



Wheat stem sawfly
in egg laying position

The Wheat Stem Sawfly

in NORTH DAKOTA

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THE WHEAT STEM SAWFLY IN NORTH DAKOTA

Introduction

The wheat stem sawfly is no stranger to North Dakota. Originally it lived in the tall hollow-stemmed native grasses of western North America, and it has been found infesting these grasses from Michigan to California. With the introduction of large acreages of cereal grains that replaced many of the native hosts in the Northern Great Plains area, the sawfly readily transferred to these grains, particularly spring wheat. Today wheat is the favorite host plant in North Dakota.

History

The sawfly was first seen in 1890 mining the stems of native grasses in the vicinity of Alameda, California. In 1895, adults were collected in the Canadian Northwest Territories, and in the same year larvae were found feeding in wheat stems near Souris, Manitoba. In 1906 larvae were found attacking wheat near Kulm, in south central North Dakota. By 1909 losses of five to 25 per cent were reported from the area around Minot and in the Red River Valley near Fargo. The North Dakota infestation reached epidemic proportions in 1916, but receded rapidly and by the early 1920's the sawfly was a pest of slight importance. From 1940 to the mid-40's the sawfly again became a problem and as much as 50 per cent crop loss was reported in northwestern North Dakota.

Through cultural control practices, wheat stem sawfly damage has been held to a minimum in North Dakota from the mid-40's to date. However, each year the sawfly manages to take its toll in wheat plant damage.

Life History and Damage

The winter is passed as a mature larva in the base of a wheat straw at or below the surface of the soil. In the spring the larva transforms to a pupa inside the wheat straw and the adult emerges during June. The females lay their eggs by thrusting them into the plant tissues on the upper parts of the stem. The larva bores down through the joints and by late summer reaches the lower parts of the plant close to the surface of the ground. Here it cuts a V-shaped groove entirely around and inside the stem which causes the stem to break off. The larva plugs itself in the base of the plant with its frass (Figure 1) thus forming a chamber in which it hibernates and later pupates.

Sawfly damage is two-fold. First, they cause between 10 to 14 per cent reduction in yield by their tunneling activity in the infested stems. Additional loss occurs when sawfly-cut stems fall to the ground and become unharvestable.

Description of the Insect

When it is mature, the sawfly larva measures 1/2-inch or longer, and is pale or yellowish in color (Figure 2). The head is darker, and also the rear end, which terminates in a short, blunt point. This description and the fact that frass is found in association with the sawfly larvae serves to distinguish the insect from other insects that infest wheat stems in North Dakota.

The adult sawfly, or parent insect, is somewhat like a slender wasp in appearance; 1/2-inch in length; black, with yellow markings which form rings on the

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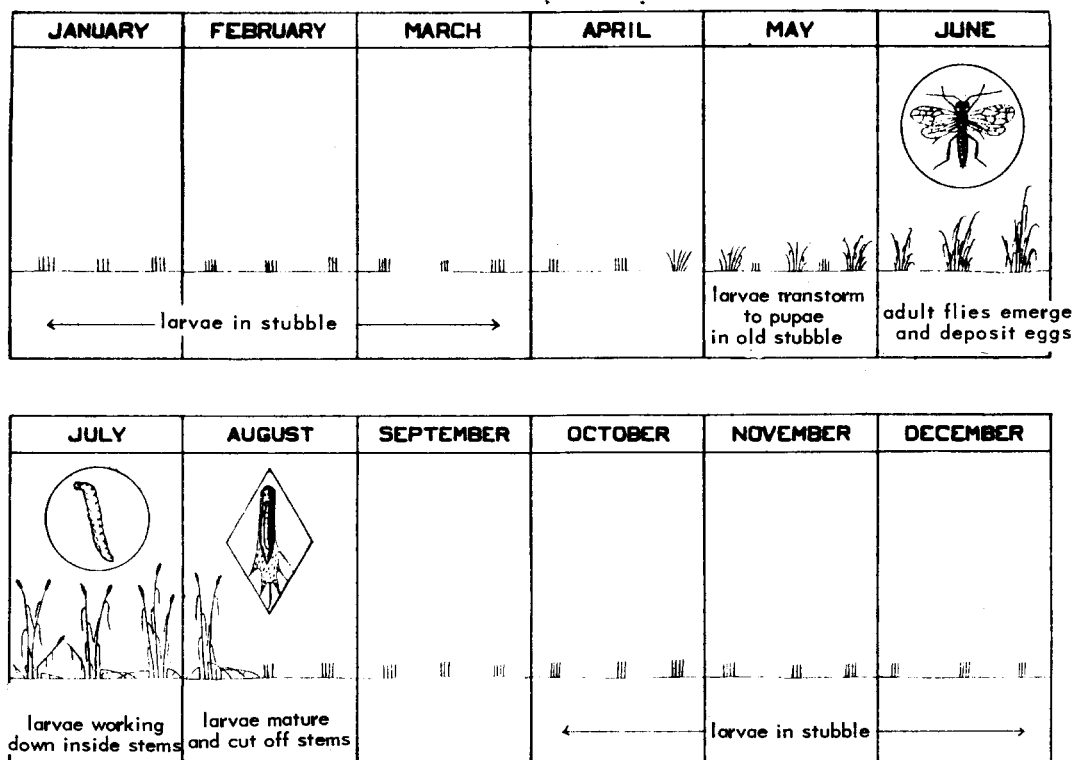


DIAGRAM OF LIFE HISTORY OF THE WHEAT STEM SAWFLY.

abdominal segments (Figure 3). When observed in the field, sawflies may be recognized by the habit of resting, head downward, on the stems of grain plants, clinging close to the stems.

The term "sawfly" is applied to insects of this kind because of the sawlike ovipositor with which the eggs are thrust into the plant tissue in which the larvae feed on hatching.

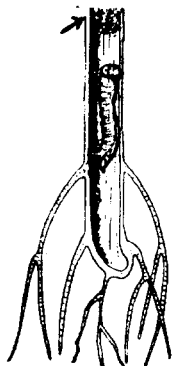


Fig. 1-Sawfly larva in stem (note frass plug - arrow).

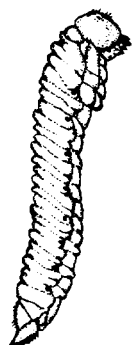


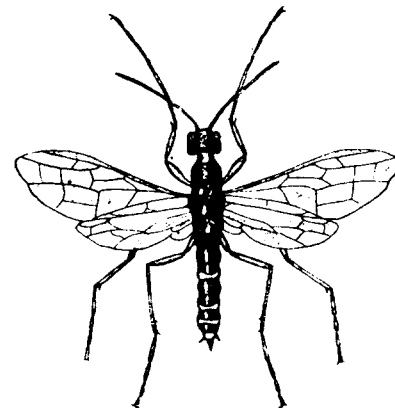
Fig. 2-The wheat-stem sawfly: mature larva. Enlarged.

CONTROL

Tillage

Tests have shown that combining deep spring tillage (particularly with a mold-board plow) with shallow fall tillage will give up to 80 per cent sawfly control.

Fig. 3-Adult wheat-stem sawfly. Much enlarged.



If shallow tillage is practiced, as much stubble as possible should be left on the soil surface.

Early Harvest

Harvesting sawfly infested wheat as early as possible without affecting yield is also recommended to save infested stems before they fall.

Trap Strips

Trap strips have not proved to be effective in controlling wheat stem sawflies. Besides being costly, this control method is not practical in the sawfly areas of North Dakota where strip cropping is carried out.

Planting such crops as barley, rye or durum in strips around the wheat crop has been given some

attention, but, again, has not been found to be too effective mainly because the sawflies often pass up the intended barrier crop and continue into the wheat crop to lay eggs.

Resistant Varieties

Fortuna, Chinook, Rescue.

Damage by the sawfly has been most severe on old wheat ground, especially where the crop is left as stubble during the winter without fall plowing or tillage. Sawflies emerging from the old stubble readily deposit eggs in growing wheat in the same field or adjacent fields. Therefore, crops other than wheat should be planted on or next to ground heavily infested with sawflies the previous year. Barley, rye, and durum are relatively resistant to wheat stem sawflies, although these crops may become infested during years of heavy sawfly populations.

Use of resistant varieties of wheat tends to keep down the severity of sawfly damage in any locality where the insect becomes abundant. Until 1966 there were two sawfly resistant varieties of wheat available—Chinook and Rescue. Neither of these varieties equals hollow-stemmed varieties such as Chris and Justin in yield or quality.

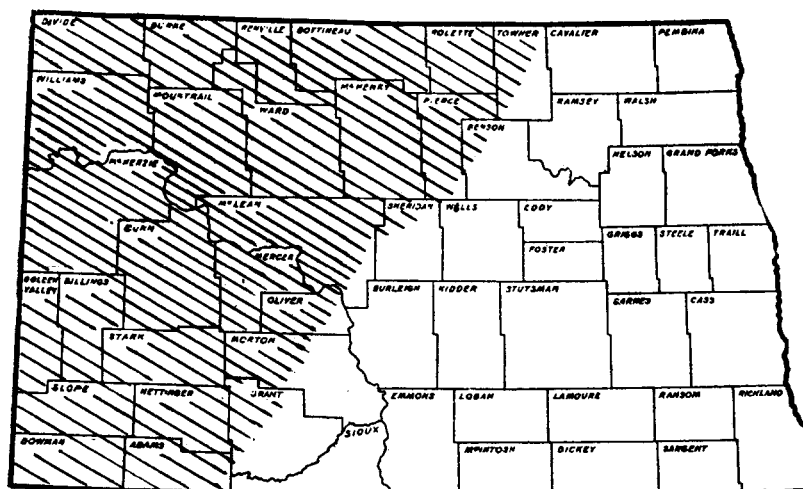
On May 16, 1966, a new sawfly resistant variety of wheat called Fortuna was released jointly by the State

Agricultural Experiment Stations of North Dakota and Montana, and the Crops and Entomology Research Divisions, Agricultural Research Service, USDA. Fortuna is the first variety produced from efforts in North Dakota to combine adequate leaf and stem rust resistance and good yielding capacity in a solid-stemmed, sawfly resistant variety. This new variety has been observed in yield trials in North Dakota since 1961 and in regional trials since 1963. Fortuna has yielded about 8 to 10 bushels an acre more than Rescue or Chinook, and has averaged 1 to 2 pounds a bushel heavier in test weight. In limited comparisons Fortuna has equalled Chris in average yield and test weight.

Fortuna is recommended for production only in those areas where the sawfly is an important wheat pest (see map). It is not recommended for non-sawfly areas where black chaff infections commonly occur. Ordinarily, solid-stemmed wheats are more susceptible to lodging than hollow varieties such as Justin, and they should not be grown where lodging often occurs, unless sawfly damage is of greater concern than lodging.

Acknowledgements

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Major area of wheat-stem sawfly infestation in North Dakota

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