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## RECENT ARMY WORM AND VARIEGATED CUTWORM OUTBREAKS IN IOWA

H. E. JAQUES

The 1919 and 1920 outbreaks of Army worms within our state were by no means new experiences for Iowa. Previous heavy losses from this pest, however, date back so many years that the younger generation of farmers knew them only by tradition. With older men, the memories of their experiences seem to have been somewhat confused so that many stories were related that were but in part in keeping with the history and habits of the Army worm. With all classes there seemed to be an unwarranted fear of the insect and exaggerated ideas of its ability to travel, reproduce and defy the efforts of man to control it.

### THE 1919 OUTBREAK

Beginning early in June and continuing throughout the month reports of serious damage due to attacks of the Army worm and the Variegated cutworm were received from many of the counties in the southern part of the state. It was found that these attacks with the exception of a few scattering outbreaks, were confined to the four rows of counties comprising the southern part of the state, with a more or less serious infestation in practically every county within this range. Thruout the western half of this belt the Variegated cutworm was by far the most numerous while in the eastern part of this region the Army worm was easily the predominating species. This then represented the northern limits for this longitude of a general and destructive outbreak of the Army worm which occurred in the spring of 1919 and which had its southern boundary well down in Texas.

On the sixteenth of June in company with the county agent of Lee county a corn field west of Donnelson was visited. Army worms had hatched in a low lying woods pasture adjacent to the corn field and were at the time of our visit migrating well into the corn field. The corn which would average a foot in height was being seriously eaten, with many worms to the hill. Although it was mid-day with bright sunshine, the worms were actively

at work. It was interesting to note that in a corner of the field, the entire heads were being eaten from a small patch of squirrel tail grass, *Hordeum jubatum*, which may be counted as one score for the Army worm.



Fig. 58. Army worms beginning to destroy a hill of corn.

Later the same day in company with the county agent of Henry county a corn field near Salem was visited. There again the worms were coming from an adjacent pasture. In this case a large percentage of the hills of corn were eaten to the ground or the plants were reduced to short stumps.

A few weeks later representative fields thruout the infested areas were visited. The plan of work was to dig for pupæ, note adults and study the natural enemies with a view to determining the probable seriousness of future broods.

The Variegated cutworm (*Peridromia saucia*) while having a rather wide range of food plants seems to favor the leguminous alfalfa as to be aptly termed the

"alfalfa cutworm." The region of heaviest infestation in Iowa in 1919 of this pest was in the southwestern part of the state. Page county was one of the counties hardest hit. In it alfalfa, clover and wheat suffered severely. An active control cam-

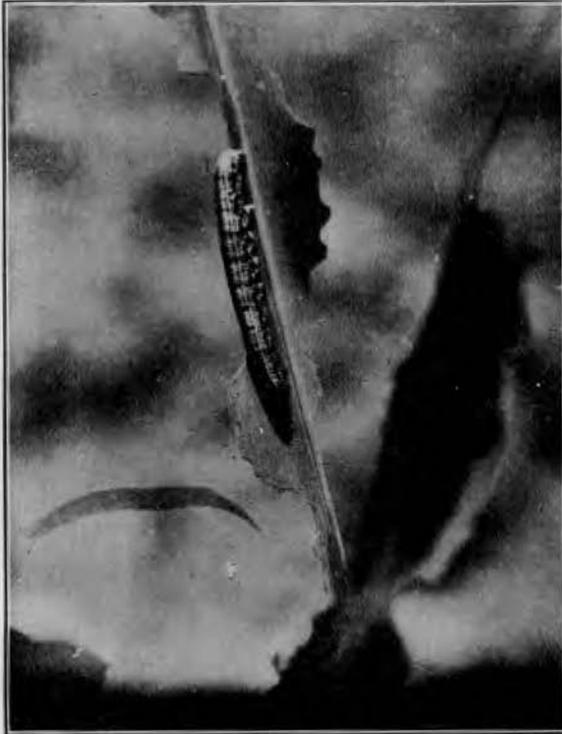


Fig. 59. Army worm feeding on corn (life size).

paign was conducted with good results as shown by a special report of County Agent Eichling. Montgomery and Pottawattamie counties seem to come next in order of severity. Further east in Marion, Mahaska, Jefferson, Van Buren and other counties it seems that the Army worm (*Leucania unipuncta* Haworth) did more damage than the Variegated cutworm while in the counties still further east the Army worm held the field unchanged by its closely related competitor.

The Army worm seemed to confine itself in choice of food very largely to plants of the grass family, corn, small grains, timothy meadows and blue grass pasture suffering most heavily. In several places corn fields were invaded and the crop over

destroyed. Some wheat fields suffered a total loss while numerous Blue grass pastures were eaten to the ground with a serious temporary loss.

Our active field work was begun July 10, on which date several

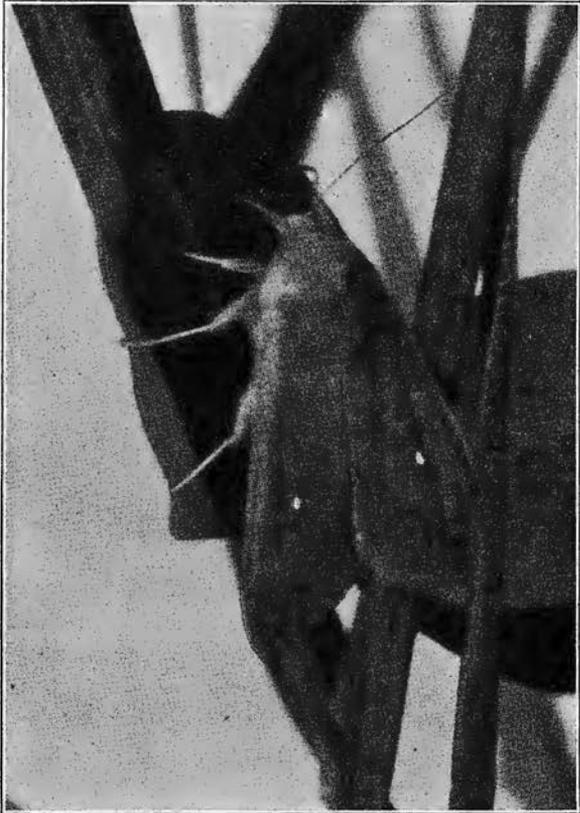


Fig. 60. Army worm moth (enlarged). The white spot on the wing is a distinguishing character.

infested regions in Marion county were visited. Adult moths were seen flying in the fields with a fair degree of abundance and pupæ were readily found by digging. Several species of parasitic Tachina flies and Braconids also were abundant. About one-third of the pupæ taken emerged that same day and the others which did not contain parasites within a very few days. Both species were found in this county, in some cases both in the same field. The trip then led to Mahaska and Wapello counties, thence to the southwestern part of the state. While an occasional living pupa was found for several weeks it came very shortly (by the

fifteenth of July) to the time where practically all pupæ located showed either emergence or a parasitized state. It will be seen that the writer got into the field too late to get any very complete data on the emergence of the first brood, but it is quite plain that the end of that period for the year considered was about July 15.

In fields known to have been infested with either or both of these worms, as a rule little trouble was experienced in locating pupal remains and in reading their history. They were usually found buried from one-half inch to an inch and a half under ground tho sometimes they would be found on top of the earth, having pupated under some little rubbish lying there. The pupæ of the two species could be readily distinguished by color and size, those of the Variegated cutworm being somewhat larger than the Army worm pupa and a chocolate brown, while the pupa of the Army worm was more slender and a lighter reddish brown. Along the weed covered fence row of an alfalfa field north of Council Bluffs, the pupæ of the Variegated cutworm were found as abundant as forty to the square foot. Out in the field they were not nearly so numerous. Poison bran had been used. This was the highest record for abundance, though a number of counts made in other counties approached it. A few of these pupæ showed successful emergence but the greater percentage were parasitized.

It had been noted when the worms were doing their damage in the spring that many were carrying tachina fly eggs. Tachina flies were reared from pupæ of the worms taken by digging. The species by far the most abundant was *Archytas analis*, a large tachinid with bluish black abdomen, gray thorax, reddish brown eyes and white face. Many pupæ of the Variegated cutworm taken thruout the summer were filled with the open puparium of one of these flies. The abundance of the adult flies was further evidence that they had done their control work well. These flies could be found in abundance on the flowers of sweet clover, alfalfa, catnip and smartweed wherever the Army worm or Variegated cutworm had been numerous. In some fields there were so many as to suggest the presence of a swarm of bees.

In almost every field visited, numerous bunches of braconid pupæ could be found where they had emerged from their cutworm host. In some counties but few pupae could be found even where the larvæ had been numerous, showing that the parasites had done their work early.

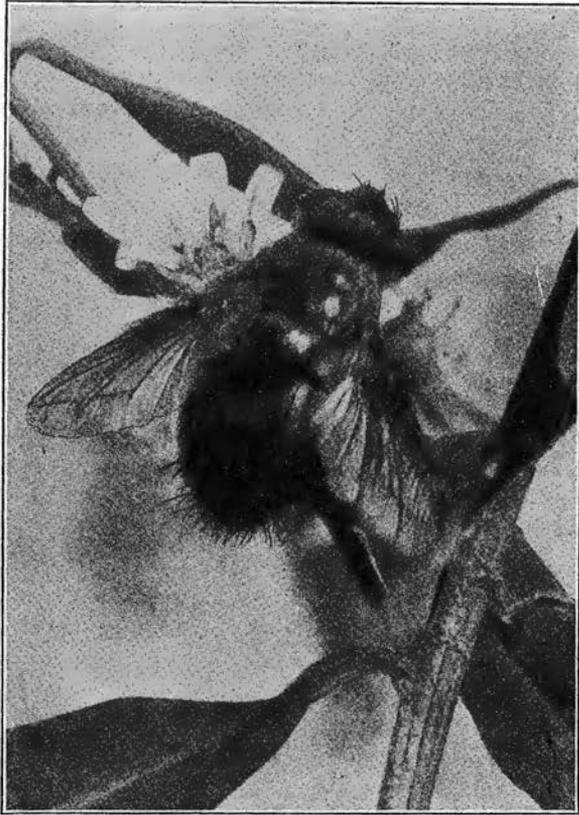


Fig. 61. *Archytas analis*, adult, enlarged.

Mention should be made of the fungus diseases which destroyed larvæ and pupæ as well as of the several species of Ground beetles and Stink bugs found to be associated in the work of control.

Thruout the summer a lookout was kept for any indications of a second brood. No worms were seen or reported tho an occasional Army worm adult was taken, seeming to indicate a small second brood. The latter part of August and early September saw some individuals of *Archytas analis* again feeding at flowers. This seemed to indicate at least two broods, as earlier in August none of the species was to be found.

#### THE 1920 OUTBREAK

During the spring of 1920 occasional Army worm moths were observed flying to lights. The evening of April 21, an unusually abundant flight was reported at the farm of George Blasie near

Floris in Davis county. The moths were so numerous as they visited the flowers of a large apricot tree in the early evening as to practically cover the tree. They did not appear there again, however. The early summer of 1920 brought no reports of Army worm damage but during the last weeks of July it became apparent that northwestern Iowa was suffering heavily from Army worm attacks. This outbreak also touched the northeast corner of the state and extended on north into Minnesota. Prompt work on the part of the State Entomologist and the county agents brought the worms in many cases under control and greatly reduced the loss.

The oats crop suffered most heavily, the damage resulting from the worms climbing into the panicles and cutting off the spikelets until the ground was covered with loose oats. Reports of the loss of from five to ten bushels of grain to the acre were quite common and in some fields the loss was so nearly complete that the entire acreage was left uncut. Some farmers saved their grain by cutting it greener than they would otherwise have done. A farmer living in Pocahontas county told of seeing three binders working on Sunday in a very green piece of oats. He could not guess the reason until the wheels of his car began to skid from running on Army worms crossing the road. Low lying and rank growing oat fields suffered most. The early oats escaped by ripening ahead of the worms. Had the worms appeared a week or ten days earlier the loss of the oats crop would have been close to total in many areas.

From the oats the worms frequently went to the corn, which in most cases suffered but light damage due to its size and the fact that the worms were approaching maturity. In some fields, however, the leaves were stripped up to the ears and the silk cut off short from the younger ones. In such cases the worms could be found in the tips of the ears eating the growing silk, thus preventing its reaching a length to warrant pollination.

Some timothy meadows suffered. In mixed meadows the clover would be left standing even though the timothy and other grasses were cut tight to the ground. A patch of Soudan grass was seen where the side next to the damaged oat field was badly eaten, with many worms and pupæ to be found along the rows.

Some worms were observed to be dying of fungus troubles, while many white bunches of braconid cocoons, each telling of the wreck of an Army worm, could be found in the infested fields. Among the living worms in almost any field could be found

shriveled specimens plainly "enjoying poor health." These needed only to be torn open to find from one to three or four maggots, young tachina flies. Adult tachina flies, with *Archytas analis* predominating, but one or more smaller species being common, were very abundant in the fields and many of the pupæ of the Army worms contained the larva or puparium of a tachinid, while a high percentage of the worms carried fly eggs on their "necks." Ground beetles of several common species were very numerous in the fields. *Harpalus compar* Lec. was the predominating species while *Calosoma calidum*, often mentioned as an enemy of Army worms, was not infrequently found. From the abundance of these many natural enemies it would seem unlikely that this same region would suffer from Army worms during the season of 1921.

It is difficult to estimate the amount of loss due to the 1920 outbreak of Army worms in our state, and not easy to say where the loss was greatest. It would seem that Sac and Pocahontas counties likely suffered most heavily altho certain regions in many of the counties were hard hit. It is interesting to note that Calhoun county, on the southern border of this year's outbreak, was the most northern county to have an Army worm outbreak in 1919, while Des Moines county was the only county of the twenty-two in the southern part of the state known to have Army worm troubles in 1919 that had the worm again this year. Early in April and thereafter for two months and more adult Army worms could be found at lights almost every warm night. It is an interesting question as to whether or not these moths in southern Iowa are in any way related to the appearance of worms in the northern half of the state.

The Variegated cutworm was not reported as a destructive agent to farm crops during the summer of 1920 tho from many parts of the state came reports of its damage to tomatoes. The worms after hiding in the soil by day would climb into the vines by night where they ate off the blossoms and young fruit or burrowed into the larger green ones and the ripe tomatoes.

From these two years' experience with Army worms and the closely related Variegated cutworm it is evident that poison bran bait will ordinarily offer an effective means of control; that where the worms are traveling they may be stopped by a well constructed ditch, but that it is a good plan to run a row of poison bran along the ditch to care for the few worms that will likely find some means of crossing the ditch; and that their natural enemies

may be counted upon in most cases to get the matter well in hand and to prevent an outbreak the second year in a community. Where the crop will permit hogs will soon destroy immense numbers of worms if given access to the fields. The use of drags and rollers to crush the worms is sometimes suggested but had only a low percentage of efficiency when tried during these Iowa outbreaks.

While the Army worm is a notable traveller when in search

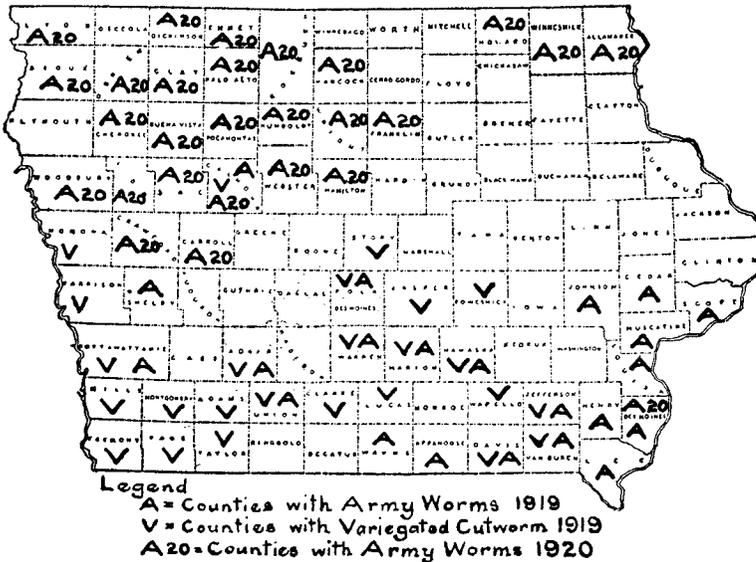


Fig. 62. Map of Iowa showing distribution of Army worms and Cutworms.

of food, his migrations are limited at the most to crossing a field or two. They never travel for miles or across counties. In our state it seems most likely that there are two broods per year. Whether they pass the winter as partly grown larvæ or in the pupa state or by both methods is not fully established.

The accompanying map shows the counties known to have suffered loss from these pests. The photographs are originals.

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