

Menace of Insect Hordes Calls for Prompt Protective Measures

Army Worm, the Worst of Pests That Levy Tribute of Millions of Dollars, Begins March Northward

HUNDREDS of millions of dollars of tribute are to be levied by enemies within our midst. Just when we look confidently forward to the restoration of peace it is brought home to us that we have got to do battle with other kinds of foes that cannot be halted by threat or the parade of armed forces. Our antagonists this time are hordes of three sorts of insects—the boll weevil, the army worm and the locust or the seven-year locust.

These three pests are likely to tax us very heavily during the present year unless radical measures are adopted to arrest their ravaging advances. According to the United States Department of Agriculture the seven-year locust has put in an appearance in nearly every State east of the Mississippi River, and the authorities say that the activities of these voracious locusts are likely to be as far flung as they were during the summer made memorable by them in 1868.

The public might be justified in feeling apprehensive of the welfare of our great bumper crop of wheat were it not a fact, so the experts say, that the locust is not apt to attack this staple cereal. Instead, the locusts are far more likely to confine its destructive activities to young fruit trees and to the foliage of shade trees generally. We may have to pay more for our peaches, plums and apples, but even without the locust the retailer would undoubtedly find excuse for raising his charges just to keep in harmony with the prevailing trend toward higher prices.

But the Army Worm Is Worse.

The days may be made hideous by the incessant crackling din of these noisy insects, we may find them under foot wherever we walk in the presence of verdant crops, and we shall have to accept as inevitable the upturning of lawns beneath which these unwelcome creatures have been bred. But all of these manifestations of the pests are economically of modest significance compared with the devastation which may be wrought by the onward march of the army worm. It is this insect plague which is causing State and governmental entomologists much alarm.

From Washington comes the news that the army worm has appeared again in Texas and that it has started to work its way northward right through the regions where our wheat fields flourish. It isn't a problem of guarding against the vast swarms which may have their origin in the far South, for those particular worms will really have but a circumscribed zone of aggressive movement; the prime task is to watch for them everywhere. The mildness of the past winter has made it easier for us to meet our coal bills, but it also favored the survival of many insects that otherwise would have been killed. These forces, with the advent of warm weather, millions more than normally of these insects are alive and ready to multiply their baneful kind.

The army worm is particularly destructive to winter wheat, corn, other cereals, grasses and kindred plants. It is known to attack young corn in a manner similar to the well known corn-ear worm, the young larvae devouring the tender folded leaves and, as the worms increase in size, they frequently burrow right into the heart of the forming ear and destroy it. In the summer of 1914 the army worm appeared in New York State, New Jersey, Pennsylvania and some sections of New England, and did a great deal of harm to vegetation. At that time the army worm was looked upon as an insect novelty here, but its appearance in the United States actually dates a good many decades earlier.

Mentioned in 1707.

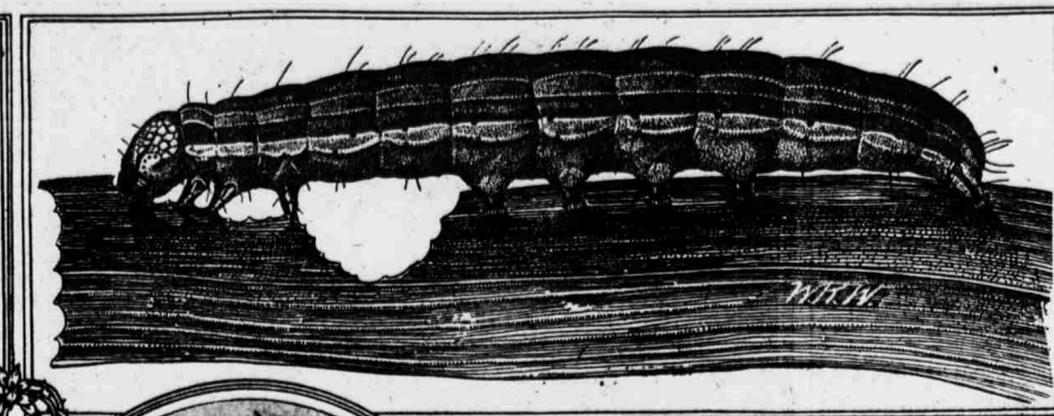
As far back as 1707 mention is made in an erudite popular natural history of the army worm's hurtful ways, but at that period it had not attained to the dignity of a widely destructive native insect pest. That came certainly and surely in the course of time. During the summer and fall of 1848 the army worm burst itself in Florida, and two years later it aroused apprehension because of its widespread ravages. For the next twenty odd years it kept so well within bounds that it attracted no particular attention, but in 1868, the year of the great locust visitation, it broke loose in the cotton belt and did a vast deal of damage. From then on the army worm did more and more injury at fairly frequent intervals. In 1870 it carried its campaign into Kansas, Missouri and Indiana, and in 1872 it caused the farmers of Georgia heavy losses, and six years later it wrought, so the records show, "sad havoc" to the winter wheat in Illinois. After rearing for a couple of years, as if gathering strength for a new assault, the army worm made further inroads in 1878 upon the rice fields of Georgia and South Carolina. After stripping these, with appetites unquenched, the worms turned upon the grass, cabbage, beans and strawberry beds of those States. During 1884 there was a considerable outbreak of the pest in Illinois and Kansas, and in 1885 and 1889 army worms were very troublesome in Indiana. The corn and pea crops in Louisiana suffered tremendously from the worm in 1882, and four years later they were exceptionally abundant and destructive in Florida.

Destruiveness Always Widened.

Subsequently there were several army worm outbreaks, and most of these were marked by an ever widening region of devastation. In 1898 and 1899 the worms made further incursions, and just nineteen years ago a particularly destructive species took to the field. The 1899 campaign of the worms comprised a very considerable portion of the U. S. States east of



A SWARM OF 17-YEAR LOCUST ATTACKING THE FOLIAGE OF A SHADE TREE



THE TRUE ARMY WORM AND ITS DESTRUCTIVE WORK



COTTON BOLL WEEVIL



A BOLL WEEVIL INJURY TO COTTON BLOOM

the Rocky Mountains and the damaged areas extended from New York State far to the South. At that time Texas was included, as now, and so were Kansas, Nebraska, Ohio, Indiana and Illinois.

According to the entomologists there may be from two to three generations of the army worm during a single summer. And the same experts inform us that "each succeeding generation usually becomes more destructive than that which precedes it." The authorities are commonly agreed that the army worm, especially the fall army worm, is of Southern origin, and this fact helps to explain why it does not appear yearly in conspicuously injurious numbers. Its instinct prompts it to strive continually to obtain a foothold further north than its natural range, and here is where weather conditions play an important part in its life history and its propagation in higher latitudes. Ordinarily, if the season be against them, they are killed in great numbers during the fall and winter months, and therefore, but few of the creatures are left to multiply their kind the following spring and summer.

How the Pest Breeds.

The early appearance of the army worm in Texas may justify the fear that States considerably to the north have become restocked by the flight of the parent moths from the Southern breeding grounds in the warm swamp lands. The moth which produces the fall army worm is a member of the same family which likewise embraces the parents of the baneful cut worm, an importation from the Old World and of long years of American acclimatization. It is the habit of these nocturnal moths to deposit their eggs in clusters, and when at first they are very dark as to escape observation, except when moving in numbers, and their whereabouts are further concealed by the normal habit of hiding in the deep grass during the day time and feeding mostly at night. This explains why one may be to be within a field, garden, or lawn unmolested, only to arise at dawn to find the place devastated. The mature army worm ranges from an inch to an inch and a half in length and is about a quarter of an inch through.

The life history of the army worm is not a long one. The first of the larvae or worms are from eggs deposited the fall before. Their manner of wintering is of interest. When full grown the larvae work their way into the ground to a depth ranging from a quarter to an inch and a quarter deep. In the spring the worms appear from under a brief while, reenter the earth, and remain in the cocoon state for several weeks, at the conclusion of which they emerge as moths, which, in their turn, lay eggs and start again the evolutionary life of the army worm. In the three weeks of its active career the army worm can do a deal of damage, and to eradicate the pest it is essential to kill the parent moths as well as to destroy the worms themselves.

Lately, the army worm has some natural enemies, and among these the sparrow is probably the most effective because of its numbers. The blue jay comes next, and then follow the tachinid fly and a certain variety of beetle. These foes will not suffice to keep the army worm within bounds when their name is legion, and it is needful then to resort to man made expedients. Trenching the fields, a generous use of kerosene and the ample spreading of arsenical powders will aid in a crisis, but clean cultural methods will do much more toward eradicating the hibernating or slumbering pests. That is to say, keep the edges of fields and the hedges of gardens free from long grass and weeds, where the larvae lurk and fall ploughing will kill those that have already

entered the ground for wintering. Of course these efforts will not avail if the parent moths come from the South in the spring time. We cannot expect to detect the eggs and to destroy them before the worms are hatched out and are abroad upon their ravaging career.

Just when the spindles of the world are nearly ready to resume their pre-war activities, just when so many of the nations are anxious to obtain more cotton fabrics, the unwelcome news comes that the cotton boll weevil is up and doing with increased energy and bent upon devastating our fields. Again, we have the past mild winter to thank in large part for this disturbing state of affairs, a very considerable percentage of the hibernating weevils having survived when with

DOWN IN THE COTTON BELT WHERE MUCH DEPENDS UPON THE ERADICATION OF THE BOLL WEEVIL.

colder weather they would have been in great measure exterminated. The experts tell us that the boll weevil in a single year may occasion a cotton loss of more than 400,000 bales, and at pre-war prices this would represent a money sacrifice of quite \$25,000,000. To-day, with cotton selling at an average of about 40 cents a pound, the toll levied by these insects would be equivalent to fully 100,000,000. No wonder, the United States Bureau of Agriculture has pronounced the boll weevil to be the worst cotton pest in this country and, probably, the most destructive cotton insect in the world. This ravaging creature apparently will not feed upon any other plant—it just insists upon eating the precious cotton boll.

Like many others of the conspicuously injurious insects present in this country, the cotton boll weevil is not a native of the United States. Its place of origin, so the entomologists declare, was beyond question in the high plateau region of Mexico or Central America, and in the distant days of its beginning it may have fed upon some plant other than cotton. This is not necessarily conclusive, for there is said to be ample evidence that the cotton plant itself had its origin in that elevated area. If this be so, it would seem that the boll weevil migrated to be in touch with its chosen food; and the records indicate that the insect in all likelihood occasioned the abandonment of cotton growing in parts of Mexico and Central America. Certainly we cannot afford to face a similar catastrophe.

Prior to 1892 the boll weevil had spread through Mexico, but little is known regarding the extent or the rapidity of this dispersion. About that date we do know that the boll weevil made its unwelcome way across the Rio Grande near Brownsville, Tex. It may have been carried over in seed cotton sent to Brownsville to be ginned, or it may have spanned the water gap on its own wings, for the insect has well developed powers of flight. This gift of aerial locomotion is one of the factors that make it so difficult to restrain the migration of these pests.

Our agricultural authorities inform us: "Since 1894 the boll weevil has extended its range annually from 40 to 70 miles, although in two instances the winter conditions have been such

as to cause a decrease in the infested area. During the first ten years after its advent into this country the annual rate of spread was 5,640 square miles. Since 1901 the annual increase in the infested territory has averaged 26,880 square miles, but in one exceptional season, namely 1904, 41,500 square miles became infested." By way of qualification, however, the same experts say: "Of course, the figures given do not refer to the area in cotton. In many parts of the infested territory the area devoted to cotton is much less than 10 per cent. of the total area."

Statistics on the Loss.

Some time prior to 1912 Dr. L. O. Howard, Chief of the Bureau of Entomology, U. S. Department of Agriculture, found that the statistics available showed that the weevil then caused a reduction of at least 50 per cent. of the cotton crop in regions invaded by it, but that after the first few years the farmers generally resorted to proper means by which it was practicable to greatly reduce this loss. However, this gain in crop went hand in hand with increased cost of production. Further, this same investigator writes:

"The average yield per acre in Texas from 1892 to 1901, this country, weevil had not done damage sufficient to affect the general production, was 0.4 bale. The average since that time, i. e. from 1902 to 1911, was 0.36 bale. By comparing these periods we have a reasonably accurate basis for estimating the damage the insect has done. The difference is 0.04 bale, or 30 pounds of lint per acre each year. At prices current through the period in question this means an annual loss, without considering the value of the seed, of at least \$2.70 per acre which has been sustained by the cotton planters of Texas. Assuming that the area planted in cotton in Texas has averaged 10,000,000 acres, the annual loss for the State from 1902 to 1911 has been \$27,000,000. A conservative estimate, ending with 1911, shows that since the weevil invaded this country it has caused a loss of 2,575,000 bales of cotton, valued at about \$125,000,000."

In 1913 the area planted to cotton was 27,089,000 acres, the average yield was 123 pounds per acre, and the total crop amounted to 3,336,000,000 pounds, selling at an average price of 12.2 cents. In 1913 the region planted covered 35,890,000 acres, the yield was only 103.9 pounds per acre, and the total crop amounted to 3,709,000,000 pounds, selling at the same price of 12.2 cents a pound. Unfortunately there has been a fairly continuous drop in the acre yield since 1913, and the boll weevil can undoubtedly be held

Cox Caught Napping.

The revenue man slept that night in Cox's cabin. He and the family slept in the one room that the cabin afforded. George Cox, however, with his rifle across his knees, sat up all night in a chair tipped back against a big cupboard. The official noted this fact as being suspicious. In the morning, when all the family were gathered at the breakfast table, the revenue man, who is now a successful practicing lawyer in Laurel county, suddenly drew his "forty-five," jumped from his chair, "covered" the men and threw open the door of the cupboard. "The revenue man is in the cupboard," he said. "The man in the cupboard is carrying on the back of the store."

Engaging Frankness.

Cox formerly had a still, operating under a Government license. One day a traveler visited his cabin. He was invited in and had supper with Cox's family.

"What might your business be, stranger?" asked Cox. "Air ye a lawyer?"

"No," was the reply.

"School teacher?"

"No."

"A minister, then?"

"No," was the final response; "I am a revenue man."

Cox, busily eating, dropped his fork, which was midway to his mouth, to his plate, and gazed in astonishment at the visitor.

"I'm a-goin' to look after the horses," Cox said to his wife. He arose and went out, not to attend to the stock, but to warn of their danger some of his relatives who were working his still, for while the plant was operating under a Government license, the invariable custom of owners of

Boll Weevil and Locust Threaten Far Flung Devastation—Mild Winter Increases Number of Bugs

In the main responsible for this reduction.

And now for some general details about the boll weevil itself, and the lure which draws it especially to the cotton boll. The weevil has a periodic thirst and, apparently, there is just one liquid that appeals overwhelmingly to its palate. On the underside of cotton leaves, on the midrib, or principal vein, and sometimes on two other veins, can be found a little elongated depression which usually looks sticky and frequently holds a drop of liquid. On the outside of the squares at the base of each bract or leaflet are other little cups, and between the bract and the bud itself are three more cups. At the bottom of the flower cup still more of these sticky vessels are found. They are called "nectar cups" because they exude a sweet liquid. This is the tittle that the boll weevil is drawn to. The adult boll weevil is about one-fourth of an inch in length, but its size depends upon the amount of food that it obtains while in the larval stage. The boll weevil passes the winter in the adult condition. In the spring and throughout the fruiting season of cotton the eggs are deposited by the female weevils in cavities formed by eating into the fruit of the plant. An egg hatches under normal conditions in about three days and the grub immediately begins to feed. In from seven to twelve days the larva or grub passes into its pupal stage, corresponding to the cocoon of butterflies and moths. This stage lasts from three to five days. Then the adult issues and in about five days begins the production of another generation.

Three Weeks to Mature.

Climatic conditions cause considerable variation in the duration of the stages, but on an average it requires from two to three weeks for the weevil to develop from the egg to the adult. Males and females are produced in about equal numbers. The males feed upon the squares and bolls without moving until the food begins to deteriorate. The females refrain from depositing their eggs in squares visited by other females. As many as fifteen larvae have been found in a single boll. A conservative estimate of the progeny of a single pair of weevils during a season, beginning on June 20 and extending to November 4, is 12,755,100.

The number of weevils hibernating successfully has been determined very accurately for different conditions. Out of 25,000 weevils 2.82 per cent. survived the winter of 1905-6. These weevils were placed in a variety of conditions which must have approached those that weevil must naturally encounter. The winter of 1906-7 was practically a normal one so far as temperature and precipitation were concerned. In extensive work during the winter of 1906-7, out of 75,000 weevils 11.5 per cent. survived. That winter was a mild one.

In the face of the prolific breeding of the weevils, the steadily increasing regional areas in which the insects are found, and the fact that the past winter was, relatively speaking, a warm one, it is not hard to understand why a bill has been introduced recently in the Legislature of Florida to ask the Federal Government to recommend to Congress the suspension of cotton planting for one year. It is hoped in this way to substantially stamp out the boll weevil by denying it its only food.

This same scheme has been suggested before, and at that time—1913—it was estimated that the loss to the farmers would amount to \$108,000,000. The idea was to establish a prohibition strip, or "dead zone," a hundred miles wide, running through Georgia, Alabama, Tennessee and Florida. Measures of this nature are being considered by a number of many experienced persons, that only in this way could lasting results be obtained.

On the other hand, the Government authorities have shown that the boll weevil can be held greatly in check by proper cultural methods, and also by the use of insecticides which can be sprayed upon the plants at certain stages of their growth. By the latter process the weevil's drink can be poisoned, and as it takes its thirst at least once every day its doom can be sealed if the proper use is made of prompt and applied broadcast. Certain it is, unless corrective measures of a radical nature are resorted to throughout the entire cotton belt, we shall have to pay still higher for our cotton textiles, and we may even be hard pressed to find a market for the native product to meet our accustomed demands.

How Long Do Stage Stars Last?

Continued from Seventh Page.

Opera House, Washington, D. C., September 13, 1897, this play lasting her three seasons.

Julia Marlowe was born in Caldwell, eight miles from Keswick, Cumberland, England, August 1870, and educated at the public schools in Cincinnati and Kansas City. She made her first appearance on the stage at Ironton, Ohio, in 1882, as a sailor in a juvenile "H. M. S. Pinafore" company. Subsequently she played the part of Miss Joseph in the same opera and also appeared in the parts of "The Nurse" in "The Chimes of Normandy" and the Page in "The Little Duke"; subsequently she played the part of Heinrich in "Rip Van Winkle" of the Robert McWade. Under the management of E. E. J. Miles, she toured in "Hunchback" and "Stephanie" in "The Hunchback" and "Maria" in "Twelfth Night," and "Mylene" in "Pygmalion and Galatea" and then studied for three years under the tuition of Ada Dow, a well known American actress.

Her first appearance as a "star" took place at Bayonne, New Jersey, in 1887, when she played Parthenia in "Ingo-

On the Inside in the Heart of the Moonshine Country

Continued from Ninth Page.

If you dare—and if you can. Penetrate this section where you do not meet a person in a half day's walk—but where a rifle barrel glistens among the rustling leaves—and the uncrowned kings of the moonshine trade will come before your eyes.

"Plas" Reed's prosperous still is on Wildcat Mountain. Larkin Reed's still is there, too. "Thes" Will White, nephew of ex-Judge White, the well known Manchester lawyer, is assisting Larkin Reed in the work.

Up Red Bird River.

"Up Red Bird River," the bootleggers of Clay county whisper, considerably big proof M. S. can be produced by these "in the know." Jake Lovell and Joe Stephens have a well equipped establishment carefully concealed there. They are dangerous men, feared by the revenue officers. "Jake" and "Joe" will feel irritated, even peevish, when they hear about this article.

In the mountains south of London, Jake Ferris, veteran dodger of the wily sluths, has secreted for years a solidly built still that produces ten gallons of M. S. a day. The Ferris place is twenty-eight miles south of London.

Sam Richardson and M. E. Bibbey have another ten gallon a day still, thirty-three miles southwest of London. They are never without their guns, and are ready for any trouble the Government may start. They are not looking for trouble, they will tell you; but they will not dodge it when it looms on the horizon.

John Jensen, whose cabin is in the hills not far from Manchester, is re-

puted to be conducting a profitable still near by, but in the daytime he is frequently seen in miner's clothes, and John asserts positively that his only business is coal mining. Many similar instances could be related.

How is all this vast amount of moonshine whiskey disposed of?

A natural query, that. The bootleggers, and the distillers themselves, know how to hide bottles behind trees, in bags of meal, under brush piles, under stumps, &c. They slip it by freight, and by express too, to points within the State.

One man alone at Corbin, Ky., has handled and is handling the output of more than one still. He is N. D. Antonio Measer, the most dangerous bootlegger in Kentucky.

Ask old "Uncle Jimmy" Nixon, in his hat and a half mile west of Manchester, how to dispose of M. S. "Uncle Jimmy" is 107 years old, the oldest man in the State, and has often handled the "juice." He could tell you the entire history of moonshining in Kentucky if he were persuaded that no harm would come to any of his friends from the telling.

George B. Cox, the man who runs the refreshment store at Gray, Ky., in Knox county, just over the line from Laurel county, in the heart of the moonshine district, could describe minutely the methods of the bootleggers. Cox is a cousin of George B. Cox, the former Republican leader in Ohio. Cox sells sandwiches, sarsaparilla, "pop," ginger ale, &c., but it has always been somewhat of a mystery why so many men who have rarely been seen to drink "soft stuff" should make Cox's store their headquarters. Some of the best county bootleggers of the nearby counties rendezvous at Cox's store.