July 2017

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Notes on Injurious Insects.

Herbert Osborn, Entomologist.

Hickory Bark Beetle.
(Scolytus 4-spinosus Say.)

In July 1895, Mr. D. A. Porterfield sent to the station some small beetles of this species with some twigs, showing their work and the following statement:

"They are cutting the leaves off all the Hickory and Walnut trees in Traer, and at this season of the year am it will kill the trees. ** They have killed some shellbarks for me that are eight inches to a foot in diameter."

The same pest has injured many trees in Manchester and other places during 1896.

This species was long ago described by Say, and its work discussed by Prof. Riley but its appearance in such destructive numbers calls for a brief notice.

![Image of Hickory Bark Beetle]

The beetle, (Fig. 1), feeds at the base of leaves and burrows into the twigs for food, the nature of this injury being shown in figure drawn from one of the specimens sent by Mr. Porterfield. Later the eggs are deposited in crevices and
openings in the bark and the young burrow canals just within the bark between the bark and solid wood. This work, when the beetles are numerous, is very destructive to the trees. There is a decided probability that the trees denuded of foliage during summer will be found to be seriously damaged within the bark by the following spring.

From the extent to which the foliage is devoured it would seem that spraying with London purple or Paris green would be quite effective as a means of protecting valuable shade trees. For the prevention of the injury from the larvae which is really the more important matter, it is claimed that scraping the bark down to the inner green bark will stimulate the growth and by over-powering the grubs, result in a decided improvement of the trees. It is of course applicable only to shade trees of such value as to warrant the labor involved.

THE CHICKEN MITE.
(Dermianyssus gallinac.)

During the past year or two we have had a number of letters with regard to the common chicken mite, and as the pest seems to be causing no little trouble to poultry raisers and farmers, it has seemed desirable to give it some attention.

The following extract from a letter by Mr. C. A. Wiren, Belinda, Iowa, will serve as a sample of those received.

"Our chickens are pestered nearly to death, yes some to death, by the smallest kind of a nit or louse that fills and crowds on everything pertaining to chickens. We clean the chicken house once a week regular, winter and summer, but they have been with us three or four years. We have sprayed the chicken house with kerosene but it does not seem to help much and once last summer I smoked the house inside with fires and wet hay."

The mites or "ticks," as they are often called, are very small and when filled with blood from the chickens have a red color, but when unfed they are whitish or grayish. They have eight legs in later stages, but when quite young have but six. The mouth parts shown in the figure at c, are capable of extrusion so as to penetrate the skin of the fowl.

The mites remain on the chickens only while feeding and are to be found in great numbers secreted in the cracks and corners of the chicken house or adjacent places. On this account measures for their suppression must be directed toward
freeing the fowls from them and killing all that are harbored in the building or preventing their attacks on the fowl. The

attacks on the chickens are made more particularly at night, though of course some mites may be found on the fowls at almost any time. The plan which we have commonly recommended is to thoroughly spray the inside of the chicken house with kerosene or kerosene emulsion, taking special pains to remove all mites from cracks or rough spots on the roosts and then to daub the ends of the roosts with soft tar so that the mites in attempting to reach the fowls must perish in the tar. It is believed that this method persistently followed will keep the ticks in check even if it does not exterminate them entirely. It will of course be necessary to keep the barrier fresh by additions of tar, as the earlier applications harden and it will be important to look for any places of secretion for mites especially places where the chickens gather and are exposed to renewed infection with mites.

Mr. Wiren reports that in his case while this method helped for a time that the mites were soon as bad as ever. Possibly some point to which the chickens had access was not reached in the treatment and so a renewed attack was possible with the production of a new generation of mites. Persistent watchfulness and most thorough treatment with whatever method is employed is certainly essential for success.
Spraying Mangels for Blister Beetle.

In August, 1895, the common black beetle (*Epicauta pennsylvanica*) was reported as doing serious injury to four or five acres of mangels that were being used for experimental purposes. Investigation showed that beetles were very abundant over patches of considerable size and eating the leaves very rapidly.

Since mangels are rapidly coming into greater prominence as a root crop in Iowa, especially in the sections largely devoted to dairying, and since blister beetles are more or less abundant every year, it is important for the farmers of Iowa to know definitely what remedy to apply. Sugar beets are subject to same attack and can be treated in same manner.

Although spraying with London purple has been thoroughly tested, yet two lines of experiment were outlined to show their relative values:

1. To use a mixture of London purple and flour (1 part London purple to 15 of flour) and applied in the morning as a fine powder while the dew was on the leaves.

2. To spray with a solution of London purple, using one pound to 200 gallons of water.

Under the first method, ten rows were dusted with a Leggetts "powder gun." The powder distributed while the dew was still on the leaves was very effective; but it would have required a number of days to complete the treatment, while an immediate result was necessary. It was so windy during the day that the application of the fine powder was useless. On some of the plants treated in this way the leaves were slightly burned in places. This was due to the fact that the powder was not perfectly distributed, being thicker in some places than in others. Moreover this method was found to be too expensive on account of the material and time required for application. The cost being at least three times that of spraying.

The second method was used for the remainder of the field with entirely satisfactory results. The water solution did not injure the leaves in any way and the beetles were so effectually destroyed that within a few days hardly a live one could be found. Had they not been sprayed there can be no
doubt that the crop would have been seriously injured. No check was left because the mangels were already in an experiment and the beetles would have injured the check or else spread over the entire field thus requiring the check, to be of value, to be effectively isolated.

Considering the fact that this species migrates very readily, it was thought possible that the beetles would soon leave the field. Such, however was not the case and the injury was too rapid and extensive to admit of any unnecessary delay. A common hand spray pump and a barrel holding 50 gallons were used, thus requiring one man to do the pumping and one to handle the nozzle. For these 4 to 5 acres it required about 200 gallons of the solution. Counting London purple at eight cents a pound, the cost of the material per acre was less than two cents. The labor was the greatest expense, since it required two men, a boy and a horse and cart for eight hours, including hauling of water, thus making the entire cost come within four dollars, or about one dollar per acre.

When mangels or beets are grown on a very large scale spraying apparatus for heavy work can be arranged so as to have one nozzle for each row, covering as many rows at a time as desired and at the same time allowing the cart or wagon to be drawn along at a good steady walk, thus avoiding the numerous stops necessary with smaller apparatus. In this way the already small expense would be reduced more than one-half in time and labor.*

The Hessian Fly in Iowa.

The Hessian Fly is one of the most noted of the pests of wheat, and especially in winter-wheat regions is one of the most serious insect enemies that the farmer has to contend with. Hitherto it has not attracted any attention in Iowa, mainly it has been thought because that most of the wheat grown in the state has been spring wheat. Possibly it has occurred in small number, surviving on volunteer wheat or other food plant for the fall brood, but not multiplying fast.

*The field work in this experiment was under the immediate direction of Mr. C. W Mally, now Assistant Entomologist in the Ohio Experiment station.
enough to cause trouble. Certain it is that, with the exception of one possible instance, it has never been reported to the station, until the present season. Somewhat curiously the reports this year are not from the winter-wheat section of the southern and eastern portion of the state, and the region nearest the infested localities of other states, but from the northern and western portion where spring-wheat is the rule and winter-wheat only rarely raised.

The work of this insect is quite easily recognized especially after the insect has reached the flax-seed stage. At this time the wheat stalks have become withered, often broken down, and an examination of the joints near the ground will reveal under the leaf sheaths and closely pressed against the stem a brownish seed like body very similar in form and size to a flax seed. This is the puparium of the Hessian fly, and within it may be found the insect in the chrysalis stage.

The adult insect is a very small two winged fly, very much like a mosquito in shape, of a dark color and the wings delicately fringed. The legs are slender. The body, wings and legs are covered with hair like scales. These insects appear twice during the year. Once in early autumn when the eggs are laid on fall or volunteer wheat, and again in spring when the eggs are deposited on spring wheat or upon the stalks of fall wheat or winter wheat. The eggs are very small, about one-fiftieth of an inch in length, pointed at each end and pale red in color. These hatch in about four days into a maggot which is a fleshy, light colored, footless creature that obtains its nourishment by puncturing the tissues surrounding it. The effect of its work is to cause a swelling and weakening of the stalk at the point attacked causing the plant to wilt and break down. On completion of this stage, and by the time wheat has ripened, for the first brood or by the time of cold weather for second brood the larva contracts, its skin forming a hard brown covering resembling very closely a flax seed, on account of which this stage is called "flax seed" stage. Within this covering the maggot changes to pupa and in this condition remains until ready to issue an adult fly.

Prof. Forbes has determined that during some seasons, there may be more than two broods, the extra broods being
distributed through the season on volunteer wheat which may appear irregularly. Generally, however, we may rely on the two ordinary broods and adopt measures of repression accordingly.

**Remedies:**—It will seem from the above that the insect is in the flax seed stage from the time the wheat is harvested until the fall growth furnishes opportunity for the deposition of eggs for the second brood. Any measures therefore which will destroy the stubble down to the surface of the ground will involve the destruction of the insect.

Burning of the stubble is therefore urged and plowing under to a considerable depth and subsequent rolling is also considered of much advantage. The destruction of the volunteer wheat by plowing under will also be of service and when winter-wheat is grown the delay of planting until after frost has killed the flies will also be advantageous. Some authors recommend pasturing the fall wheat with sheep for the purpose of destroying the larvae or flax seeds in late autumn.

This insect is attacked by a number of very destructive parasites and these in many instances serve to keep them in check sufficiently to prevent serious damage. Among the specimens which have been sent me this season all have developed one of the parasites (*Semiotellus destructor*) in great numbers; so much so that none of the Hessian Flies have been reared. From this it is evident that the parasite has been as thoroughly introduced as the fly itself and it is to be hoped that it will so increase as to prevent serious damage to the wheat crop of the state.

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**THE ARMY WORM.**

*Lucania unipuncta* Haw.

The Army Worm is a pest which though present in some numbers every year, is seldom so abundant as to attract attention. The present season however, has been an exception to this rule, the abundance of the insect and the damage it has caused being one of the notable events of the season. It was exceptional also in the early appearance of the first brood, the first reports of which commenced to reach
us the latter part of May. At first it was suspected that other species were concerned in the damage, but the receipt of specimens from a number of different localities soon proved that the genuine Army Worm was the insect at work.

It would be interesting to specify the localities and dates of appearance of the insect throughout the state, but this would require so much of space that it seems necessary to omit it. It may be remarked, however, that the first appearances were in the south-eastern part of the state and followed with the season to the northern and that the appearance of the second brood, beginning in the early part of July followed about the same course and that from the reports received we concluded that the insect must have appeared in almost every county of the state. Its abundance and the amount of damage varied in different localities, but was peculiarly noticeable in, and adjacent to fields of rye. In many instances this crop was entirely ruined and in some localities serious injury resulted to pastures, meadows and some field crops.

As soon as it appeared that this invasion was to be widespread, a press circular was issued and sent to all papers of the state, in which the best known methods of treatment were stated; thus forewarning and preparing any who might have to protect their crops from it. Our correspondence has shown that there is considerable apprehension of damage in another season, and while we do not anticipate any unusual injury from this species in the immediate future, it seems best
to make a brief statement of its habits and of the methods of control that are available.

The moth which is the parent form of the army worm is of a brownish color with a conspicuous white dot in the center of the fore wings. Its wings expand nearly two inches and the body is about one inch in length. Its general appearance being shown in the adjoining figure. Its appearance in this form is somewhat irregular and records indicate that the winter may be passed in either egg, larva or pupa stage. For the present season it would seem that the eggs had been deposited in the fall and hatched early, producing a brood of full grown worms in early June.

The eggs are laid in folds of grass-leaves or on other plants of similar character. The larva is usually rather dark and striped as shown in the annexed figure. They feed almost exclusively upon grasses or plants of the grass family, eating the leaves and heads of grain, sometimes stripping these to such an extent as to destroy the crop even when the stalks are not affected. Before pupating they enter the ground burrowing to the depth of half an inch or an inch and, for broods appearing during the summer, this stage is passed in eight to ten days, or in the late broods this stage may remain until after winter.

Records indicate quite clearly that army worms are most abundant after dry seasons or a series of dry years, such conditions favoring their increase. Usually they are confined to pastures and meadows, in low ground. But, after favorable seasons they become so abundant as to devour everything in their normal areas and therefore forced to migrate to adjacent fields. It is during these migrations that they become known as the "Army Worm."

If noticed in time their damage may be very largely prevented and in any case, the damage following a general movement of the worms is unnecessary. Where a pasture or meadow is found infested it may be sprayed with London Purple...
or Paris green. In case the worms are moving in any given direction the spraying should be over as trip in advance of the army, and to make certain of immediate effect the solution may be made strong; a pound of the poison to every seventy-five or 100 gallons of water. Stock should not be allowed access to the sprayed grass for at least a week or ten days or until after one or two heavy showers. On smooth ground crushing the worms with a heavy roller may prove effectual, but usually the places where the worms are at work, are too uneven and soft for successful use of this method. To prevent worms from migrating into adjacent fields, an obstruction in the way of a deep furrow is very serviceable. The furrow is usually best made with a perpendicular wall on the side opposite to the moving worms. In case the ground is not firm enough to form a perpendicular wall, a furrow with finely pulverized sloping walls will prove effectual, the earth falling back with the worms as they attempt to crawl out of the furrow.

The Army Worm is attacked by many parasites and from the fact that numerous specimens of these were received the present season there is every probability that the worms will be less abundant another season.

One of these parasites is illustrated in the figure. The front part of the body of worm bearing the eggs will doubtless appear familiar to many who observed the worms this season.

One of the most abundant forms this season however, was the military microgaster, (Microgaster militaris); the white cocoons of which massed where they issued from the worms were in many cases mistaken for eggs.

A NEW PEST OF POTATOES.

It would seem as if the potato were sufficiently infested with troublesome insects, but the present season has furnish-
ed a new pest and one which to judge from the damage it has inflicted here, is capable of causing a great amount of damage. It proves indeed to be a species that has been troublesome on other plants, but so far as we can determine it has not hitherto attacked this crop. The insect which is known technically as *Empoasca mali* Le Baron has been recognized as a serious pest of apple trees and it is closely related to species that occur on beans and some other garden crops. It is a minute greenish insect so nearly the color of the leaves on which it rests that it easily escapes observation until the withering of the leaves indicates its presence.

The injuries of this pest were first called to my attention in the latter part of June by Mr. Kegley, of Ames, who had a small patch of early potatoes badly injured by them, but a few days later they were also found plentiful in the college garden causing serious wilting of some of the early varieties and more or less plentiful over several acres of potato crop. At this time June 28th to July 6th, 7th and 11th, they were in both larval and adult stages and it would seem that there had been an egg deposition on the potatoes soon after they were up, and that the adults of early July were the first maturing from this brood of eggs. The injury threatened to be so serious that we took immediate measures to treat the entire patch and with so much of success that it seems desirable to record the method. A spraying outfit was arranged with a horizontal bar to the rear of wagon and four nozzles fitted to cover thoroughly four rows of vines, the spray being directed forward and a little downward. Three or four feet in front of these nozzles and suspended from the rear of the wagon was a narrow board, long enough to brush the tops of the four rows to be covered by the spray. The effect of this was to not only brush the tops of the vines and cause the hoppers to fly into the mist, but also to expose the larvae adhering to the stems and the underside of the leaves so that many of these were wet. Others of the adults were wet by alighting on wet leaves after the spray had passed, and the larvae by moving on to moist places or by brushing of wet leaves. Kerocene emulsion of the usual proportions was used.

While it was evident and indeed expected that many of the insects would escape, a large per cent. were killed by the
first application, and a second application, a few days later so depleted their numbers that no further attention seemed necessary. The fact that, where not already damaged the vines treated made a vigorous growth and produced a good crop is evidence of the benefit secured. It is worthy of mention also that the potato flea beetles which were abundant on the vines at the time were also notably decreased in number by the treatment. The gardener, Mr. W. H. Cameron, who made the applications was so well satisfied with the results of this treatment that he feels sure, the pest can be checked at will, if taken in time. No second brood has appeared on these fields.

The best results were secured during the middle of the day between ten and four, when the hoppers fly readily if disturbed. The nozzle should be adjusted to throw a fine but dense mist-like spray as fully into and under the leaves as possible and the team may be driven at a fairly rapid walk. About ten acres can be treated per day.

NOTE—This species was described by LeBaron (Prairie Farmer Sept. 1853, v 13, p. 330) as *Tettigonia mali,* and later by Prof. S. A. Forbes (13th Report State Entomologist of Ill., p. 181 and 182, under the name *Empoasca albipicta* in both cases as an apple pest. Since it belongs properly to the genus *Empoasca* it should be known as *Empoasca mali,* Le Baron.

**A NEW SHEEP LOUSE.**

Hitherto we have known of only one species of louse affecting sheep, the biting louse (*Trichodectes sphaerocephalus*) but a recently discovered species occurring on the sheep on the college farm and also received from Missouri, is an interesting and important addition. A full technical description has been prepared for publication in a forthcoming report upon the Insects Affecting Domestic Animals to be issued by the U. S. Department of Agriculture, Division of Entomology.

This species is peculiar in that it confines itself to the feet and lower part of the legs which may be one reason why it has escaped notice hitherto. The eggs are deposited on the same parts so that in all stages it is easily reached by washes or may be destroyed by simply running the infested animals into a shallow tank of sheep dip or kerosene emulsion without immersing them and wetting the wool. I have proposed for it the name of Sheep Foot Louse, (*Hacmatopinus pedalis.*)