

A few of the more important questions which growers are asking regarding the fly and its control are considered in this circular.

How can one detect the fly?—The adult, winged fly, which is seldom seen by the wheat grower, resembles a very small mosquito. The female fly lays her eggs on the surface of the blades and later they hatch and the small maggots go down behind the leaf sheath where they feed. The maggot is soft and green or cream-colored. When full-fed, it changes to the flaxseed stage. This is what the farmer usually finds either in the young plant or in the stubble at harvest time. It is brownish in color when fully developed and is the size and shape of a flaxseed. As many as fifty of these flaxseeds may develop on a single plant. From this stage later emerges the fly. The maggot or flaxseed behind the leaf sheath is often incorrectly spoken of as the egg. The egg is a small reddish object fitted neatly into the grooves on the surface of the blades.

A badly infested young plant remains dwarfed, with but a few short, thick, straight, deep green leaves. Pull down the blade and its sheath and the maggots or flaxseeds will be found tucked away behind it. The spring brood causes lodging due to a weakening of the straw just above the joint. Carefully pull away the dry sheath from the stubble and the flaxseed will be found often fitted into a depression in the straw.

How many broods are there a year?—In Missouri there are two important broods of flies each year. One appears in September and early October, the other early in the spring. These two are responsible for the main damage. Besides these two broods there may be a light secondary fall brood late in the fall, a light secondary spring brood just before harvest, and a summer brood. These are usually of little consequence and will not cause serious trouble if the two main broods are properly controlled.

How and when does the pest damage wheat?—It is while the Hessian fly is in the form of a maggot that it does all its damage. After it goes down behind the leaf sheath it works on the wheat stem and feeds on the plant sap. The irritation and loss of sap weakens or kills the plant.

The damage to the crop begins with the young wheat in the fall. The flies of the fall brood lay eggs which produce maggots and these damage the young plants. The damage may be so great on early seeded wheat that scarcely a healthy plant can be found in late November. The heavy damage is done in the fall on young wheat and again after growth starts in the spring, resulting in lodging and poor grain.

Is wheat stubble left unturned in young clover meadows or elsewhere a source of danger?—The Hessian fly passes the summer in the flaxseed stage in stubble, and all infested stubble which is not plowed under soon after harvest will give off adult flies later. The majority of the healthy flaxseeds in the stubble give off flies in the fall. Infested wheat stubble in young clover meadows is, therefore, a source of danger to wheat.

Should badly infested wheat be plowed under?—This very common question can not be answered with any degree of satisfaction. Even after carefully going over an infested field it is not safe to recommend plowing under. It is remarkable how badly a field may be injured and yet with favorable conditions come out and make a fair yield. This is especially true in case of fall injury. One should be absolutely certain the pest has ruined the crop before he is warranted in plowing it under. However, when he is certain the crop is gone he should not permit it to stand and give off flies for further damage to other fields of wheat. Plow it under deeply and work the ground to prevent the emerging of adult flies later. Occasionally a wheat grower in the fall will reseed an early sown field of wheat that has been destroyed by the fly without first plowing under the infested plants of the first seeding. This is folly, for the pest will pass the winter on the injured wheat, appear as flies in the spring and deposit eggs on the plants of the second seeding with the result that the crop is usually severely damaged. The same thing occurs where one farmer seeds early and another after the fly-free date. When spring comes, the flies from the early seeded field infest the field seeded properly.

How and when can the pest be controlled?—Four lines of work carefully carried out will rid any region of the pest in one year. These include first, the plowing under of all infested stubble soon after harvest; second, the working of the ground to firm it and prevent the growth of volunteer wheat; third, seeding wheat on or soon after the fly-free date; fourth, securing the cooperation of all wheat growers in the vicinity. But the question is raised, can this be done? Yes, it can and has been done in Missouri over entire counties. In 1916, Madison county was heavily overrun by the pest and most fields of wheat scarcely made seed. Following harvest the wheat growers got together and carried out the foregoing treatments almost to a man and the 1917 crop was completely saved from injury.

Plowing under stubble.—Clover and grass seeded with wheat will prevent the turning of some stubble but all infested stubble that possibly can be should be plowed under 6 to 8 inches deep, preferably in July. Follow this with a drag, harrow or disk to close up

crevices and firm the soil. Very few flies will be able to emerge from the soil if the work is carefully done.

Keeping down volunteer wheat.—Some of the stubble will not be plowed under, so some flies are sure to emerge later. If volunteer wheat is kept down these will find no wheat plants on which to lay eggs when they come out and will die without leaving offspring. The cultivation will also put the seed bed in the best possible shape for seeding wheat later.

Seeding on fly-free date.—Some wheat growers wish to pasture their wheat in the winter and object to this remedy for the fly, on the ground that the fly-free date is too late to seed in their vicinity. Since 1914 the Department of Entomology, University of Missouri College of Agriculture, has maintained experimental fields throughout the State for the study of the fly and its control. The results of these experiments show that where the bed is properly prepared and the soil is suited for wheat growing, the fly-free date is not too late for seeding wheat in Missouri. In the experimental fields seven plots were seeded at intervals of one week, three before, one on and three after the fly-free date. The records of yield show that the plot seeded one week before the fly-free date, the one on the fly-free date, and the one seeded a week after the fly-free date gives the greatest average yields and the average yield from these three seedings is not greatly different. However, when there is no serious fly problem to consider growers may very well seed one week earlier than their fly-free date for safety on grain yields. When they need the pasture, as in 1934, 1935 and 1936, they should seed either winter barley or rye early rather than wheat, since the Hessian fly does not breed so freely on these grains. Wheat seeded early for pasture in the fall of 1935 was largely responsible for the serious fly infestation that fall.

The fall brood of flies in any locality has a definite period for emerging, laying eggs and dying. If the seed does not go into the soil until the last of the flies are dead, there can be no fall brood of the pest to attack the crop later. The fly-free date for each county as determined by the field experiments is shown on the accompanying map of Missouri.

Cooperation is necessary.—The small winged fly may migrate as far as one or two miles and then lay its eggs on wheat. Since the pest moves from farm to farm it is important that all wheat growers in a given neighborhood cooperate. One neglected wheat grower may furnish enough flies to infest an entire neighborhood. If all will cooperate in plowing under stubble, keeping down volunteer wheat and seeding on the fly-free date, the pest can be effectively controlled.