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ec1521 Revised 1945 The Hessian Fly and its Control

O. S. Bare

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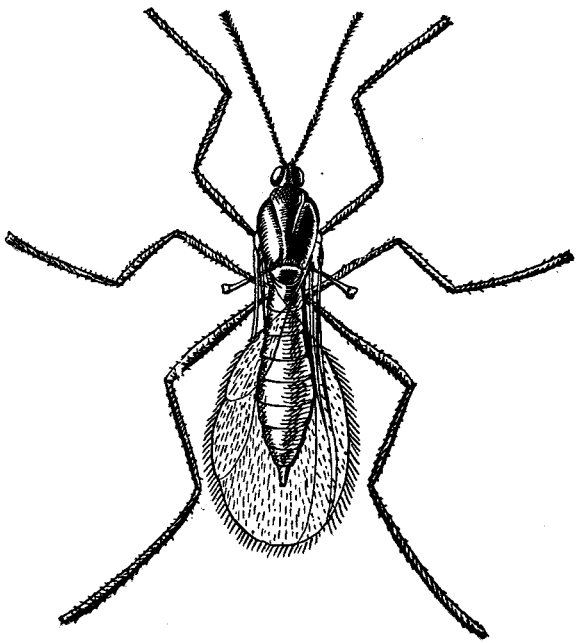

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The Hessian Fly and Its Control[1]

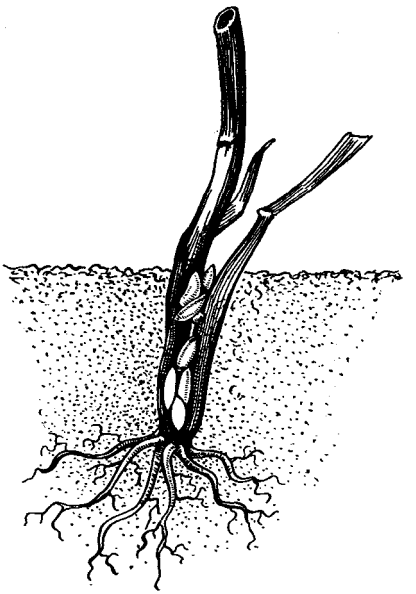
O. S. BARE AND MARTIN H. MUMA [2]

SERIOUS infestations of the Hessian fly occur frequently in the southeastern quarter of Nebraska. In this area it probably causes more loss to the wheat crop than any other insect. The damage suffered is two-fold; young plants are affected in the late fall and early winter; and further loss occurs just before harvest in the late spring and early summer.

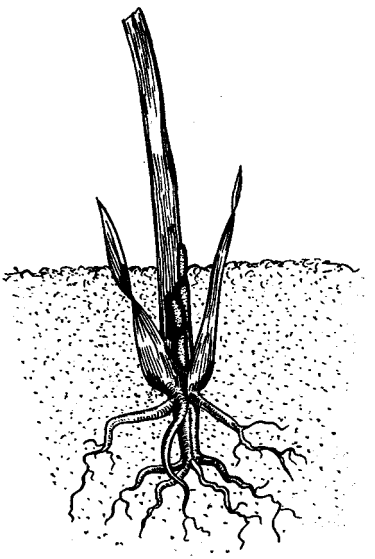
The Hessian fly has been known in this state for many years, but scores of requests for information about it continue to be received each year. Several of the questions most frequently asked are answered on the following pages.

What does the fly look like?

The adult Hessian fly greatly resembles an undersized mosquito. (see front cover.) The abdomen walls of both male and female are more or less transparent. In the case of the female fly, however, during the period when her abdomen is distended with orange-red eggs, the walls appear to be red.



Hessian fly maggots at base of wheat plant



Hessian fly "flax-seeds" on wheat.

[1] *Phytophaga destroctor* (Say).

[2] Extension Entomologists.

Where and when does the fly lay its eggs?

The Hessian fly lays its eggs on the leaves of young wheat plants, selecting the younger and more tender leaves. Egg-laying begins very soon after the adult fly emerges. Since the adult lives only a few days, its egg-laying period is short. The orange-red eggs are laid in rows along the veins on the upper surface of the leaf. They are long and slender in form, and although very small can be seen with the naked eye.

How soon do the eggs hatch and where do the maggots go?

Under favorable conditions the eggs hatch in a few days. The young maggots are red, but soon change to a white or cream. They work their way down along the leaf veins and lodge behind the leaf sheath at the base of the plant. Here they feed on the plant juices. Often many maggots may be found behind the leaf sheaths at the base of a single plant.

Badly infested plants become dwarfed. The main stem is likely to die, and the plant sends out tillers to replace it. Some of these tillers may also be killed. The leaves of an infested plant are short, straight and thick, and unusually dark green in color. Later in the fall many of the plants turn to a yellowish or brown hue, and the field presents a spotted appearance. Some plants may die before winter begins; those that are weakened but still live are very subject to winter-killing.

What is meant by the "flaxseed" stage?

This is the stage the fly passes through after the maggot completes its growth. The maggot shrinks away from its outer coat or skin, which hardens and turns brown. It much resembles a flaxseed, from which its name is derived. The "flaxseeds" are found behind the old leaf sheaths around the bases of the plants and also back of the leaf sheaths just above the joints.

How many main broods or generations has the Hessian fly?

It has two main generations: one in the fall, and one in the spring.

When does the fall generation of Hessian flies appear?

Under Nebraska conditions, emergence of the fall generation of flies usually begins late in August, and continues throughout most or all of September. Time and rate of emergence depend on the amount of moisture present, and on temperatures. Plenty of moisture and normal temperatures cause an early and rapid emergence, whereas dry weather, and abnormal temperatures delay it.

Is there ever a second fall brood?

Yes, but not normally. In the fall of 1940 there was a very heavy second brood which caused serious damage. Rains early in August brought out the flies of the main brood two weeks earlier than

usual. The rains also caused a heavy growth of early volunteer wheat at the right time to furnish a place for flies to lay eggs. Unfortunately, many farmers neglected to destroy the volunteer wheat, and because of the long warm fall, the second brood matured in it, and flies emerged and spread to all wheat regardless of the time it had been sown. As flies prefer to lay their eggs on very young wheat, the fields that had been sown on or near the fly-safe date were as heavily infested by this second brood as some of the early seedings. The trouble, however, lay with the early volunteer wheat and the few early plantings. If these had been eliminated before the fly safe date, there would have been little if any second brood to spread and cause damage.

Where and how does the Hessian fly pass the winter?

The fly lives through the winter in the "flaxseed" stage at the bases of young wheat plants. In mild winters a few may remain in the larval or maggot stage, but this is not usual in Nebraska. Normal winters appear to have little effect on the "flaxseed" stage in the southeastern third of the state.

When does the spring brood emerge and where do the flies lay their eggs?

The spring brood begins to emerge from the "flaxseeds" early in April, continuing throughout that month. The flies lay eggs on the plants in the fields where they emerged but also fly to other wheat fiields. Some eggs may be laid on barley. Flies travel with the winds and may go a half mile or more. Each female lays from 100 to 300 eggs. These eggs hatch in a few days and the young maggots crawl down the leaves and lodge behind the leaf sheaths at the base of the plant or just above the first joint of the stem. They feed and develop there, weakening the stem and causing the stalks to break over after the wheat has headed. Sometimes plants in a heavily infested field may be broken over so badly that few of the heads can be caught by a binder. Many of the heads do not "fill," and kernels are lacking or badly shrunken. This brood matures late in May or early in June.

Do we ever have a second spring brood?

Yes. A second spring brood may appear, but under Nebraska conditions is seldom heavy enough to cause much damage. The eggs of this brood are laid on the upper leaves, and the maggots lodge behind the leaf sheath at the upper joint of the stem. These cause the heads to fill poorly and may cause some breaking over.

Where does the fly spend the summer?

The Hessian fly spends most of the summer in the "flaxseed" stage in wheat stubble, but in heavy infestations, may also be present in moderate numbers in barley stubble. An occasional "flaxseed" may be found in rye stubble, but rarely if ever in threatening numbers. Oats apparently is immune to its attack.

Does summer weather have any effect on the Hessian fly?

Yes. Extremely hot, dry weather through July and August is unfavorable for its development. In years of extreme drouth and heat, such as 1934 and 1936, so many of them perish in the "flaxseed" stage that little trouble is experienced the following year. In moist cool seasons, however, destructive populations can build up in a remarkably short time.

Can the Hessian fly be controlled effectively?

Yes. A combination of three simple control measures is so nearly 100 per cent effective that if all farmers would observe them, the Hessian fly could never build up in sufficient numbers to become a serious pest. Cooperation among all wheat farmers in the infested territory is all that would be necessary to give practically complete control and prevent any serious damage.

What are the control measures for the Hessian fly?

1. Plow infested stubble early. This buries the "flaxseeds" so that emerging Hessian fly adults cannot reach the surface. Harrowing or disking shortly after the ground is plowed makes this more effective.

2. Destroy, by disking, all volunteer wheat that comes up before the fly-safe date. This eliminates early wheat on which the emerging flies of the regular fall generation could lay eggs. If such young wheat is not available the flies die without laying eggs or lay them on plants on which the young maggots cannot develop successfully.

3. Delay seeding of wheat until the fly-safe date which is announced each year by the College of Agriculture. If no early volunteer wheat has been allowed to stand, then there is no place for emerging flies to lay their eggs, and an infestation is avoided.

What is meant by "average fly-safe date"?

Records over a long period of years show the average date for safe-seeding in any particular county. This is called the "average fly-safe date." The actual as opposed to the "average" fly-safe date in any particular year may vary as much as a week or more, either earlier or later than the "average fly-safe date," depending on moisture and temperature. Entomologists at the College of Agriculture determine the "actual" dates for the different counties and announce them by radio, through the press, and through all county agricultural agents' offices in the infested counties.

How is the fly-safe date determined?

The date is determined by daily checking on the emergence of adult flies from infested stubble, daily egg counts on young exposed wheat plants, and daily counts of adult Hessian flies caught on exposed sticky screens placed in their line of flight in infested stubble fields. Most important and dependable is the daily count showing the percentage of live "flaxseeds" still left in infested stubble.

Table Giving Average Fly-Safe Date for the More Heavily Infested Counties

County	Date	County	Date
Adams	Sept. 26 and 27*	Nemaha	Sept. 29 and 30
Burt	Sept. 24	Nuckolls	Sept. 28
Butler	Sept. 25 and 26	Otoe	Sept. 28 and 29
Cass	Sept. 27 and 28	Pawnee	Sept. 30 and Oct. 1
Clay	Sept. 26 and 27	Platte	Sept. 23 and 24
Colfax	Sept. 24 and 25	Polk	Sept. 25
Dodge	Sept. 24 and 25	Richardson	Sept. 30 and Oct. 1
Douglas	Sept. 26	Saline	Sept. 27 and 28
Fillmore	Sept. 27 and 28	Saunders	Sept. 25, 26 and 27
Gage	Sept. 29 and 30	Sarpy	Sept. 27
Hamilton	Sept. 25 and 26	Seward	Sept. 26 and 27
Jefferson	Sept. 29 and 30	Thayer	Sept. 28 and 29
Johnson	Sept. 29 and 30	Washington	Sept. 25 and 26
Lancaster	Sept. 27 and 28	Webster	Sept. 27 and 28
Merrick	Sept. 24 and 25	York	Sept. 26 and 27
Nance	Sept. 24		

* Where two or more dates are given the first applies to the northern and western parts of the county.

Distributed in furtherance of Acts of May 8 and June 30, 1914. Extension Service of the University of Nebraska College of Agriculture, the U. S. Department of Agriculture cooperating. W. H. Brokaw, Director, Lincoln, Nebraska. 8—45—20M

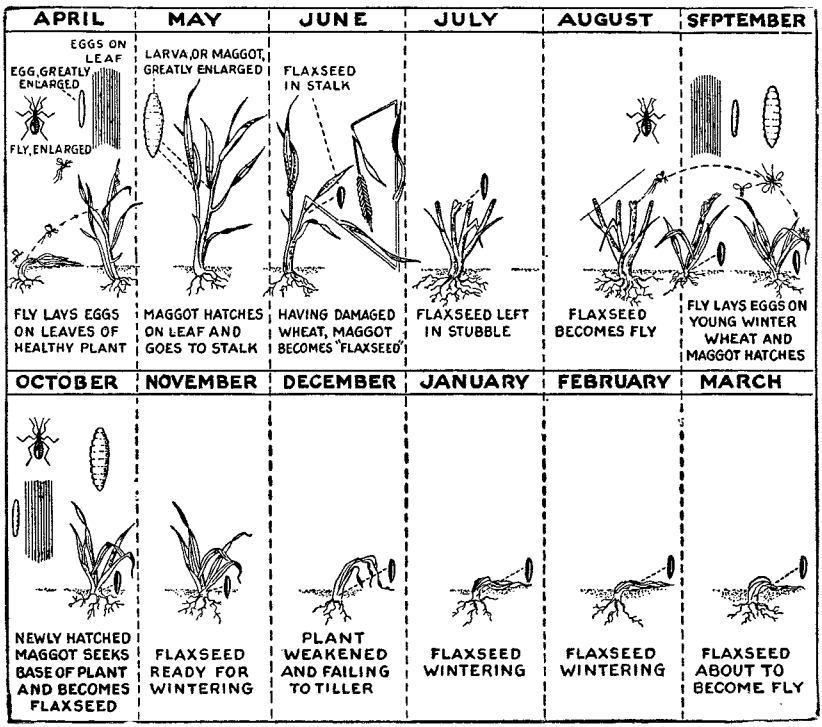


Chart showing seasonal history of the Hessian fly.