

## GRAPE COLASPIS AS A CORN PEST IN ILLINOIS\*

BY

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### GENERAL STATEMENT

The Grape Colaspis, *Colaspis brunnea* (Fab.) is one of the corn pests which regularly does a small amount of damage but which occasionally appears in outbreak form in central Illinois, causing severe losses to the corn crop. It was reported by S. A. Forbes [4] in an outbreak in western Illinois in 1900, and was noted by the author in 1924-1926. The latter outbreak seems to have been the most important recorded in the State up to the present time, and was the cause of the observations here reported. Losses were first reported in many of the western counties during the early part of the outbreak, but it later developed into a serious corn pest throughout the central part of the State. In 1926 at least two thousand acres of corn were totally destroyed and many more were damaged.

### FOOD PLANTS

The adults of the Grape Colaspis have been observed to feed on red clover, corn, timothy, alsike clover, soybeans, alfalfa, swamp smartweed, bull nettle, grape leaves, strawberries, and apples. The larvae have been taken on the roots of red clover, alsike clover, sweet clover, soybeans, timothy, corn, and strawberries. The insect is also reported [3] as feeding on potatoes, beans, watermelon, okra, roses, plums, pears, wild hop, willow, and Virginia creeper. The adults hide at the bases of the plants during the night and feed during the daytime.

### PRELIMINARY OBSERVATIONS.

Several reports of damage were received in 1924 and were investigated. When damage was reported again in 1925 a survey was made to determine any important factors which might appear and the survey was repeated in 1926.

Briefly, the results of these surveys indicated that the most severe damage occurred in corn planted on land where red clover had been

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plowed under, and, further, that the bulk of the losses were in fields that had been plowed late in the spring just before the corn was planted. Some losses occurred where soybeans had been grown in the same field for a period of years in succession. The result of the surveys led to a more detailed study of the life and possible control measures for the pest. This study was started during the summer and fall of 1926.

#### LIFE HISTORY AND DESCRIPTIONS

A general life history study was made but only a few details were determined.

*Adult.* The adult is a yellowish-brown or straw-colored beetle about one-fifth inch long, oval, rather convex, the wing covers marked with alternate ridges and depressed lines or rows of small punctures. Collections are reported by Forbes [4], mostly from southern Illinois, from June 22 to September 15, and by the present author from June 19 to August 29. During this time they are most abundant in red clover fields, although they are found on a number of plants as stated above.

*Egg.* As far as can be determined the eggs have not yet been found or described. Attempts by the present author to obtain eggs from beetles in captivity were unsuccessful. From our observations and knowledge of the habits of the beetles we presume that the eggs are laid on or around the bases of the food plants during the latter part of July and during August. These eggs probably begin hatching during the first half of September.

*Larvae.* The larvae are small, grub-like, about three-sixteenths inch long when full-grown. They are grayish-white or a distinctive very light tan color, with a brown head and neck-shield. The legless segments each bear a pair of fleshy appendages tipped with two or three short hairs. The authors earliest finding of the larvae was September 20, 1928, when they were about one-sixteenth inch long; the latest finding was July 1, 1926. The earliest and latest reports available are in unpublished notes by Forbes, in which the larvae were shown to be present September 13, 1883 and July 9, 1883 at Anna, Illinois. The larvae are slow-growing and live about nine months.

*Pupae.* The pupae of the Grape Colaspis are about one-eighth inch long and white in color. As they near maturity the eyes turn red and the mandibles black. At the posterior end of the abdomen are two incurved hooks with a large backward-directed spine just anterior to each. Pupation takes place in small oval cells two to three inches deep in the soil, usually about six inches from the base of the food

plant, and requires about two to three weeks. Pupae were first found June 5, 1922. Pupae were found June 16 and adults emerging June 30, 1925.

*Hibernation.* It has been shown [1] that the insect hibernates as a larva. Early in the season these are found close to the soil surface. During the latter part of October or first part of November in this

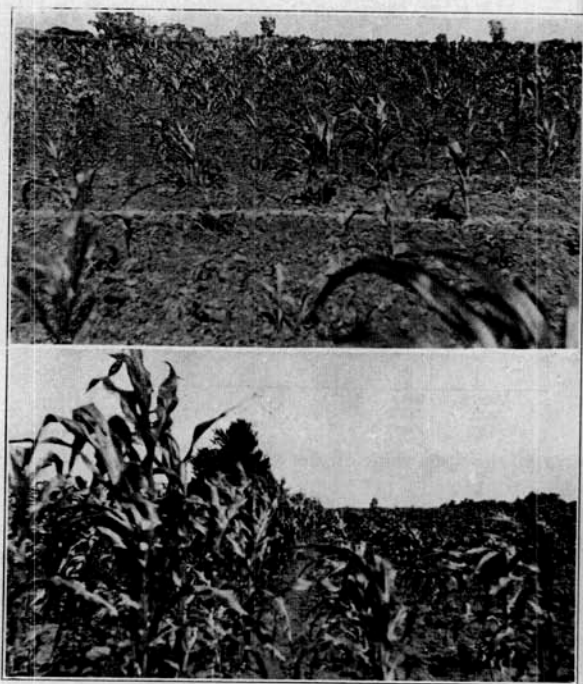


FIG. 1. (*Above*) Corn injured by Grape Colaspis—Note missing and withered hills. Planted on red clover land plowed in late spring. (Near Lynnville, July 21, 1926.)

FIG. 2. (*Below*) At the right, corn on red clover land plowed in late spring; at the left, corn on red clover land plowed in late fall. (Near Lynnville, July 21, 1926.)

latitude they start downward in the soil, and by the latter part of November 60 to 70 per cent of them are eight to ten inches deep, and considerable numbers are found as much as twelve inches below the surface. They remain here until the last part of April the following spring. Larvae were found May 4, 1927, returning to the surface.

## TYPE AND EXTENT OF DAMAGE

The adults eat small oval holes through the leaves, frequently linked together to make larger holes. These may sometimes be so numerous as to skeletonize the leaf, but adult feeding does not often cause serious damage in Illinois.

The larvae feed on the surface of the roots. They may remove the surface in a ring entirely around the root, or they may eat out narrow strips lengthwise of the root. This removes the root hairs and causes the plant to starve.

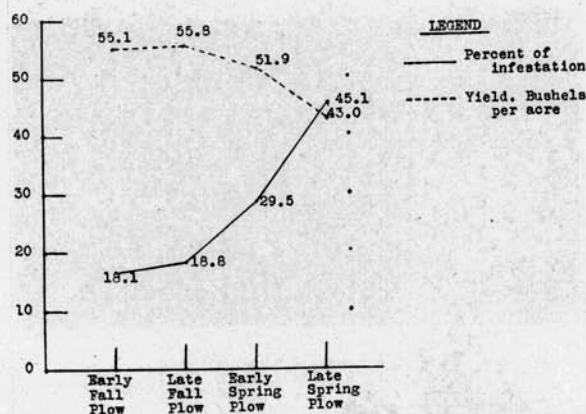


FIG. 3. Graph showing relation between yield of corn and infestation by grape colaspis.

During the 1926 season the larvae in many fields destroyed 30 to 40 per cent of the plants. A number of records show 60 to 70 per cent of the plants destroyed and in one field 78 per cent of the plants were rendered worthless. In one eighteen acre field it was necessary to replant seventeen acres. In the one remaining acre the clover in the field had been killed the previous year. (See figs. 1 and 2.)

## CONTROL

Two lines of control are made available by the investigations carried on during 1926-1929, namely (a) adjustment of the rotation, and (b) timely plowing of sod land where corn is to be planted.

Investigations made as a part of the life history studies show that the larvae are most numerous in second-year red clover sod and are less numerous in other types of grass and legume sods. There are some numbers in second-year sweet clover sod, but this crop will ordinarily be plowed under in a manner that will act as a control

measure. When sweet clover is used as a soil-building crop it is generally plowed under at the end of the first year. The following table [1] shows the results obtained in digging cubic-foot areas in the types of cover listed and indicates that the use of sweet clover or soybeans to replace red clover as a soil-building crop would greatly reduce the necessity of supplementary control measures.

TABLE I

NUMBERS OF LARVAE OF *Colaspis brunnea* IN SOIL AT ROOTS OF VARIOUS CROPS

Crop	Number Diggings	Number Fields	Number Larvae Found	Number Larvae per cu. ft.	Maximum	Minimum
2nd year red clover.....	8	2	264	33.0	67	16
1st year red clover.....	6	2	4	.66	2	2
2nd year sweet clover....	4	2	42	10.5	16	5
1st year sweet clover....	3	2	16	5.33	6	4
Soybeans .....	8	3	1	.12	1	0
Timothy .....	5	2	4	.8	2	0

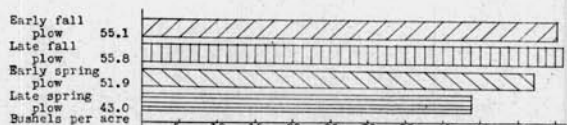
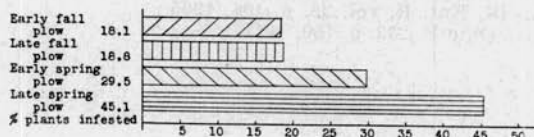


FIG. 4. (Above) Graph showing percentage of plants infested by grape *Colaspis* (average of three years experiments).

FIG. 5. (Below) Graph showing yield of corn from plots infested with grape *Colaspis* (average of three years experiments).

The attempt to control Grape *Colaspis* in red clover sod took the form of experiments to determine the effect of plowing at different dates. These tests were made on farms in Morgan County all within a mile of the station of Arnold, Illinois. Portions of the red clover sod were plowed at different times mid-September, early November, early April, and late April or early May just previous to corn planting. The plots were duplicated in the field in each case. The corn was planted on the plots at the same time and otherwise handled in the usual manner. In early June of each year two hundred hills were dug from each plot and the roots and surrounding soil were carefully examined for the presence of larvae or pupae. In the fall typical samples were harvested from each plot and the yields recorded. This experi-



ment was repeated for three successive years. None of these was a year of heavy infestation.

The graphs (figs. 3, 4, and 5) show the results of the experiments. The figures are the average of all records for each plot for the three year period.

Lack of space prevents showing the records for each year, but these all correspond quite closely with the average results shown. In all cases the fall and early-spring plowings showed the least numbers of larvae present and the highest yields of corn on the plots.

It has been stated [5] that spraying the food plants of the adults would control the adult population.

#### LITERATURE CITED

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