

HOW TO FIGHT THE HESSIAN FLY

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 F ALL the insect pests of wheat the Hessian fly is most destructive. It was first introduced into this country in straw brought from Europe by the Hessian soldiers in Revolutionary days.

It is widely distributed and does more or less injury locally every year. Like most of our destructive pests, however, it appears as a general scourge more or less periodically following a series of favorable years. One or more dry summers followed by mild winters usually brings on Hessian fly troubles. The dry weather keeps the pest in the resting condition in the stubble and also prevents the plowing under of stubble and then with the early fall rains wheat is sown early and the flies appear and lay their eggs on the young wheat. These are the ideal conditions for an outbreak of the fly.

The injury to wheat is due to the work of the maggot or larval stage of the fly. The small, dark, winged, mosquito-like fly does not attack the wheat.

The maggot rasps on the tender plant with a pair of sharp fangs, causing a flow of sap which it drinks. The young wheat, when attacked in the fall, stops growing and turns yellow. Usually this first appears where the ground is poorest, but if the infestation is bad it will finally show up over the whole field. If the weather is favorable tillers are usually produced and the crop is not completely destroyed, unless the infestations be very severe.

In the spring the wheat may start off strong and thrifty, but as soon as the rains cease and the spring brood of maggots begins to feed, the wheat stops growing and turns yellow. When the pest is not too abundant the wheat may head out and produce a partial crop, though the heads do not fill properly and the grain is light. The lodging or falling of wheat begins about the time of heading and continues until it is ripe. In case of severe infestations no heads form at all.

Develops Like Other Flies.

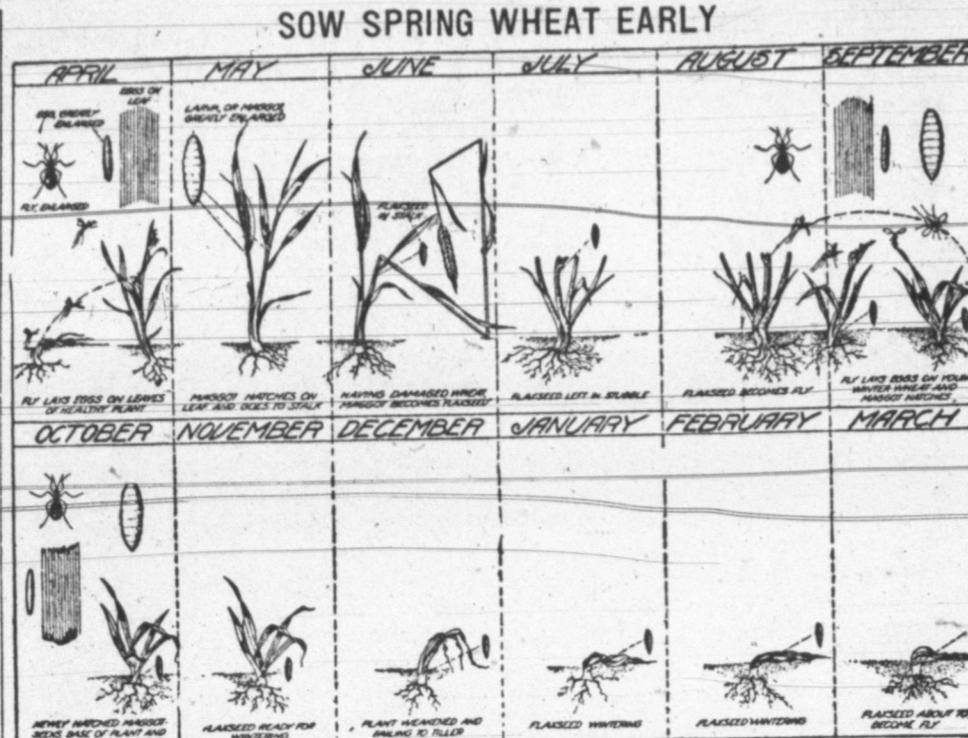
The development of the Hessian fly is similar to that of other flies. The adult winged fly lays eggs on the wheat leaves. These hatch into very small, whitish maggots which feed on the sap of the plant. When nearly full fed the maggot may appear green due to the green sap it contains. When full fed the maggot turns brown and takes on the shape of a flaxseed. The maggots in the flaxseed stage are often packed together in groups of from six to thirty in the base of a wheat plant. Within this brown case the small maggot changes to the resting or pupal stage and later the fly emerges.

In Kansas and other states of about the same latitude, there is normally one fall brood, one full spring brood and a later partial spring brood of flies. From the last of August to the middle of October the small black mosquito-like flies continue to emerge and lay eggs on the leaves of wheat. Each fly lives but a few days. The females lay an average of 100 eggs. When the eggs hatch the small maggots pass down between the leaf and the small stalk to feed on the stalk. By the time cold weather comes, the maggots are full fed and change to the brown flaxseed stage. In this form they spend the winter below ground in the crown of the wheat plant. About the middle of April they hatch and the first brood of Hessian flies appears. These flies lay eggs which hatch during May, producing the spring brood of maggots. In case of a warm, damp spring these may mature and produce a second brood of flies which pass the summer in the wheat stubble in the flaxseed stage. It is the brood which is mainly responsible for the destructive fall swarms of flies.

While this is the normal cycle, some years additional secondary broods may appear and during a dry spring the secondary spring brood may not appear at all. Cool, dry weather always retards the development of the fly while warm, damp weather hastens it. If there is an excess of moisture during the summer the flies may come from the flaxseed stages in the stubble and deposit eggs on volunteer wheat producing a secondary summer brood. In the same way a small secondary fall brood may appear during November in case of excessive rainfall though such cases are rare. Late sown wheat is seldom attacked except by the spring brood which migrates in from infested fields.

The Hessian fly is most effectively controlled by proper methods of farm practice. The destruction of all infested stubble very early and the sowing of wheat late enough in the fall

This destructive wheat pest can be controlled only by careful farming methods, and farmers of the whole community must work together in order to protect their grain crops.



This chart shows the part played by the stubble and the young plants of the next crop, as also by volunteer wheat, in passing the Hessian fly from crop to crop.

The attack against the fly in winter wheat, therefore, must be made in the summer and fall by burning and plowing under the stubble and in delaying seeding until after the egg-laying period of the fly, as shown on the map above. Mere diskings of stubble is not sufficient. It must be burned or plowed under deeply. Where the plants in infested fields are mostly dead, there is no need of waiting—the fields should be plowed under in early spring, the soil thoroughly rolled, and planted to a crop other than wheat or barley. The only hope of the wheat grower lies in prevention, as once the growing crop is infested nothing can be done to lessen the damage.

In the case of spring wheat, sowing should be done as early as conditions permit so that the plants may get a good growth and be in better condition to withstand the spring crop of maggots. Where spring wheat is ruined by the fly it should be destroyed by harrowing, diskings or pasturing.

Where rotations are possible they furnish the best method of starving the fly on an infested field. Wheat following infested wheat may keep the fly alive where other crops give the fly no chance to winter. Barley and rye also support the fly, and should not be used in such rotations.

to escape the fall brood of flies are the most practical methods known for controlling this pest.

Since the pest is found in the wheat stubble during the summer in the resting flaxseed stage it can be completely destroyed if all infested stubble be destroyed. Plowing under stubble early in July where it is not too dry, is the most logical and economical method of placing the stubble where the pest will be destroyed. Some farmers disk thoroughly and then in a week or two plow the stubble under. In case the pest is located in the stubble above ground, burning off stubble will destroy it though the stubble is also lost. The flaxseed stages are often located so low in the stubble that burning them may not destroy all of them. By all means get rid of all stubble in the infested regions before August. Co-operation is necessary. One infested stubble field will furnish flies for a whole community. Farmers must work together in order to fully destroy the pest. After the stubble has been plowed under, work the ground so as to pack it, and keep down all volunteer wheat.

Sow Wheat Very Late.

The second effective remedy for the fly is to sow wheat as late in the fall as possible so as to escape the heavy swarm of flies. If wheat is not yet up when the flies come they die without a place to lay their eggs and the crop escapes injury. It is folly to suppose that wheat sown after the swarm has come and gone, will be as badly infested as early sown wheat. As an example, in a normal fall the flies have largely come and gone in north Missouri by October 1, in central Missouri by October 7 and in south Missouri by October 15 and wheat sown after these dates is seldom attacked by the fly in the fall. Late sown wheat may suffer severe injury in the spring if the spring brood of flies migrates to it from neighboring fields which were sown sufficiently early in the fall to be attacked by the fall brood of flies. It shows poor judgment to sow wheat in August or September for pasture, in a region where the fly is abundant.

Look out for trouble in the crop of wheat following a year in which the Hessian fly has been destructive. Avoid this by thoroughly destroying the infested stubble and by sowing late enough in October to escape the fall swarm of flies. If these precautions are taken by all farmers there is no need of completely abandoning the growing of wheat in any community for a few years.

Life History.—The adult flies of the fall brood appear in the fields early in September, and the females scatter about to lay their eggs on the young wheat plants as soon as they are large enough. These eggs are laid in regular rows of one to a dozen along the veins on the upper side of the wheat blades. The individual egg is very

small, about one-fiftieth of an inch long, of a glossy reddish color. About three to five days these eggs hatch into small reddish larvae scarcely larger than the egg from which they hatched, and these larvae migrate down the blade between the leaf-sheath and the stem until they reach a point near the root. Here they stop to absorb the plant juices, and cause a gall-like enlargement or swelling at the point of attack. They grow rapidly, and three weeks later are thick, whitish maggots about one eighth of an inch long.

Become Lively in April.

Once fully grown the larvae contract, leaving their outer skins to form hard, dark brown shells, commonly known as flaxseeds or puparia, and remain in this condition and situation through the winter. Inside these flaxseeds the white larvae may be found until spring when they change to the pupa stage. Early in April the pupae push off the end of the flaxseeds and then force their way out from under the enveloping leaf-sheath. Having found a way out of the plant the thin pupal skin splits and the adult fly escapes. Eggs are laid back on the wheat during April and early May and the same development is gone through as in the fall, except that the migrating larvae locate in the first or second joints above the roots. They become full grown and enter the flaxseed stage before harvest, remaining in the stubble through the summer if it is normally dry, to give forth the adult flies of the fall brood in September; but if the summer is rainy many will come forth soon after harvest and go through an additional summer brood on the volunteer wheat.

The injury by the Hessian fly is done during the fall and spring by the growing larvae of the two broods. In the fall the first effect of attack is to cause the wheat to become abnormally dark green and to tiller freely, later turning yellowish and brownish and finally killing the affected blades. The field then appears dead in spots, or sometimes over the whole field. Badly attacked plants may later recover if there is plenty of moisture. In the spring the presence of the larvae in the lower joints interferes with the sap flow and weakens the straw, so that the heads fail to fill and toward harvest the straw is apt to crinkle or break at the point of attack so that the grain becomes badly lodged and often not worth harvesting. Only wheat, rye and barley among our cultivated grains are attacked by the Hessian fly.

Rotation of crops is a practicable Hessian fly control measure, for not only does the bringing in of corn, oats, alfalfa, or clover tend to starve out the pest, but if the wheat field is changed the fall brood of flies must migrate to more or less distant fields to find wheat and this results in a large mortality among them.

CONDENSATIONS

The United States yearly produces \$200,000,000 worth of buttons.

The Chinese government is about to open its first aviation school.

Pasteboard boxes with sanitary insect-proof openings have been invented for containing sugar and other food in similar form.

F. C. Cutler, a poultry dealer in Townsend, Vt., is said to have a pullet that was hatched April 1 and laid its first egg August 14.

Sudan grass yields from one to eight tons of cured hay to an acre.

Every young man in Cedarville, Wis., a small settlement in Marinette county, is a member of a newly organized anti-tobacco club.

A new seashore amusement device, an inventor has patented a roller coaster supported by floats that is driven over water by screw propellers.

Two Illinois inventors have patented a bracket with which it is possible to hang both shades and curtains at windows without using pins or screws.

A woman is the patentee of a telephone in which the transmitter and receiver are combined in one instrument and inclosed in a hood for privacy.

A water tank and tower in Texas town, built entirely of re-enforced concrete, has withstood gales that have wrecked dwellings in its vicinity.

The resignation of Rev. Dr. C. C. Smith, pastor of the Baptist church at Roodhouse, Ill., left the town with a population of 2,000, without a resident pastor.

CLOTHES NEVER MORE GORGEOUS

Good Reason Why Season Will Go Down Into History as Age of Gold.

EXPENSE GIVEN NO THOUGHT

Gowns Designed for American Women Command Prices Which a Few Years Ago Would Have Been Considered Fabulous—Brief Descriptions.

New York.—It is not an exaggeration to say that clothes are made of bullion. That is why this season will go down into history as the age of gold.

Possibly, when the de' Medicis reigned in Italy, and when the most gorgeous trousseau in the world was prepared for the young Catherine, Princess of Florence, who was to marry French king, the son of Francois Premier, there might have been such gowns included as France offers America today.

The only single item of expense that the dressmakers forgot to place on the gowns of today was precious jewels. There is a feeling on the part of many women who pay for these new clothes, that there must be a diamond hidden somewhere in the folds.

Everything that could be devised to create expense was thought of and used. Every animal in the land gave up its hide; every glittering stone that could be produced from crystals, natural and artificial, was gathered together and facetted by skilled workmen and raised 40 per cent of their original price. All the bullion in the land that was not real gold was spun into threads miles and miles long and laid in great heaps at the sides of needleworkers, who were paid their own price for the workmanship that has not been equaled since the sixteenth century.

Stained glass windows, historic altar clothes and jeweled robes placed about the madonnas in gothic churches, gave up their designs, in order that the American woman's gown might be more sumptuous in appearance.

Where ordinary furs could not be used, expensive processes were invented to shave these hairs into a resemblance of the peltry of precious animals, and the cost was added to the gown's price.

Sprinkled With Semi-Precious Gems.

The designers of clothes looked to the jewelers to help them get quantities of brilliant quartz, artificially colored onyx and peculiarly cut bits of glass that could be sprinkled over the surface of tulle, satin and net.

A fine, new thread of gold was spun which would hold these semi-precious gems in place. This was made of bullion threads in three colors—red, blue and Roman gold—which were skillfully wound together into tiny ropes that would loop themselves into masses of color on a brilliant surface.

Peculiar crystals were found by the men who know mineralogy, that could be cut to exactly resemble the great



A conspicuous frock brought to America, of bright green taffeta, with a bodice of jewels.

Jewels of the fifteenth century, the sapphires and emeralds that hung over cloth-of-gold gowns and were imbedded in the stomachers of Elizabeth, Catherine de Medicis and Mary, Queen of Scots.

The old method of using flat gold threads was brought back into the process of gown-building. Its old name Lame was kept. The name was taken from the method by which this gold thread was pounded and beaten until it became a supple blade of grass and could be run in and out of the net in any design attempted.

Marvelous Needlework.

Needleworkers were called up from the furthest recesses of French art work, and Belgian refugees who had crowded the institutions of Paris were given work to do in which they were skilled and superior.

Whole surfaces of gowns were so closely embroidered with bullion threads that they resembled a fifteenth-century coat of mail. When the French designers began to fashion all these magnificent materials into gowns for American women, they painted the lily and gilded refined gold; in other words, they heaped precious peltry on some precious gems, held them together with bullion, worked rare lace into the spaces and provided a foundation of metal

tissue that was revived from the twelfth century.

The High Price of Dressing.

And now do you see why this period will go down into history as the Age of Gold? Everything will glitter that women will wear this winter, and it will be gold, silver, steel, crystals and gorgeous fabrics. It is not possible, however, to buy such clothes at the usual price. Paris did not intend this to be done, and yet, to do her full justice, she does not believe that out of the glory of her clothes she will receive more profit, if as much, than she has received in recent years.

Why? Because all work, fabrics and dyeing have become expensive, beyond counting in Paris. The cost of satin went up to \$10 a yard, brocade

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