falls, especially the isolated summer storms, were probably never recorded.

According to 1939 to 1968 data obtained from rain gauge records of six stations, higher elevation areas generally receive more intense rainfall than lower elevation areas. This is not necessarily true for all stations, however, and other factors such as location and exposure apparently affect the occurrence of heavy precipitation. The 24 hour-long duration rains occur with some regularity throughout the year, but rain gauge records indicate that a one hour-short duration rainfall has never been recorded between October and March. Intense rainfalls of both types occur with greater frequency at the higher elevation stations.

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Literature Cited

American Meteorological Society. 1959. Glossary of meteorology. American Meterological Society, Boston.

Bogucki, D. J. 1970. Debris slides and related flood damage associated with the September 1, 1951, cloudburst in the Mt. Le Conte-Sugarland Mountain area, Great Smoky Mountains National Park. Unpublished doctoral dissertation. The University of Tennessee, Knoxville, Tennessee.

Meteorological Office, Air Ministry. 1940. The metorological glossary. Chemical Publishing Company, Inc., New York.

Moneymaker, B. C. 1939. Erosional effects of the Webb Mountain (Tennessee) cloudburst of August 5, 1938. Journal of the Tennessee Academy of Science. 14:190-196.

Schwarz, F. K. and N. F. Helfert. 1969. Probable maximum and TVA precipitation for Tennessee River Basins up to 3,000 Square Miles in area and durations to 72 hours. Weather Bureau Hydrometeorological Report No. 45. Government Printing Office, Washington.

Smallshaw, J. 1953. Some precipitation-altitude studies of the Tennessee Valley Authority. American Geophysical Union Transactions. 34:583-588.

Tennessee Valley Authority. 1937. Precipitation in Tennessee River Basin Annual 1937. Tennessee Valley Authority, Knoxville.

Tennessee Valley Authority. 1951. Flood of September 1, 1951, in and near Gatlinburg, Tennessee, Volume 1. Tennessee Valley Authority, Knoxville.

Tennessee Valley Authority. 1966. Floods on West Fork Little Pigeon River—Gatlinburg, Tennessee, Tennesseee Calley Authority, Knoxville.

United States Weather Bureau. 1940. Weather glossary. Weather Bureau Report No. 1445. Government Printing Office, Washington.

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THE OCCURRENCE OF CORN BORERS IN THE UPPER MISSISSIPPI VALLEY

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Abstract

A survey was conducted to determine the infestation resulting from two broods of corn borers. It was conducted twice each summer, in June and August, 1968 and 1969, and covered a 15 county area in Tennessee, Arkansas, and Mississippi. Five fields in each county were located and surveyed to represent the infestation of the entire county.

The comparison of the data obtained from the first survey of 1968, to the data from the first survey of 1969, indicated there was a general increase in the amount of infestation in 1969. However, data from the second survey of 1969, indicated a decrease in the amount of infestation as compared to the data of the second survey of 1968. The decrease was probably due to existing drought conditions in the summer of 1969. Overall, borer populations during 1969, were somewhat lower than in 1968.

Introduction

The European corn borer, *Ostrinia nubilalis* (Hubner), and the southwestern corn borer, *Zeadiatrea grandiosella* (Dar), are two of the great destructive insect pests in the United States. These pests cause millions of dollars in damage each year. Because corn is becoming an ever increasing crop, and because corn borers destroy millions of dollars worth of corn annually in the South, a study of the European corn borer and the southwestern corn borer, collectively known as the corn borer complex, was conducted. There is little known of the abundance of corn borers in the tri-state area of the Mississippi Delta. The abundance of corn borer infestations was determined by a quantitative infestation survey in 15 counties in the tri-state area of western Tennessee, eastern Arkansas, and northern Mississippi. Figure 1 is a map of the fifteen counties surveyed.

Figure 1. Map of Fifteen Counties Surveyed.

Materials and Methods

Fifteen counties of the tri-state area of Arkansas, Mississippi, and Tennessee were selected for surveying the damage resulting from the complex of corn borers. This survey was conducted during 1968 and 1969. Twice each summer field surveys were made so that the damage resulting from the two broods of corn borers could be determined. One survey began in early June and the other in Mid-August.

To adequately represent each county, five corn fields of approximately ten acres each were selected in different sections of each county. The location of the fields were pre-determined by dividing the county into four quadrants. Then, if possible, a corn field was located in the center of each quadrant and one field in the center of the county. This meant that 75 fields representing a minimum of 150 acres were to be located, if possible, and the data recorded twice each summer for two years. During the first survey in 1968 and 1969, most of the infestations were located on the leaves and in the whorl of the immature corn plants. During the second survey in 1968 and 1969, leaf feeding, stalk damage, frass from boring holes into the stalk, stalk breakage, tassel breakage, and the shank of broken ears, could be observed for second brood infestations. On many occasions lodging would be noted thus allowing an opportunity to examine and observe various stages of borer larvae causing damage.

Results and Discussion

The field data gathered in 1968 and 1969, indicated that there was an overall decrease in borer population during 1969, as compared with 1968. Table 1 shows the results.

During the first survey of 1968, approximately 1,375 acres were surveyed with an average of 91.6 acres of corn per county and 19.1 acres per field. The average amount of infestation calculated for each field was 15.9%. The distribution map for infestation of the first generation borers of 1968 (Figure 2) indicated an overall light infestation except for three counties with light-moderate infestation. These three counties with light moderate-infestation were Shelby Co., Tennessee; Fayette Co., Tennessee; and DeSoto Co., Mississippi.

TABLE I. Summary of Field Data For 1968 and 1969

	1968 Broods		1969 Broods	
	1st	2nd	1st	2nd
Number of Counties Surveyed	15	15	15	
Acreage Surveyed	1,375	1,168	931	15
*No. of Fields Surveyed	72	65	71	916
Average No. Acres Per County	91.6	77.9	62.1	68
Average No. Acres Per Field	19.1	18.1	13.1	61.1
				13.5
	Percent			
Infestation Per Field	15.9	50.1	20.0	39.0
Difference Between First and Second Brood Surveys	+34.2		+19.0	
Difference Between First Broods		+4.1		
Difference Between Second Broods			−11.1	

*The differences in the number of fields were that some of the corn fields were cut for silage during the latter half of the summer, thereby reducing the total number of fields.

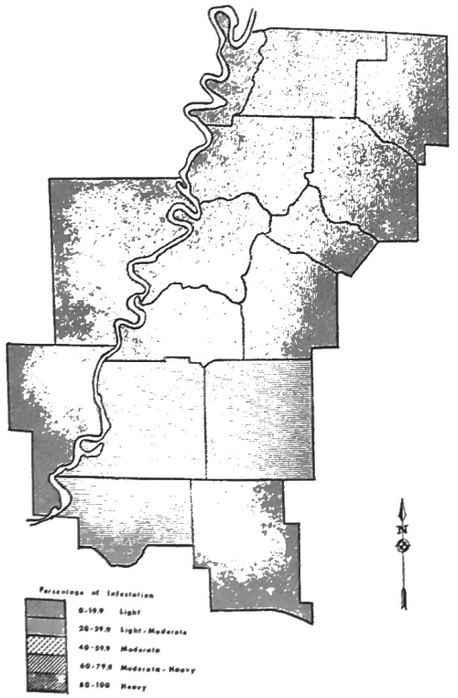

Figure 2. 1968 Distribution Map, First Brood Corn Borer.

These counties are in the southern part of the area surveyed. The remaining counties surveyed had light infestations.

The second survey of 1968 covered approximately 1,168 acres with an average of 77.9 acres of corn per county and 18.0 acres per field. The average amount of infestation was 50.1%. The distribution map for infestation of second generation borers of 1968 (Figure 3) indicated a full range of infestation. Two counties, Haywood Co., Tennessee, and Crittenden Co., Arkansas, had light infestation. The data gathered from the remaining 12 counties indicated an increase of infestation with Tipton Co., Tennessee, and Lauderdale Co., Tennessee, having light-moderate infestation. The four following Tennessee counties had moderate infestation: Crockett Co., Dyer Co., Weakley Co., and Obion Co. in the northern survey area. Shelby Co., Tennessee, and DeSoto Co., Mississippi, had moderate infestation in the southern area. Survey data from Mississippi Co., Arkansas, and Marshall Co., Mississippi, indicated heavy infestation of 80% or more.

During the first brood survey of 1969, approximately 931 acres of corn were surveyed with an average of 62.1 acres of corn per county and 13.1 acres per field. The average amount of infestation per field was 20.0%. The infestation distribution map (Figure 4), indicated only light and light-moderate areas. The Tennessee counties of Weakley, Obion, Dyer, and Gibson, in the northern part of the survey area showed light infestation. Also, the amount of infestation in the southern region indicated only light infestation. This included the following counties: Crittenden Co., Arkansas; Shelby Co., Tennessee; DeSoto Co. and Marshall Co., Mississippi. The remaining seven counties had light-moderate infestation, six of which are located in the central portion of the survey area. The seventh, Lake Co., Tennessee, is located in the northern area.

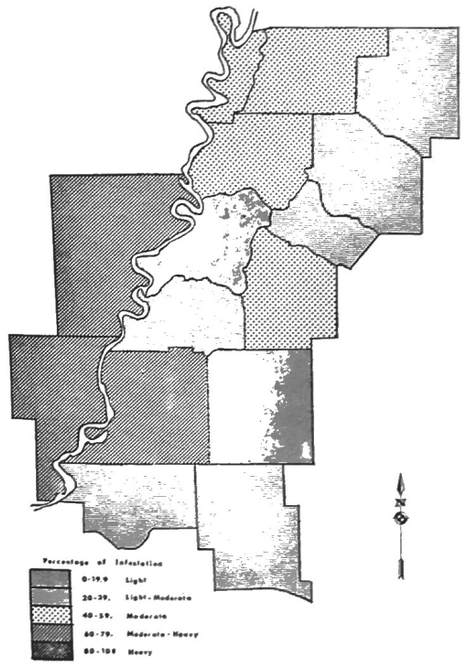

Figure 3. 1968 Distribution Map, Second Brood Corn Borer.

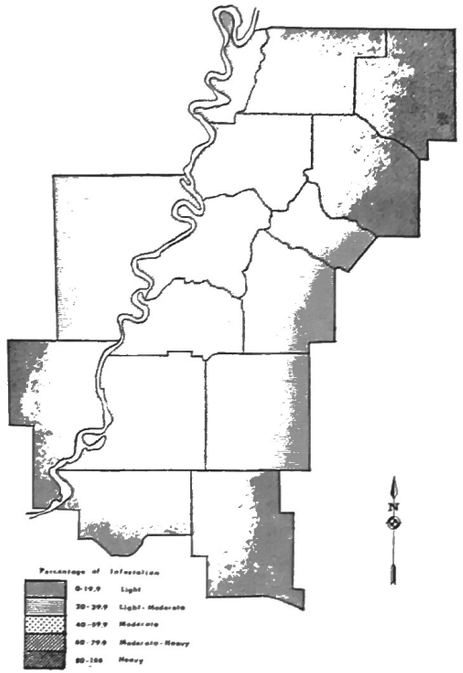

Figure 4. 1969 Distribution Map, First Brood Corn Borer.

During the second brood survey of 1969, approximately 916 acres of corn were surveyed with an average of 61.1 acres of corn per county and 13.5 acres per field. The average amount of infestation was 39.0%. The infestation distribution may (Figure 5) indicated a general decline in population with no counties indicating heavy infestation. Data gathered from Fayette Co. and Haywood Co., Tennessee, indicated a decrease in infestation from light-moderate to light as compared to the first brood survey of 1969. Data from Lauderdale Co. and Crockett Co., Tennessee, remained unchanged from the first brood survey of 1969. However, there were no heavily infested areas during 1969.