



BUG BIZ

Pest Management and Insect Identification Series



Mayetiola destructor, Hessian fly

(Diptera: Cecidomyiidae)

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Description

Adult hessian flies are brown or black, with females occasionally appearing reddish-brown due to the orange eggs developing inside the abdomen. Female adults are approximately 3 mm in length. Males are slightly smaller. The general appearance is similar to mosquitoes and various midges. The antennae are moderately long, multisegmented, with bead-like segments (moniliform). Eggs are orange, elliptical in shape and less than 1 mm in length. Larvae are flattened, broad and grublike, and reach 6 mm in length when mature. They possess a transparent green stripe along the top surface and are otherwise white. Pupation occurs within the third stage larval molt (puparium), which becomes darker. This stage is referred to as the flax seed stage based on resemblance to flax (*Linum usitatissimum*) seeds.

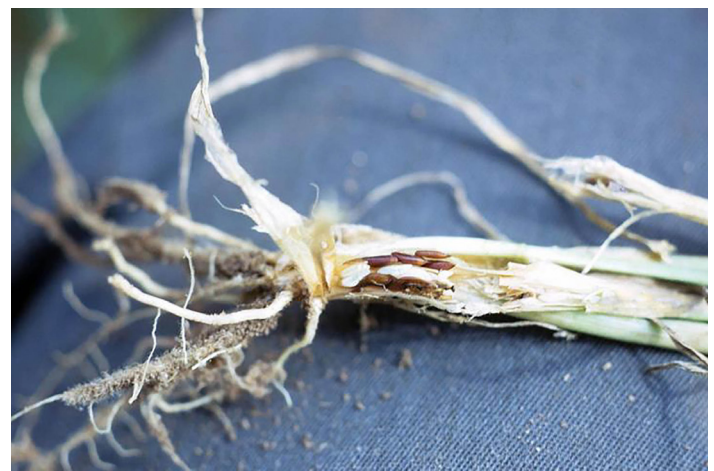
Hessian flies belong to the large, taxonomically challenging family Cecidomyiidae, referred to as gall midges. Circumstances and the nature of damage from Hessian flies are usually diagnostic, but positive identifications should be done by a taxonomist or entomology diagnostician as the first step in management.

Life Cycle

Hessian flies can complete a life cycle in an average of 28 days. If temperature and other environmental conditions are not suitable, development may be postponed through periods of dormancy. Eggs are deposited in grooves on the upper side of plant leaves and, depending on the temperature, require three to seven days (50-85 F, 10-29 C) for larval hatching. Neonates (hatchlings) require 12-24 hours to travel from the egg to a feeding location. This is a period of high larval mortality and many die due to humidity (too much or too little), wind, cold and rain. At an ideal temperature of 70 F



Hessian fly, adult female (Scott Bauer, USDA Agricultural Research Service, Bugwood.org, Creative Commons 3.0).



Hessian fly damage to wheat (John C. French Sr., Retired, Universities: Auburn, Georgia; Clemson; and University of Missouri, Bugwood.org, Creative Commons 3.0).

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(21 C) for growth and development, adults may emerge after 10 to 14 days. Larvae undergo three developmental stages (instars) and double in length from the first to the second. Adult females live for one to two days during which they deposit 100-300 eggs. Up to six generations per year may be completed in Louisiana.

Ecological Significance and Pest Status

The Hessian fly is one of North America's oldest known invasive species, having been documented as early as 1709. The common name derives from the belief that the species was introduced by German soldiers (Hessians) during the Revolutionary War. Evidence suggests this may not be true, and multiple independent introductions are more likely. Hessian flies are found in most wheat-growing regions in the United States and are regarded as sporadic pests in Louisiana wheat. Severe infestations were documented in central and southern Louisiana during spring 2023, the first of such infestations in over a decade. Other grass crops are also susceptible, and an alternate common name for the species is barley fly.

Galls produced by Hessian fly larval feeding behavior provide protection and create a nutrient-rich feeding location as larvae burrow into stem joints. First-instar larvae in wheat seedlings use the venation of the leaf to guide their migration toward the base of the plant or inside the plant crown where feeding locations are established. Infested wheat foliage is darker, almost blue-green in color and growth is stunted. Seedlings may compensate by increased tillering, but persistent infestation inhibits the formation of further tillers and yield loss results.

Management

When high-yielding resistant cultivars are unavailable, a systemic pesticide paired with delayed planting is an economically viable approach to Hessian fly management. In addition, parasitoids can improve Hessian fly control in fields planted with intermediate resistance wheat varieties.

Monitoring. Traps baited with female sex pheromones of the Hessian fly are effective and efficient for collecting adult male Hessian flies. Pheromone traps detect the presence of male populations in wheat fields, but trap captures have not been shown to correlate with economically detrimental larval infestations and crop loss. The lack of connection between trap captures and economically important infestations may be due to substantial egg and neonate larval mortality prior to establishment of feeding sites.



Hessian fly larvae (Peggy Greb, USDA Agricultural Research Service, Bugwood.org, Agricultural Research Service, Bugwood.org, Creative Commons 3.0).



Hessian fly field damage (John C. French Sr., Retired, Universities: Auburn, Georgia; Clemson; and University of Missouri, Bugwood.org, Creative Commons 3.0).

Cultural management. Since most Hessian fly management measures (i.e., resistant cultivars, delayed planting, destroying volunteer wheat and seed treatments) are preventative, evaluating the risk of Hessian fly damage weeks before planting to determine which measures are appropriate is critical. The most effective method for controlling Hessian fly appears to be planting wheat cultivars that are resistant.

Biological management. Many species of Hymenopteran parasitoids (wasps) attack the Hessian fly. Forty-one species of Hessian fly parasitoid wasps are known in North America and Europe. Three species, *Platygaster hiemalis* (Platygastridae), *Homoporus destructor* (Hymenoptera: Pteromalidae) and *Eupelmus allynii*

(Hymenoptera: Eupelmidae), are widespread and are considered valuable parasitoids in suppressing Hessian fly infestations.

Chemical management. Use of insecticides solely for Hessian fly control is uncommon. Only when at least three of the following five conditions are met, should foliar applied pesticides be considered: 1) the current wheat crop was planted directly in, or within 400 yards of, a wheat field from the previous year; 2) a resistant cultivar was not planted in the current field; 3) neonicotinoid seed treatment was not applied to the current field; 4) previous years' yield loss from Hessian fly occurred in nearby fields; and 5) Hessian fly eggs have been discovered on the wheat leaves of the current crop.

References

- Benedict, L. F., B. R. Leonard, M. Ghimire, S.A. Harrison, Fangneng Huang. 2011. An Emerging Wheat Pest in Louisiana. <https://www.lsuagcenter.com/portals/communications/publications/agmag/archive/2011/winter/hessian-fly> (Accessed 25 February 2023).
- Bergh, J. C., M. O. Harris, and S. Rose. 1990. Temporal patterns of emergence and reproductive behavior of the Hessian fly (Diptera: Cecidomyiidae). *Annals of the Entomological Society of America* 83: 998–1004.
- Schmid, R. B., A. Knutson, K. L. Gile, and B. P. McCornack. 2018. Hessian Fly (Diptera: Cecidomyiidae) Biology and Management in Wheat. *Journal of Integrated Pest Management*. 9: 1–12. doi:10.1093/jipm/pmy008 (Accessed 21 February 2023).
- Tooker, J. F. 2012. Hessian fly on wheat. College of Agricultural Sciences, Cooperative Extension, Entomological Notes, Penn State University. <https://extension.psu.edu/hessian-fly-on-wheat> (Accessed 23 August 2023).
- Wise, I. L. 2007. Parasitism of the Hessian fly, *Mayetiola destructor* (Diptera: Cecidomyiidae), on spring wheat (Poaceae) in southern Manitoba. *Proceedings of the Entomological Society of Manitoba* 63: 23–32.
- Withers, T. M., and M. O. Harris. 1997. Influence of wind on Hessian fly (Diptera: Cecidomyiidae) flight and egg laying behavior. *Environmental Entomology* 26: 327–333.
- Villegas, J., S.A. Harrison, and G. B. Padgett. 2023. Hessian fly infestations in Louisiana Wheat. <https://www.lsuagcenter.com/articles/page1681832119152#:~:text=Hessian%20flies%20are%20active%20when,measures%20to%20manage%20this%20pest>. LSU AgCenter (Accessed 23 August 2023).

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