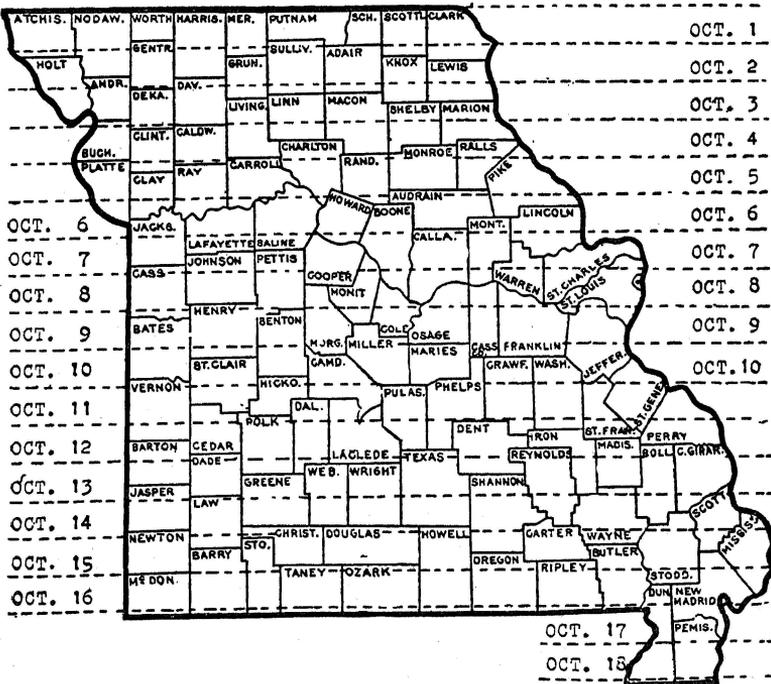


# The Hessian Fly

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Map showing fly-free dates for Missouri. Wheat seeded on or after these dates should escape fall fly injury.

The hessian fly is one of the most destructive pests of the wheat crop in Missouri. In 1916, it destroyed six million bushels in this state. In the fall of 1935, it was again so abundant in the southern half of the state that it seemed certain to seriously reduce the 1936 yield. However, weather conditions unfavorable to the pest in the spring of 1936 practically eliminated the fly infestation and resulted in a fair crop yield. The late open fall of 1940 permitted the pest to

again increase in numbers so that the 1941 wheat crop showed rather serious reduction in yields in many parts of the state. A survey recently completed, to determine the abundance of fly carry-over in the 1941 stubble indicates that there is enough of the pest to offer a definite threat to the 1941 fall seeding of wheat, if farmers do not take the necessary steps to control the pest before wheat is seeded.

### **The Life Cycle of the Hessian Fly**

Beginning at wheat harvest, the pest is in the resting stage mostly in the wheat stubble. In this stage, it is a small, whitish maggot inside a brownish-black case between the base of the dry leaf and the straw. This is spoken of as the flaxseed stage due to its close resemblance to the seed of flax. Most of the flaxseeds are just above the first or second joint, though occasionally one may be found higher up on the straw. In this stage they survive the summer heat, and in September the maggot changes to the pupa stage within the flaxseed case. In Missouri, by late September, the flies of the regular fall brood begin to emerge. Prior to this, however, some flies may emerge especially if rains are frequent.

The adult hessian fly resembles the small, black gnats seen frequently around flower pots in the home. They are about the size of a small mosquito and are seldom seen in the field by wheat growers. These adults lay their slender, microscopic reddish eggs mostly in the surface grooves on wheat blades. In a week to ten days, under favorable temperatures, these hatch and the small maggots crawl down between the base of the leaf and the tender stem of the plant just above a joint or node. Here the maggot draws on the plant's supply of sap and causes the destruction of the plant cells and, usually, the entire plant. The regular fall brood of maggots are usually full-fed and ready to pass again to the flaxseed stage by late October.

In this flaxseed stage the pest survives the winter and gives off adult flies of the regular spring brood. Then the laying of eggs, hatching, and the destructive work of the maggots are repeated, often resulting in the lodging or breaking over of many of the wheat straws before harvest. The full-fed maggots of the spring brood are again in the flaxseed stage at wheat harvest.

There is normally a regular fall brood and a spring brood of the pest. However, in case of rainy summers there may appear a partial supplementary summer brood. Also, in an open fall and in an early spring there may appear a supplementary fall and a supplementary spring brood. As a rule, these supplementary broods are light, but they may somewhat upset the regular control program.

### **How the Hessian Fly Damages Wheat**

The fall brood of maggots working on the young wheat may kill the plants outright before they have started to produce tillers. In severe infestations, more than 90 per cent of the stand of wheat may be thus destroyed. A young plant that is infested takes on a deep green color, the blades remain short and heavy and tend to stand in an upright position. Such plants do not have the typical healthy color with a growing tip or bud and long, slender blades. In time, the deep green color fades and the plant dies.

The work of the spring brood may dwarf the tillers, causing them to produce no heads or perhaps dwarfed heads with shriveled grain where several maggots attack the same tiller. When only one maggot attacks a tiller it may cause a brown depression in the straw just above a node, in which the maggot and later the flaxseed lies. This may so weaken the straw at that point, however, that it breaks over or lodges. In severely infested fields, half of the plants may lodge and those standing may produce a greatly reduced yield of inferior grain.

### **Control Measures Which Wheat Growers Should Apply**

With the low returns per acre from wheat, it is at once evident that, in order to prove economical, control measures for the hessian fly must cost but little per acre to apply. The use of insecticides—sprays or dusts—are impractical, due both to cost and to the fact that no known chemical can be safely and effectively used. For the effective control of the hessian fly it has been necessary to depend largely on certain common farm practices. With a little careful planning, cultural practices will give complete control of the pest. *A combination of stubble destruction, elimination of volunteer wheat, and seeding on the safe-seeding date can be made 100 per cent effective without adding any cost to the growing of wheat.*

**Destruction of Stubble.**—Since the pest is found largely in the stubble in the flaxseed stage during the summer months, it is natural to expect that by disposing of infested stubble the number of hessian flies can be greatly reduced. Burning of stubble gives only partial destruction of those flaxseeds close to the ground. A better plan is to plow under the infested stubble and work the ground to firm it. By this means, most of the flaxseed stages of the pest can be buried so that few of the adult flies will be able to escape from the ground later. The plowing of infested stubble fields not seeded to timothy, clover, or lespedeza, as soon after harvest as possible will therefore greatly reduce the number of flies to emerge later and oviposit on volunteer or fall seeded wheat.

**Keep Down Volunteer Wheat.**—Some of the infested stubble in any community can not be disposed of by plowing since many stubble fields are seeded to grass or a legume. Also, due to the lodging of much wheat in heavily infested fields, volunteer wheat is sure to develop in such fields following summer rains. This volunteer wheat may be visited later by the adult hessian flies when they begin to emerge and they will deposit their eggs on it the same as on the regular fall seeded wheat. In such cases, this volunteer wheat becomes infested and if left standing will later serve as a source of reinfestation for the whole community. It is important, therefore, that wherever

possible volunteer wheat be destroyed by cultivation as fast as it shows up.

**Seeding on the Safe-Seeding Date.**—*The proper timing of the seeding of the wheat in the fall is by far the most important single practice in hessian fly control.* Much infested stubble cannot be disposed of and some volunteer wheat cannot be destroyed, but every wheat grower can keep his seed wheat in the bin until the proper time for safe seeding so that his wheat will not show above ground until the adult flies of the regular fall brood have come and gone.

In the fall of 1916, following the disastrous loss from the hessian fly that year, the department of entomology of the Missouri College of Agriculture, in cooperation with the Bureau of Entomology of the U. S. Department of Agriculture, began a careful study of the pest under Missouri conditions. To determine when the fly is on wing laying eggs in the fall five to seven seedings of wheat were made at weekly intervals in each of about a dozen fields distributed throughout the wheat growing areas of the state. These carefully timed seedings were made in the different areas each year for fifteen or more years. Late in the fall, wheat plants from the different test plots were collected and examined to see which were infested with the fly. Only the earlier seedings normally showed infestation, while all plots in each field seeded after a certain date would be free of infestation.

Some will ask if these seeding dates are not too late for the wheat to winter safely. The answer is no, if the seed bed is well prepared and the soil is suited for wheat. *In years when the hessian fly threatens to be serious in your locality delay your wheat seeding until your proven safe-seeding date.* When there is no fly danger you may safely seed a week earlier if you wish.

**Community Cooperation.**—The hessian fly has wings and can fly one or more miles to infest wheat. Frequently, a field seeded on the safe-seeding date will escape fall infestation only to become infested in the spring by flies moving in from a neighbor's field, where he failed to control his flies. Fly control, therefore, becomes a community problem and all wheat growers in the community should assume the responsibility of doing their part to keep this pest under control. Do all you can to reduce fly damage to your crop and encourage your neighbors to do the same. The 1942 wheat crop in Missouri, similar to the one in 1916, seems certain to be seriously damaged by the hessian fly if growers do not apply the simple cultural practices outlined above for protecting their crop. With the present world conditions, it behooves every Missouri farmer to do all in his power to protect his crops and the nation's food supply against any and all insect losses.