

The Hessian Fly in Oregon

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Hessian Fly In Eastern Oregon

An apparent newcomer to the list of cereal pests in eastern Oregon, the Hessian fly has been found scattered throughout Umatilla County and the lower elevations of Morrow County. Union County and the higher elevations of Morrow County are currently free of the pest. The survey locating the fly was completed August 4, 1981, funded by the Oregon Wheat League, and conducted by the authors. It was begun after Rickman reported significant infestations of Hessian fly in 1980 and 1981 on the Pendleton Experiment Station. The fly attacked spring-planted wheat and irrigated wheat fields.

Four fields of the 63 that were sampled had infestation levels expected to cause yield losses (15 percent or above). Figure 1 shows where fields were sampled and the percentage of tillers infested at each sampling site. This circular describes the nature of damage done by the fly, some of what is known about its life cycle, and currently available control practices.

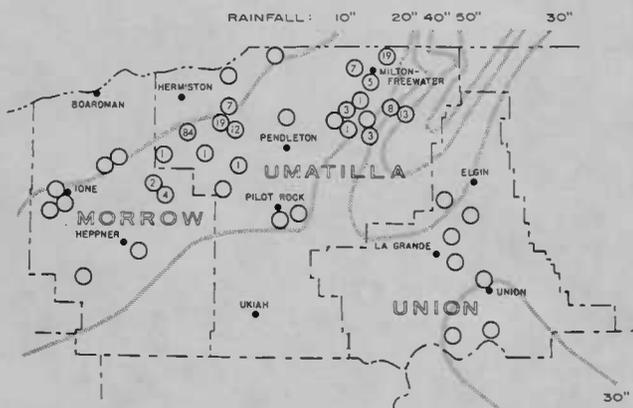


Figure 1. Hessian fly survey locations, 1981, showing percentages of infestation. Empty circles indicate no flaxseed found in 100 tillers.

Type of Injury

Wheat stems infested in the fall are stunted and usually die during the winter. See figure 2. Injured leaves turn dark bluish green, display a thickened appearance, and stand more erect than those of uninfested plants. The central growing shoot may be missing. Small white maggots about 3/16 inch can be found behind the sheaths of



Figure 2. Wheat at the left is uninfested; at the right, infested with Hessian fly.

the lower leaves of the plant, usually below the surface of the ground. Heavily infested plants may die during the winter.

Stems infested in the spring may die or break (lodge) shortly before harvest. In the early spring the appearance of injured plants is much the same as that in the fall. Later on in the spring, the maggots or "flaxseeds" (puparia) can be found beneath the leaf sheath above the surface of the ground, sometimes as high as the second or third joint. Infested stems often break as the heads mature. Grain yields can be greatly reduced. Economic loss probably occurs when from 15 to 30 percent of the tillers are infested.

Host Plants

Wheat, barley, and rye are the preferred host plants of the Hessian fly. Wheat is by far the favorite. Hessian fly does not occur in oats. Occasionally small numbers of

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maggots are found on different species of wild grasses, such as quack grass.

History

The Hessian fly occurs throughout the United States. It was first documented from Scapoose, Oregon in 1897. Common in the Willamette Valley, it is becoming more prevalent now in the Columbia Basin. The recent survey conducted by the authors indicated that 50 percent of the fields inspected in Umatilla County were infested. Although most fields in the basin had low infestations, one had 84 percent of the inspected stems infested with Hessian fly. A survey of Morrow County showed the fly to be present in the lower elevation wheat land. No fields in Union County were found to be infested in the Columbia Basin. It appears that irrigated spring-seeded cereals are most susceptible to infestation, followed by early fall seedings of winter wheat.

Life History

The Hessian fly has four stages in its life cycle: egg, larva (maggot), pupa (flaxseed), and adult (fly). See figure 3. As an adult, the insect is a small mosquitolike fly that has a very short life span, no more than 4 days (figure 4). On warm days in the egg laying season (spring and fall), flies may be seen flying about and laying eggs on wheat leaves. On cool days, or in early morning when there is a heavy dew, the flies are down among the leaves or on the ground. The females deposit eggs on the upper sides of leaves. The eggs are orange or pink when first laid.



Figure 4. Hessian fly adult (Keith Pike photo).

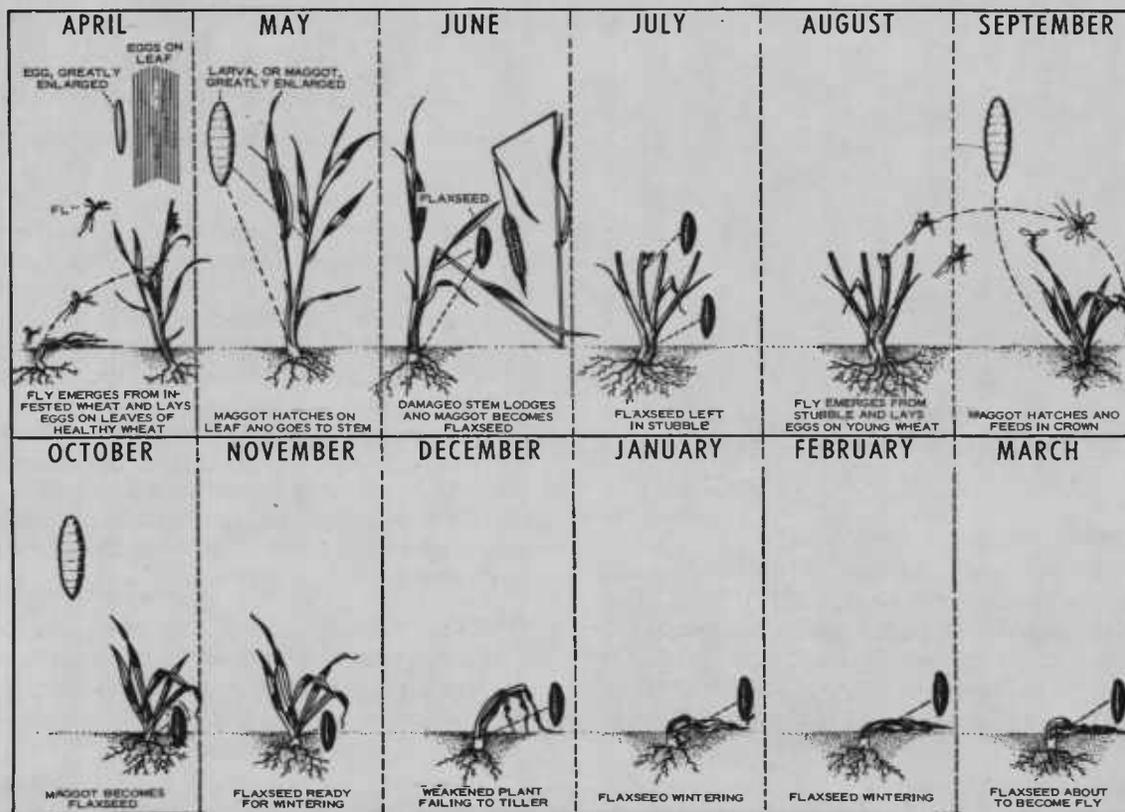


Figure 3. Seasonal development of the Hessian fly.

Young maggots hatch from the eggs in from 3 to 10 days, depending on the weather (figure 5). The maggots or larvae migrate down the leaf grooves to settle behind the leaf sheaths of young tillers, or to just above the nodes if on jointed wheat. Feeding occurs here. During feeding, the larvae turn white and take on a smooth, glistening appearance. Mature larvae show a translucent greenish stripe down the middle of the back through which the contents of the stomach may be seen.

Once full growth is attained—in 3 to 6 weeks—the larval skin hardens to form a dark brown puparium, commonly referred to as the flaxseed (figure 6). Nonfeeding larvae within the puparia remain there for various lengths of time before pupating and emerging as adult flies.

The Hessian fly usually has two to three partial generations per year, one to two in the spring and one in the late summer or early fall. Occasionally a second generation will occur in the spring. Usually the flaxseed of the spring generation spend the summer in wheat stubble to produce another emergence of flies in late summer or early fall. Fall-generation flies deposit eggs on volunteer wheat or early-sown winter wheat. Larvae from such eggs overwinter in the flaxseed stage and produce flies in the spring.

Rain in late August or September, accompanied by cooler temperatures, are key factors that prompt pupation and adult emergence in the fall. In the spring a mean temperature of 50° F. is usually required before fly

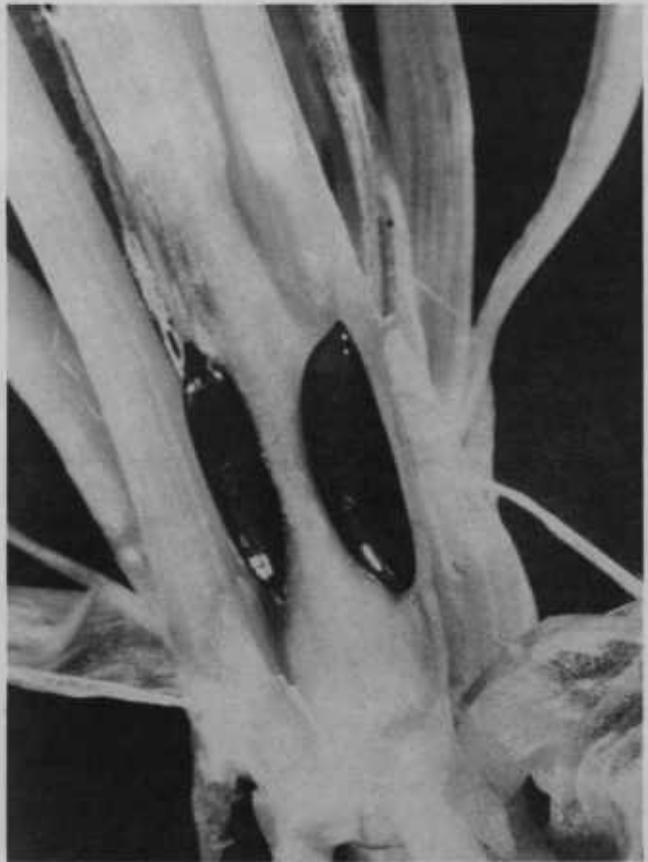


Figure 6. Puparia or "flaxseed" of the Hessian fly, at the crown of the wheat plant.

emergence begins. In most years very little emergence occurs before April. Warm weather emergence occurs before April. Warm, wet weather in early spring can lead to heavy infestation in wheat seeded in late February or March.

Weather and Farm Practices

Under natural conditions climatic factors determine the geographical distribution of the fly. In the past Hessian fly has primarily been a problem of western Oregon and western Washington—regions of high rainfall. Until recently it has not been a problem in areas where the average rainfall drops below 30 inches or the relative humidity is less than 60 percent. As the agriculture of the Columbia Basin changes, the Hessian fly will probably become more common. Practices contributing to its buildup include minimum or no-till farming, irrigation of spring wheat, postharvest irrigation of volunteer wheat for livestock feed, and irrigation of wheat in the late spring and late summer to inhibit wind erosion.

Control

Currently there is only one Hessian fly-resistant cereal variety (C. V. Waid, a durum spring wheat, developed especially for the irrigated Columbia Basin region) adapted to the Pacific Northwest. Control at this point is primarily cultural:

1. Plow wheat stubble soon after harvest to bury the flaxseed. Deep plowing prevents flies from emerging in



Figure 5. Hessian fly larvae at the crown of the wheat plant.

the fall. Wheat stubble is a primary site where the Hessian fly both overwinters and oversummers. It is most responsible for the spring populations. Plow under any volunteer wheat on which fall generation flies may deposit eggs.

2. Use fly-free planting dates. Time fall-seeded cereals so that they do not emerge until after the Hessian fly flight period has ceased. Generally, wheat sown after the second week in October will avoid Hessian fly damage.

3. Fall-seeded wheat usually suffers less injury than spring-seeded wheat. Generally, the fly prefers barley less than wheat.

4. Follow farming practices that lead to optimum wheat production.

5. Use insecticide control when other methods are impractical! Two systemic insecticides (disulfoton 15G, fall application only; and phorate 15G, fall or spring application) are currently registered for use against the fly. Apply them in furrow with the seed at planting (not a planter box application).

Chemical control

Disulfoton and phorate are also labeled on barley to control other pests. Although Hessian fly is not listed on the barley labels, its legal use to control aphids at planting

time will control Hessian fly. Always consult the labels for use restrictions. Particularly observe restrictions relating to their uses on spring seedings, seedings grown with non-irrigation, and their modes of application—band versus broadcast.

Summary

Fall Plantings:

- Early-seeded (late August and September) fall wheat is susceptible to damage.
- Plant after October 15 to avoid Hessian fly.
- No-till operations will have more problems with Hessian fly than operations using deep plowing.

Spring Plantings:

- Irrigated spring cereals (particularly wheat) are most susceptible to damage.
- Where past damage from Hessian fly has occurred, use an insecticide at planting time. Thimet 15G (phorate 15G) is labeled on wheat for Hessian fly control at planting. Di-syston (disulfoton 15G) should have a state label by spring of 1982 for this use also. Check labels for use restrictions.
- No-till operations will have more of a problem with Hessian fly than operations using deep plowing.