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## THE HESSIAN FLY IN ILLINOIS, 1910

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The wheat crop of Illinois has this year been injured by the Hessian fly to a total amount of several millions of dollars—over \$600,000 for one county, according to the conservative estimates of those in best position to know. The wide-spread appearance of this insect brought it into many districts where it was virtually unknown to those whose crops it was destroying. There is some probability of a larger infestation than usual by the fly in Illinois next year, and it is hence particularly important that all wheat growers should be fully informed as to the most approved methods of preventing its injuries to wheat. These methods are as follows.

### PREVENTION OF INJURIES

1. If volunteer wheat appears on the farm, plow it up and cover it well, rolling if necessary, when it is three or four inches high, and avoid disturbing this buried wheat for a fortnight thereafter.
2. Burn chaff, screenings, and other waste left from threshing wheat grown in fields infested this year.
3. Choose for wheat, wherever possible, ground not in that crop last year.
4. Put the soil in the best possible condition for a thrifty growth of the wheat plant, fertilizing as may be necessary.
5. Select for sowing varieties of wheat with a hard straw, and especially those which will stool or tiller freely from the root.
6. Sow as late as, in the general judgment of the region, is safe in view of the possibility of winter-killing. The dates for an average year may be approximately as follows: northern Illinois, September 20; central Illinois, September 30; southern Illinois, October 10.

7. Burn the stubble of fields which have been infested by the fly, mowing it first, if necessary; or plow the stubble under in summer as soon after harvest as practicable.

#### STAGES AND LIFE HISTORY

The reasons for these practices are drawn from the habits and the life history of the fly, of which the following is a brief general account. The insect passes thru four stages in its development: the egg, the maggot or larva, the flaxseed or pupa, and the winged or adult stage. The egg is laid on the blade of the young wheat. It is about a fiftieth of an inch in length, and just thick enough to lie in one of the grooves on the upper surface of the wheat leaf. The maggot hatching from this egg in about four days, makes its way downward behind the sheath of the leaf, and remains there sucking the sap from the young stem. It is white, smooth, soft, nearly motionless, without legs or head, and about an eighth of an inch long when full grown. It has so much the appearance of an insect's egg that it is often erroneously called the "egg" of the fly. Remaining motionless behind the leaf sheath, it finally turns dark brown, and its outer covering becomes hard and brittle, in which condition the insect is called the "flaxseed." Within their brown shells the maggots gradually change to pupae, and then to winged flies, which come out of this flaxseed as male and female, ready to pair and to deposit the eggs.

The winged insect—the fly proper—is about a tenth of an inch long, and closely resembles a very small mosquito in size, color, structure, and general appearance. Like the mosquito it has a pair of delicate wings and a sufficient power of flight to carry its very light body to considerable distances, especially before a smart breeze. This winged fly lives at most but a few days, and in this time the female deposits all her eggs, singly or in short rows, on the upper surface of the leaves of the wheat. There are several generations of the fly in a year, the number varying according to the weather of the season. There are never less than two generations in our latitude, one in fall and the other in spring, and there may be as many as four, in which case two of them appear in fall and two in spring. Whatever the number of generations in the year, all pass the winter in the flaxseed stage in the young wheat, and they pass the summer also in the flaxseed stage in the stubble of infested fields, or, to a small extent, in the stacked straw of the grain. From this stage the winged flies emerge in late summer and in fall, the earliest to appear often laying their eggs in volunteer wheat, and those which appear later, on the young wheat of the regular crop.

## NATURE OF INJURIES TO WHEAT

The injuries done to the wheat by the fly in fall and in spring are alike in character, but of somewhat different effect. The young stalk from which the fly maggots are sucking the sap in fall is likely to be killed by them at once, but in spite of this injury, the plant may react by tillering, or sending up new shoots from the root. The earliest of the maggots of the spring generation of the fly work down to the base of the young stalk, where, if they do not kill it, they so weaken it that it is likely to fall or "crinkle" as it becomes top-heavy with the formation of the head. In this case the kernels do not fill, and the head is blasted. The second spring generation, on the other hand, lives mostly in the young shoots starting from the root, and injures the crop only in so far as it prevents these youngest offshoots of the stool from maturing.

## EXPLANATION OF PREVENTIVE MEASURES

With the foregoing facts in mind, the reader may readily see the reasons for the preventive measures above advised. If the volunteer wheat becomes infested rather early, it may produce a fall generation of winged flies which appear at a time to lay their eggs on the late-sown wheat. It is for this reason especially that it is important that volunteer wheat should be destroyed shortly after the earliest flies have stocked it with their eggs, and before the maggots hatching from them have had time to get their growth.

A small percentage of the late-formed flaxseeds are placed so high on the wheat stem that they are carried away in the cut grain at harvest time, and appear in the screenings from the thresher. For this reason wheat growing near a straw stack is especially liable to become infested. These flaxseeds can, of course, be disposed of by anything which will destroy the screenings and chaff.

The winged fly is a delicate and short-lived insect, and the female lays her eggs, as a rule, on the first wheat plants she finds. Wheat sown on infested stubble is thus particularly likely to be stocked with the eggs in fall. If, on the other hand, the fly must go far away in search of plants on which to deposit her eggs, she is exposed to destruction by storms, or she may fail to find young wheat, and may perish without successfully disposing of her eggs.

A vigorous wheat plant is much better able to react against an attack by the fly, especially by stooling freely or throwing out an abundance of new shoots from the root. Whatever tends, consequently, to give vigor to the plant reduces proportionally the percentage of loss.

Injury by the spring generation being largely due to the weakening of the straw and the falling of the plant in consequence, those varieties of wheat with a strong stiff stem are least likely to be affected in this way, and least likely to be injured in their yield.

Late sowing is a standard and most useful practice, dependent upon the fact that, if correctly timed, the flies of the main fall generation will all have laid their eggs and perished before the late-sown wheat appears. Late-sown wheat is, however, liable to infestation the following spring by means of flies emerging from early-sown fields in the neighborhood. It is consequently important that communities should act together in this matter, agreeing as nearly as possible upon a common date for sowing their wheat. Late-sown wheat may even be infested in fall by flies bred in early volunteer wheat,—a fact which makes it the duty of every farmer to see that no volunteer wheat is permitted to grow on his farm.

Burning the stubble of infested fields or plowing it under in summer, if universally practiced, would effectually destroy all the Hessian flies in the country except those remaining about straw stacks. Unfortunately, however, this method is impracticable where grass or clover has been sown on wheat.

#### PROBABILITIES FOR NEXT YEAR

The number of the Hessian fly is governed, generally speaking, by the weather of the year or that of the year preceding, and by the abundance of its parasites by which the maggots may have been infested. The weather of the present summer has been rather favorable to the development of the fly, and the probabilities of general injury to wheat next year are largely dependent on the extent to which the present generation of the fly has been parasitized. The amount of such parasitism might have been easily ascertained this summer, but an exhaustion of office funds available for field work made this impossible. Under these conditions I can only say that so heavy an injury as we have this year experienced is very unlikely to occur next year. The wheat farmer should, however, take account of the fact that there is a serious danger from chinch-bug injury thruout a large part of the state next spring, and that the wheat crop will be the first to feel the effects. From the entomologist's standpoint, consequently, a conservative policy with regard to the sowing of wheat is to be advised for next year.