

MICHIGAN AGRICULTURAL COLLEGE

EXTENSION DIVISION

R. J. BALDWIN, *Director*

EAST LANSING

Printed and distributed in furtherance of the purposes of the co-operative agricultural extension work provided for in the Act of Congress, May 8, 1914.
Michigan Agricultural College and U. S. Department of Agriculture co-operating.

BULLETIN No. 16

EXTENSION SERIES

JULY, 1918

THE JOINT-WORM IN MICHIGAN.



Fig. 1.—Wheat joint-worm, much enlarged.
(After Maraltt, Farmers' Bulletin 132, Bureau of Ent. U. S. Dept. of Agr.)

Early in the present season it was discovered that the joint-worm, *Isosoma tritici*, was present in large numbers in Michigan wheat. Later developments show that another species, *Isosoma vaginicola*, more destructive than the common wheat joint-worm, is also present in restricted areas. The work of the joint-worm is almost universally confused, by the grower, with that of the Hessian fly. Both the joint-worm and Hessian fly cause wheat to lodge or go down, although in the case of the joint-worm a much smaller percentage of infested straws lodge than in the case of the "fly". The insect works primarily in wheat, although it is found also in rye, barley, and some grasses, the damage to wheat being anywhere from less than one per cent up to almost total infestation. The damage to rye is usually merely nominal except that sometimes volunteer rye may suffer quite severely. The damage done by the common wheat joint-worm is usually limited to the lodging of part of the plants and to shriveling of the wheat berry itself. The grain that is lodged is of course, lost to the reaper and the berries fail to fill properly, that is, they do not plump up well. Fortunately, outbreaks of joint-worm in the past have come to Michigan only at long intervals, periods of from ten to twenty years usually elapsing between serious invasions. In the meantime it is held in check by its own set of parasites which normally

keep the pest within due bounds. It is only when the parasites, for some reason or other, become thinned out that the pest is able to multiply and produce a destructive outbreak, and to judge by past experiences and former outbreaks, we may confidently expect the parasites to gain control of the situation in the course of a season or two, after which we shall probably forget what the joint-worm looks like until at some time, which we hope will be far in the future.

The work of the common joint-worm manifests itself in the straw, short sections of which become thickened and woody in texture, enclosing in the wall small cavities, each of which is inhabited by a tiny grub. The woody sections are very brittle and easily break out at thrashing time, where they appear as pegs from one-half inch to two inches long, coming out with the grain and being separated from the wheat by the sieves. Many of these sections do not break out but remain in the straw. Most of the grubs, however, in the pegs and in the straw are killed by the violent blows of the concaves in the separator, so that comparatively few grubs winter over in the straw itself or in the pieces broken out.

The eggs of the creature are laid in the straw itself just after the plants begin to lengthen out in the spring. The eggs are deposited in holes pierced in the

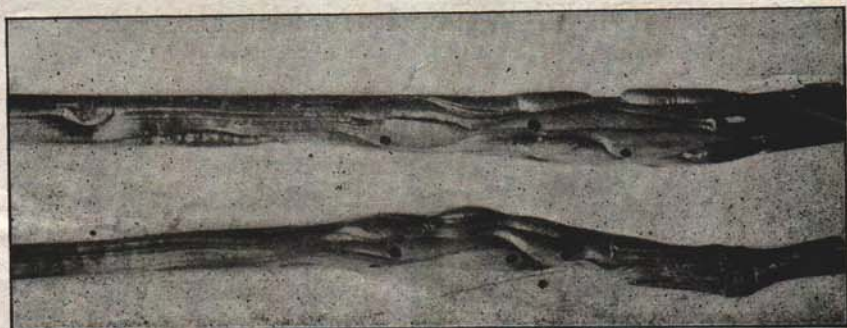


Fig. 2.—Swellings made by common joint-worms (*Isosoma tritici*) in straw, enlarged.

straw itself, by the ovipositor of a wasp-like little insect which is shiny black and considerably smaller than a mosquito. The grubs which hatch out from these eggs cause the wall of the straw to become thickened and distorted. They interfere with the proper passage of sap up the straw to the head which is forming above. This results in poor nutrition and the forming wheat grains in the heads never become quite as large as they otherwise would. There is only one generation each year and the insects live over in the unplowed stubble. In the following spring the grubs in this stubble change to little wasp-like insects resembling the ones that originally laid the eggs in the straw and fly away in search of the new crop of wheat which is just beginning to nicely lengthen out. They will fly to some distance in this search, at least half a mile and perhaps farther. The custom of using wheat for clover seeding makes us hesitate to plow under the stubble which would otherwise dispose of the adults. The greatest danger comes from putting new fields of wheat near old unplowed stubble when the stubble is known to be badly infested with these joint-worms.

Besides the common joint-worm just mentioned there is another one far less common in Michigan, and which is at present restricted to a few localities. In this species the leaf sheath becomes involved in the swelling and the diseased sections have a wrinkled, gnarled and knotty appearance. Plants attacked by

this rarer species of joint-worm often fail to fill out at all. The heads sometimes fail to come out and when they do they usually contain nothing of any value.

In order to gain an idea of the condition of affairs in the state as a whole, a survey has been conducted by Miss Eugenia McDaniel, a member of this department, aided by Mr. Don B. Whelan also of this department, and Mr. A. C. Con-



Fig. 3.—Work of the less common but more destructive joint-worm (*I. vaginicola*).

ger, assistant professor in the department of zoology, the various county agents and members of the Michigan Crop Improvement Association. As a result of this survey we are led to believe that there is a belt of well established work which starts in Van Buren and Allegan counties and which extends straight across the state through Barry, Eaton and Ingham to Livingston county. With these counties are included parts of Ionia, Clinton and Shiawassee counties, notably their southern halves. Jackson and Washtenaw counties also have suffered quite severely. This area of oval form, extending east and west across

the state has evidently been the center of infestation, although all parts of the state, apparently wherever wheat is grown in the lower peninsula, show more or less of the work to be present.

The rarer and more serious species, *I. vaginicola*, is present only very sparingly, except that there is an invaded belt included in Livingston, Oakland and Macomb counties and also one in Saginaw county.

When the presence of joint-worm in our state first became apparent the situation appeared as alarming in the light of our pressing need for wheat, but since investigation has progressed to this point we are becoming greatly reassured, because from the immense number of samples sent in from all over the state we have been able to rear clouds of parasites. These parasites are small wasp-like creatures that lay their eggs in the larvae of the joint-worms, resulting in the destruction of the pests. We know that ordinarily the parasites hold the pests in nearly complete subjection, and the presence of the parasites at this time shows that their work is progressing and that the invasion of the pest is likely to be soon a thing of the past.

RECOMMENDATIONS.

The principal source of infestation is the unplowed stubble which is left unplowed because of the seeding of clover. It is desirable to put new wheat as far away from such stubble as may be. When the infestation of the common *I. tritici* involves more than half the wheat plants, it may be well to substitute Rosen rye on that particular farm. A smaller percentage of plants infested by the more serious form, *I. vaginicola* would seem to warrant the substitution. This advice applies merely to the coming fall sowing.

It has been found that a raking of the stubble late in the fall with a side delivery rake will make it possible to collect and burn a large proportion of the infested stubble. If the catch of clover happens to be poor it is, of course, advisable to plow the stubble early in the fall and thus to do away with the danger of infestation in that particular field. In no case should one sow wheat after wheat this year.

The Hessian fly, fortunately, is not plentiful except locally, but it is with us and liable to make itself felt if given a chance. We are, therefore, recommending that in the lower third of the lower peninsula the date of sowing be from the 10th to the 25th of September and that the time be gradually extended as we proceed north so as to include from the 1st to the 15th in the northern part. Where the Hessian fly is known to be present it will be safer to sow near the later dates.

The Farm Crops Department concurs with us in these recommendations.

R. H. Pettit, Professor of Entomology.