84                      | 20                       | 64                     | 4                  | 60             | 6.3                |
| 6/30           | 5                       | 3                        | 2                      | 0                  | 2              | 0.0                |
| 7/22           | 5                       | 1                        | 4                      | 0                  | 4              | 0.0                |
| 7/29           | 11                      | 1                        | 10                     | 0                  | 10             | 0.0                |
| 8/18           | 87                      | 5                        | 82                     | 7                  | 75             | 8.5                |
| 8/25           | 186                     | 7                        | 182                    | 23                 | 159            | 12.7               |
| 9/4            | 74                      | 13                       | 61                     | 7                  | 54             | 11.5               |
| 9/8            | 36                      | 6                        | 30                     | 8                  | 22             | 26.6               |

Table 3. Parasitism of bollworms collected from cotton in insecticide treated and untreated fields.

| Location                   | Dates       | Corrected<br>total<br>larvae | Number<br>parasitized | Percent<br>parasitism |
|----------------------------|-------------|------------------------------|-----------------------|-----------------------|
| Cotton bollworms           |             |                              |                       |                       |
| Greenwood<br>(treated)     | 8/2 - 9/26  | 90                           | 3                     | 7.3                   |
| (untreated)                | 7/4 - 9/2   | 88                           | 24                    | 27.3                  |
| Rolling Fork<br>(treated)  | 7/28 - 8/26 | 63                           | 6                     | 9.5                   |
| (untreated)                | 5/26 - 6/24 | 14                           | 3                     | 21.4                  |
| Yazoo City<br>(treated)    | 8/8 - 9/27  | 123                          | 6                     | 4.9                   |
| Tutwiler<br>(treated)      | 8/19 - 9/8  | 56                           | 5                     | 8.9                   |
| Wayside<br>(treated)       | 6/24 - 7/28 | 137                          | 22                    | 16.0                  |
| Holly Springs<br>(treated) | 7/30 - 9/2  | 29                           | 8                     | 27.6                  |
| Tobacco budworms           |             |                              |                       |                       |
| Greenwood<br>(treated)     | 8/4 - 9/26  | 93                           | 17                    | 18.3                  |
| (untreated)                | 6/24 - 9/2  | 95                           | 40                    | 42.1                  |
| Yazoo City<br>(treated)    | 8/4 - 9/27  | 110                          | 14                    | 12.7                  |
| Tutwiler<br>(treated)      | 8/19 - 9/8  | 116                          | 17                    | 14.7                  |
| Wayside<br>(treated)       | 6/24 - 7/28 | 76                           | 30                    | 39.5                  |
| Holly Springs<br>(treated) | 7/23        | 8                            | 4                     | 50.0                  |