

Montana Small Grain Insects

Wheat Stem Sawfly

Cephus cinctus Norton (Hymenoptera: Cephidae)

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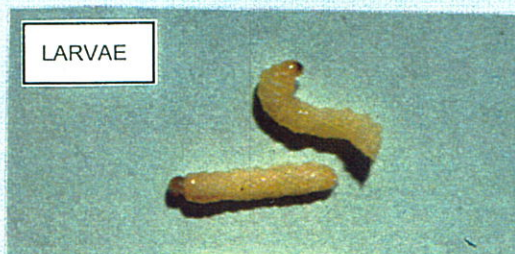
Wendell Morrill and David Weaver, Department of Entomology

Montana State University-Bozeman 59717

The wheat stem sawfly attacks wheat and wild grasses in the northern Great Plains. Infested plants usually lodge, making crops difficult to harvest. Larval feeding also reduces yields by about 10%. This pest is very difficult to control with current management practices.

OVERWINTERING

Sawfly larvae overwinter in cut "stubs". Tunnels in the stubs have a silken lining, and extend below ground down to the crowns. Tops of the stubs are cleanly cut, and are filled with a soft plug. The larvae assume an "S" shape when removed from the stub.



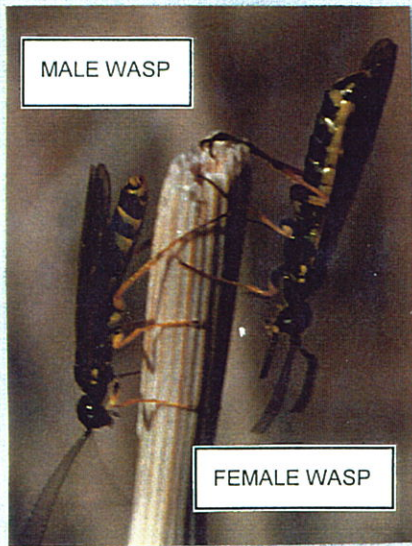
PUPAE



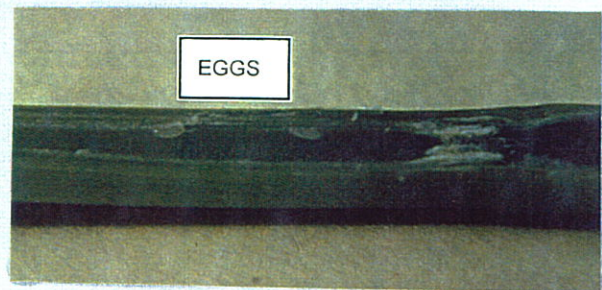
Larvae become pupae in the spring. At first, pupae are white, but dark eyes and black adult bodies soon appear. The adult wasps chew through the plugs and emerge from the stubs about 2 weeks later. Wasp emergence can be "triggered" by rain, or delayed by cold weather.



WASPS AND EGGS



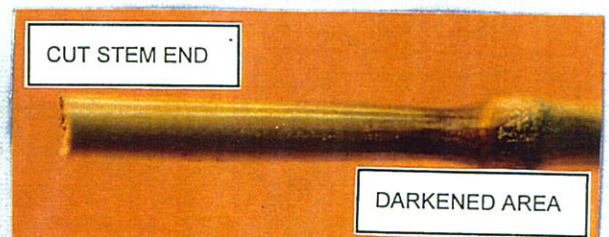
Wasps emerge in June, and mate in the stubble and in the border of nearby crops. Males are slightly smaller, and emerge a few days before females. Female wasps insert eggs into stems, and each stem may receive eggs from several wasps. The largest stems are preferred. Wheat that is in the tillering stage avoids attack. Wasps can control egg fertilization. Fertilized eggs produce females and unfertilized eggs are male. Each female wasp can lay up to 50 eggs. Individual wasps live about one week, but flights may last for a month or more.



LARVAE

Eggs hatch, and the worm-like larvae feed up and down in the stems. Larvae are cannibalistic, and only one per stem survives to maturity. Infested stems are filled with "sawdust", or chewed plant material. Sawdust indicates there has been a larva in the stem. Dark areas may appear below nodes of ripening plants. These dark spots are caused by an accumulation of plant nutrients that were unable to pass upward through damaged nodes to developing heads. Grain weight is reduced by about 10%.

Full grown larvae cut circular notches around the inside perimeter of lower stems. Some of these notched stems lodge before harvest. Lodging increases with wind or rain. Larvae are found only in the "stub", or lower stem, below the cut.

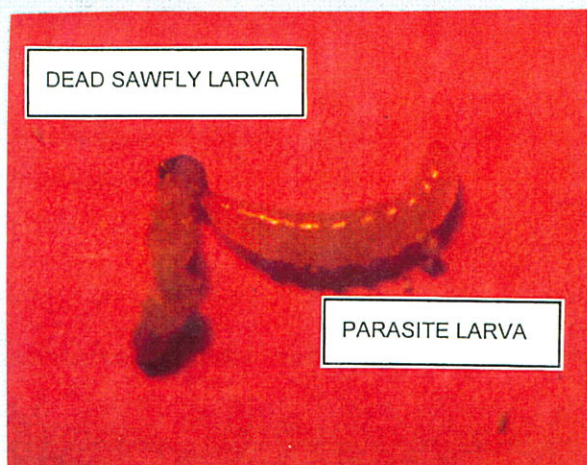


PARASITES



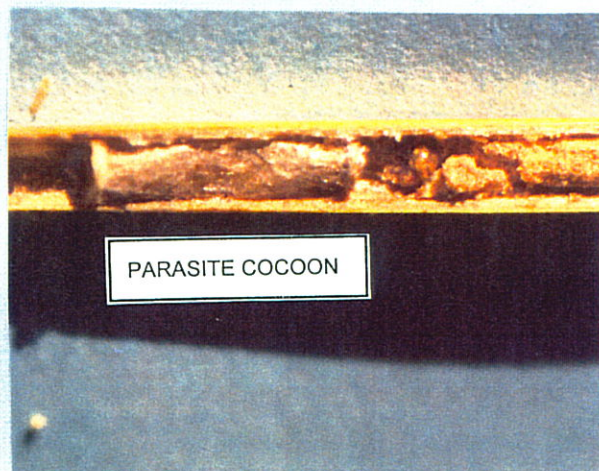
PARASITE WASP

Many sawfly larvae are killed by small parasitic wasps. The parasites overwinter in straw or stubble and emerge a week or two later than the sawfly wasps. There are two commonly occurring species. Parasites are also abundant in wild grasses. The parasite wasps search for plant stems that are infested by sawfly larvae. The parasites insert their "stingers" through the stem wall and lay eggs on the sawfly larvae. The sawfly larvae are paralyzed, stop feeding, and do not cut stems.



DEAD SAWFLY LARVA

PARASITE LARVA



PARASITE COCOON

Usually only one parasite develops on each sawfly larva, but occasionally two or three per larva are found. After feeding on sawfly larvae, the parasites construct small paper-like cocoons in the stems. Parasite wasps develop in the cocoons, and they escape by chewing tiny "shot holes" in the stems. There are one or two generations of parasites each year, and wasps are present in the field until harvest. Sawfly larvae that are in "stubs" usually avoid attack. Parasites are important because in addition to reducing the amount of stem cutting, there are fewer sawfly wasps present during the next year. Research is underway to compare the effects of chemical fallow and conventional tillage on parasite survival.

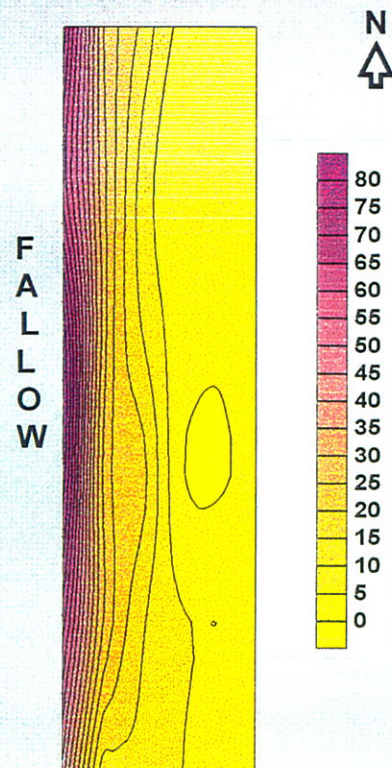


PARASITE WASP
EMERGENCE HOLES

SAWFLY ECOLOGY

Distribution of sawfly infested stems in a spring wheat field strip located near Ft. Benton, Montana, in 1998. Note that the infestation is heaviest on the west side that bordered infested stubble. After emerging from last year's stubble, wasps fly upwind because they may be attracted to odors produced by standing crops. Wasps begin to lay eggs as soon as suitable hosts are located. They are more likely to fly farther into fields where wheat stands are thin, or where stem elongation is just beginning. Due to heavy damage in field borders, some growers are increasing field size to reduce the amount of border areas. Stem infestation in this field was determined by collecting over 10,000 stems from 120 points. Samples were then taken to the laboratory, and each stem was cut open to determine if it was infested by sawfly larvae. Additional information collected from this field includes distribution of stem cutting and presence of parasites. Over 40 fields were sampled in 1998 to estimate effects of field size, tillage, and stem solidness on sawfly damage.

Percent Infested Stems



SAWFLY CONTROL

Research indicates that:

- Some sawfly larvae are killed by fall or spring tillage
- Sawfly wasps can be killed by applying insecticide, but repeated treatments usually are necessary to control wasps that emerge later.
- Narrow strips of winter wheat planted between infested stubble and spring wheat fields may reduce wasp dispersal into crops.
- Increasing field size may reduce losses if damage is heavier in borders.
- Plant solid-stemmed varieties. The Extension Service has current recommendation lists.
- Swathing will reduce harvest problems caused by lodging, but will not control sawflies.
- Late planted spring wheat may avoid attack

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