



**OBSERVATIONS ON INSECTS ATTACKING WILD RICE  
IN MANITOBA**

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Abstract

The collecting and rearing methods used in studying insects found attacking wild rice are described. Observations on the life history and parasites of Apamea apamiformis (Guenée) and Chilo plejadellus Zincken, the two most common insects are discussed.

INTRODUCTION

Extensive beds of wild rice, Zizania aquatica var interior Fassett, occur in the Whiteshell Provincial Park; along the eastern side of Lake Winnipeg to Poplar River; and in the Interlake and various other areas in Manitoba. The average harvest of wild rice from 1947 to 1963 was 75,000 pounds, gathered mainly by Indians.

Damage by an unknown noctuid was mentioned twenty-five years ago in Ontario (per. comm. T. N. Freeman. Entomology Research Institute, Ottawa 1957). A. apamiformis also caused moderate stem and seed injury at Marmora and Madoc (Hammond 1958, 1959) and destroyed fifty per cent of the wild rice crop at Lac du Bois (R. D. Bird, per. comm. Canada Dep. of Agr., Winnipeg, 1957). Large populations of wild rice insects were noted in the Whiteshell Provincial Park in 1957 (A. E. Campbell file report. Canada Dep. of Agr.); this was substantiated by rice pickers in this area. Melvin (1960, 1962) reported moderate infestations of wild rice in the Whiteshell Provincial Park and in the vicinity of Sanford on the LaSalle River.

In 1957, a request for assistance in collecting and rearing species of Lepidoptera attacking wild rice was received from Dr. T. N. Freeman, Entomology Research Institute, Ottawa. Subsequently a study of this problem was undertaken at the Winnipeg Laboratory and in the following paper, collecting and rearing methods are described, as well as observations on the life history, habits and parasites of the most prevalent species. Collecting and rearing of insects from wild rice was begun in the Whiteshell Provincial Park in 1957 and at Sanford in 1961.

METHODS

Three methods were used in rearing the insect material. The first method consisted of transporting entire rice plants in soil from the rice beds to the laboratory at intervals from very early spring until late fall. Some of these plants were dissected to count and identify the larvae from each plant; the remainder were placed in metal containers in screen cages (3' x 3' x 5'). The plants were moistened once a week until the insects completed their development. In the second method wild rice stalks were cut in 6-inch lengths and the pieces inserted vertically in moistened absorbent cotton at the bottom of a screened-top quart jar. The insects were transferred to fresh green stalks every ten days. In the third method, pupae found attached to the roots of wild rice were placed on moistened absorbent cotton in petri dishes until they completed development.

Insect material collected in the autumn was stored in a cold room at 35°F from October 15 until February 15. From then on temperature was gradually raised to 67°F and maintained there until adult emergence was complete.

Only larvae of C. plejadellus and Donacia larvae were successfully reared to the adult stage. Larvae of A. apamiformis did not develop beyond the pupal stage using any of the methods described above.

Light traps were setup over wild rice beds in early July to obtain information on dates of adult emergence and their abundance each year. This trapping method was successful and many adult specimens were collected. In addition, aphids and thrips were collected and placed in alcohol.

RESULTS

Populations counts based on the number of stems infested from 1957 to 1963 showed that the two most common insects on wild rice are a noctuid, Apamea apamiformis (Guenée) and a pyralid, Chilo plejadellus Zincken (Table 1).

Table 1. Infestation of wild rice by Chilo plejadellus and Apamea apamiformis in the Whiteshell Provincial Park and at Sanford, Manitoba.

Year	Location	No. of stems examined	Percentage of stems infested
Whiteshell Provincial Park:			
1957	Lone Island Lake	60	68
1958	Lone Island Lake	80	49
1959	Lone Island Lake	80	18
1960	Lone Island Lake	208	1.5
1961	Lone Island Lake	327	1.8
1962	Lone Island Lake	257	.5
1963	Heart Lake	70	38
1963	Rainbow Falls	151	27
Sanford, Manitoba:			
1961	LaSalle River	161	77
1962	LaSalle River	150	49

In 1957 large populations of C. plejadellus and A. apamiformis caused severe damage to the wild rice crop (Melvin 1960). In 1958 populations showed a marked decline which continued in 1959. The infestation had subsided by 1960, and less than two per cent of the wild rice crop was infested (Melvin 1960). In 1962-1963, populations in the Whiteshell Provincial Park gradually increased in size, but no further observations were made beyond this time. In 1961-1962, these two species caused severe damage to wild rice at Sanford on the LaSalle River.

The relative abundance of eight species found feeding on wild rice and the two additional ones found in storage sheds at a rice processing plant at Lac du Bonnet during a year of severe damage is shown in Table II.

Table 2. Insects feeding on wild rice and their relative abundance

Species	Family	Prevalence
<u>Chilo plejadellus</u> Zincken	Pyralidae	Common
<u>Apamea apamiformis</u> (Guenée)	Noctuidae	Common
<u>Catoclysta</u> ? sp.	Pyralidae	Rare
<u>Donacia aequalis</u> Kirby	Chrysomelidae	Rare
<u>Donacia magnifica</u> LeConte	Chrysomelidae	Rare
<u>Rhopalosiphum niger</u> Richards	Aphididae	Occasional
<u>Eribolus longulus</u> (Loew)	Chlorophidae	Occasional
<u>Stenelmis</u> sp.	Helmidae	Rare
* <u>Perimegatoma vespulae</u> Milliron	Dermestidae	Rare
* <u>Tineid</u> sp.	Tineidae	Rare

\* Found at rice processing plant.

### Chilo plejadellus

Eggs laid by caged females were found either singly or in flattened masses containing up to thirty eggs on the leaves of wild rice plants. They are oval, smooth and creamy white and hatched in about eighty days. Empty eggs were observed in the field on July 17.

The small whitish first instar larvae feed for about a week on the leaves and then bore into the stalk. They usually plug the entry hole with frass and webbing, probably as a protective measure against high water during development. The larvae bore down the stalk, feeding on the horizontal plates of pith and the inside surface. The maximum number of larvae of this species found in one stalk was four. Collections made in April, when ice still covered the lakes, contained both larvae and pupae. According to Ingram (1927) only larvae were found in winter. Collections from light traps showed that adults are nocturnal and that the peak of adult flight occurs in early July.

The adults of C. plejadellus were originally described by Zincken (1821) and the larvae by Ingram (1927) but some additional descriptive notes were made during this study. Larva are 22 to 25 mm in length and 2.5 mm in width. The head is usually 2 mm in width, reddish brown with an area of darker brown around

the adfrontal area and the ocelli. The light tan cervical shield is split by a greyish line with small brownish spots along the cephalic, caudal and lateral margins. The tan body is smooth with brownish middorsal, subdorsal and spiracular lines with a broken subspiracular line above the prolegs; the mid-dorsal and subspiracular lines are not as broad as the other two lines. The spiracles are black and the setae are dark brown. The anal plate is light tan covered with brownish spots.

The smooth, light brown pupa is from 10 to 13 mm long and 2 to 3 mm wide tapering caudally to a sharp point.

The adults are pale yellow elongated moths. The front wings are covered with patches of yellow, the apical end being gold with a row of black dots proximally. The hind wings are milky white. The front wings measure 25 to 30 mm from tip to tip extended as in mounted specimens.

Three specimens of a braconid parasite, Chelonus knabi Vier, were recovered from late-instar larvae of C. plejadellus overwintering in wild rice stalks during this study. Because of the small numbers of parasites recovered, it would appear that parasitism is not a major controlling factor of this species. Overwintering larvae of Chilo showed some mortality caused by a fungus disease, Beauveria sp.

#### Apamea apamiformis

Oviposition habits of this noctuid moth were not observed in the field but empty egg clusters were seen on the flowers during July. Eggs and larvae have been described by MacKay (1958). The larvae can be readily identified by the light brown head with darker brown reticulations; the body has a brown dorsum and a nearly continuous middorsal and subdorsal lines, and pale venter. Spiracles are rimmed with black. The early instars have a blackish dorsum, and the mid-dorsal and subdorsal lines are more conspicuous. Larvae of all instars usually feed in the wild rice heads but occasionally were found inside the stalks. In bright sunlight, they conceal themselves in the leaf sheath and wild rice stalks and come out to feed in early evening. Larvae usually feed inside the kernel and large populations will completely strip wild rice heads. The site of pupation is not known but it is suspected that late instar larvae float to shore and pupate in the litter on the shore.

Only one ichneumonid parasite, Gambus bituminosus Cush., was recovered from late-instar larvae and parasitism does not seem to be major controlling factor of this species.

#### Catoclysta ? sp.

A number of aquatic pyralid larvae were found below water level in the mud attached to the wild rice plants. There was some evidence that this insect damaged the roots. No adults were obtained in attempts to rear the larvae for specific identification.

#### Donacia aequalis and Donacia magnifica

Creamy white pupae of these chrysomelid beetles were found encased in a transparent sheath attached to the root tubers of wild rice plants in August and the adults emerged in September. Very little evidence of feeding damage was found on the roots on which these beetles occurred.

Rhopalosiphum niger Richards

Large colonies of apterous female aphids were found on stems and leaves of wild rice in the Whiteshell Provincial Park and on the LaSalle River at Sanford. Large numbers were eaten by the hover fly Platycheirus sp. and the ladybeetle, Hippodamia tredecimpunctata tibialis (Say). At the study area at Sanford, this aphid was also parasitized by the braconid parasite, Aphidius obscuripes Ashmead.

Eribolus longulus (Loew)

This fly was found in small numbers feeding inside the leaves of wild rice in the Whiteshell at Lone Island and White Lakes. This insect caused no apparent damage.

Stenelmis sp.

This drove beetle was found in small numbers feeding on the leaves of wild rice at White Lake in the Whiteshell. No apparent damage was caused by this insect.

The dermestid, Perimegatoma vespulae Milliron, was found in small numbers in the boots at the bottom of conveyor belts in a rice processing plant at Lac du Bonnet. The boots contained chaff or broken kernels of wild rice. A micro-moth, Tineid sp. was also found in small numbers in the chaff house at this same location.

The feeding sites of insects associated with wild rice are shown in Table III.

Table 3. Feeding sites of insects associated with wild rice

Species	Leaves	Stems	Roots	Flowers	Kernels	Chaff
<u>Lepidoptera</u>						
<u>Apamea apamiformis</u> (Guenée)	x	x		x	x	
<u>Chilo plejadellus</u> Zincken		x			x	
<u>Catoclysta</u> ? sp.			x			
<u>Tineid</u> sp.						x
<u>Coleoptera</u>						
<u>Donacia aequalis</u> Kirby			x			
<u>Donacia magnifica</u> LeConte			x			
<u>Stenelmis</u> sp.	x					
<u>Perimegatoma vespulae</u> Milliron						x
<u>Diptera</u>						
<u>Eribolus longulus</u> (Loew)	x					
<u>Homoptera</u>						
<u>Rhopalosiphum niger</u> Richards	x	x				

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