

Natural Enemies of the Wheat Stem Sawfly in North Dakota And Montana

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The wheat stem sawfly (*Cephus cinctus* Nort.) is a native of the Great Plains. It has only one generation a year, and spends three of its life stages—egg, larva, and pupa—in the stems of grasses and wheat. Only as an adult does it live in the open, and then for only about one week during June or July.

This trait of secluding itself within the stems of its host plants no doubt affords the wheat stem sawfly considerable protection from its natural enemies. Disease, a common destroyer of many insects, has not been recorded as infecting this species, and predators, such as spiders and robber flies, do not commonly attack the adults. Birds probably destroy more individuals than do any of the other predators, but even so their total effect on the sawfly population seems slight. Horned larks in large numbers sometimes split sawfly-infested wheat stubs with their beaks and feed on the overwintering larvae. Insect parasites probably contribute more toward reducing sawfly populations than do the natural enemies.

Native Parasites

Seven hymenopterous insects, all of them wasplike, attack the wheat stem sawfly in the United States. These parasites are known by the scientific names, *Bracon cephi* (Gahan), *Bracon lissogaster* Mues., *Eupelmella vesicularis* (Retz.), *Eupelmus allynii* (French), *Eurytoma atripes* Gahan, *Pleurotropis utahensis* Cwfd., and *Scambus detritus* (Holmg.). They have been much more effective against the sawfly in native grasses than in wheat. It is not uncommon for 25 to 30 percent of the larval population in grasses to be parasitized, and occasionally the figure approaches 100 percent. In wheat fields, however, these parasites usually destroy only one to two percent of the larvae, although larger percentages have been recorded. Unlike their sawfly host, they have apparently been unable to transfer effectively their activities from the native grasses to wheat.

Introduced Parasites

Parasites and predators imported from foreign countries have been used to fight such outstanding insect pests as the European corn borer, the cottony cushion scale on citrus trees, the gypsy moth on forest trees, the Japanese beetle, and the alfalfa weevil. Here in North Dakota, insect parasites have been introduced to fight the sweetclover weevil and the European corn borer.

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The failure of the native enemies to reduce sawfly populations materially prompted the testing of foreign parasites against this insect. It was felt that such parasites, when removed from their own natural enemies, might prove more effective than species native to the United States, especially against the sawfly population in wheat. Accordingly, two hymenopterous parasites, *Collyria calcitrator* (Grav.) and *Bracon terebella* Wesn., which attack the European wheat stem sawfly (*Cephus pygmaeus* (L)), were imported from Europe for release in the sawfly territory of North Dakota and Montana. The parasites were collected as larvae from wheat fields in France, and flown to the parasite laboratory at Moorestown, New Jersey, where they were reared to the adult stage. The adults were then flown to North Dakota and Montana and released. Both parasites have a single generation each year in Europe. *C. calcitrator* attacks the eggs of the European wheat stem sawfly whereas *B. terebella* attacks the larvae.

Parasite Releases

The localities selected for the release of the parasites were Minot, North Dakota, and Choteau, Montana, both of which are within territory where heavy infestations of the wheat stem sawfly occur in native grasses and in wheat. During the three-year period of 1952-54 a total of 20,451 parasites were released. The releases by year, locality, and species are shown in Table I.

Two release points were selected near Minot and one near Choteau. The parasites received at Minot in 1952 and 1953 were released four miles east of town, and those received in 1954 were liberated 18 miles north. All of the parasites received at Choteau were released 10 miles southeast of town.

Systematic sampling in the vicinity of the release points is being carried on to learn whether successful establishment of these parasites has taken place. Sweeps, by means of a net, of wheat fields and grassy areas are made during the summer to retrieve parasite adults. Stems of both grass and wheat are dissected in a search for the immature stages. In the spring and fall, grass and wheat stub samples containing overwintering sawfly larvae are collected and taken to the laboratory, where they are reared to adults in an endeavor to secure progeny of the released parasites.

Parasite Recovery and Establishment

Six specimens of *Collyria calcitrator*, the egg parasite, have been recovered to date. Two males were reared from sawfly larvae in wheat stubs collected during the fall of 1953 and three males and one female from larvae collected in May of 1954. These specimens were all collected from the release point four miles east of Minot. *C. calcitrator* has therefore succeeded in parasitizing the wheat stem sawfly in the field, and the progeny has survived a winter in North Dakota. No recoveries of the progeny of the larval

parasite, *Bracon terebella*, have yet been made from any of the releases.

It is not yet possible to determine whether *Collyria calcitrator* will be successful in permanently establishing itself. To be effective, the adult parasite must be present in the field during the beginning and peak of the egg-laying period of the host. It will also have to be able to withstand the severe weather that sometimes occurs in North Dakota and Montana. Only time can answer the question of its eventual effectiveness as a parasite of the wheat stem sawfly.

TABLE I.—Foreign parasites of the wheat stem sawfly released at Minot, North Dakota, and Choteau, Montana.

Year	Locality	<i>Collyria calcitrator</i>	<i>Bracon terebella</i>	Total
1952	Minot	329	1,253	1,582
	Choteau	363	974	1,337
1953	Minot	7,289	299	7,588
	Choteau	17	5	22
1954	Minot	5,727	487	6,214
	Choteau	3,672	36	3,708
Total		17,397	3,054	20,451

1955 North Dakota Bromegrass Seed Production Down; Crested Wheatgrass Seed Output Increased Over 1954

Bromegrass seed production in North Dakota in 1955 was estimated at 432,000 pounds (clean seed) compared with 512,000 pounds in 1954 and the 10 year (1944-53) average of 836,000 pounds, the USDA Agricultural Marketing Service in Fargo reports.

The smaller production in 1955 resulted from a lower yield per acre, as the acreage harvested was the same as in 1954. Yield was put at 135 pounds of clean seed per acre harvested. In 1954 the yield was 160 pounds and the average yield for the 10 year period (1944-53) was 155 pounds. The area harvested this year as well as last year was 3,200 acres. The average acreage harvested from 1944 to 1953 was 5,370 acres.

Production of crested wheatgrass seed in 1955 in North Dakota is placed at 188,000 pounds of clean seed. This crop compares with the 1954 production of 170,000 pounds. The area harvested amounted to 1,500 acres and the yield averaged 125 pounds of clean seed per acre. In 1954, some 1,000 acres were harvested and the yield was 170 pounds per acre. In the 14 year period of record, the largest production came in 1942 when 19,000 acres were harvested producing 2,000,000 pounds of clean seed.

Sweetclover seed production in North Dakota in 1955 totaled 2,100,000 pounds of clean seed. The area harvested for seed was set at 14,000 acres with an average yield per acre of 150 pounds. Production in 1955 is 47 per cent larger than in 1954 and 23 per cent above the 10 year (1944-53) average, and is the largest crop since 1952 when three million pounds of clean seed were harvested.