OCCURRENCE OF INSECT PESTS ON RICE IN PATHEINGYI TOWNSHIP

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ABSTRACT

Rice, *Oryza sativa* is the staple food and the principal article of diet in Myanmar. The occurrence and infestation of insect pests on rice were observed in Patheingyi Township. This research work was conducted from June, 2015 to February, 2016. A total of 17 species of insect pests were recorded. Among them, yellow stem borer, white stem borer, Zig - zag - winged rice leaf hopper, cluster caterpillar, army worm and rice case worm were serious pests that cause significant yield of losses. In this study the highest number of species and individual occurred in Pyralidae and lowest number of species in Saturniidae. In the study sites, the number and individual occurrence of site (A) was higher than site (B). Among the recorded species, *Tryporyza incertulas* was highest in number and *Melantis leda ismene* was the lowest in number at both study sites.

Introduction

Rice, the staple diet of over half of the world's populations is grown over about 124 millions hectares. It occupies almost one-fifth of the total world area used for growing cereals. Myanmar is an agricultural country and rice is the main staple food of the country.

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Myanmar is the world's sixth-largest rice-producing country. It was once Asia's largest exporter of rice. The world Rice watch FAO report that rice production in Myanmar had been estimated at 28.9 million tons for 2014 by the government. It was an increase from 28.3 millions tons in the year before and more than a million ton in 2012. FAO estimates that profits in exporting rice from Myanmar's produced had also increased.

In rice fields, two major factors are responsible for low yields: adverse weather (floods, drought, typhoons, etc) and pest epidemics. Low temperature is a major factor limiting in rice cultivation. The optimum temperature for the growth of rice is about 20°C, particularly during the flowering stage that induce fertility.

Most of the world's rice production is from irrigated and rainfield lowland ricefields where insect pests are constraints. The warm and humid environment in which rice is grown is conductive to the proliferation of insects. Heavy fertilized, high-tillering modern varieties and the practice of multicropping rice throughout the year also favor the buildup of pest populations.

There are 124 species of insect pests which are economically important for Asian rice plant. In tropical Asia, only about 20 species are of major importance and regular in occurrence. These insect pests can infest all parts of the rice plants and at all growth stages (Pathak, 1977).

Plant hoppers and leaf folders are important insect pests which cause significant loss of rice productivity. Rice stem borers are considered as the most serious pests of rice worldwide as they occur and infest plants from seedling to maturity stage. Also stem borers are difficult to control with chemical sprays as they burrow deep into the tissues of rice culms. (Atwal, 1976).

Rice case worm is an important pest of irrigated and rain fed wetland rice in the Orient. Hill (1983) reported that 48 species of major pests and 47 species of minor pests damaged rice plants. Vegetable hopper, Zig-zag rice leafhopper, white-backed plant hopper, stink bug, rice bug, rice case worm,

army worm are serious pests and capable of reducing rice yields in both juvenile and adult stages.

Nair (1995) reported that mechanical, cultural, biological and chemical control are main methods for pest control.

The use of pesticide is the most common and effective although it is off set by the considerable disadvantages attached to be use.

Hill (1983) recorded that natural enemies, predators and parasitoids effectively exploited harmful pests in nature. He described that lady bird beetles except *Epilachna* are predators and very effective as control agents, both as adults and larvae. They are used mainly against aphids, mealy bugs and also to kill small caterpillars.

Myanmar is an agricultural country and the effective development of national economy can be achieved by promoting agricultural sector. Therefore, to control the insect pest of rice is very important for the national interests and agricultural sector.

Patheingyi is Township where cultivation and yield of rice is high and economically important for local people. However there has been no recorded in this research work in this area. Therefore these area are chosen for the study. The main objectives of present study are:

- to record and identify some insect pests species of rice in Patheingyi Township.
- to analyze the occurrence of pest species.

Materials and Methods

3.1 Study site

Specimens were collected from rice plantation in Gwaygyigone village (site A) and Thamadaw Village(site B), Patheingyi Township. The study sites are located between 21° 57' 22.43" N and 96.07° 58.80"E.

3.2 Study period

Study period lasted from June, 2015 to January, 2016.

3.3 Collection materials

Collection materials included insect net, some chloroform, a killing bottle, some cotton, insect pins, paper envelops, a wooden spreading board and some creosote.

3.4 Collection of the specimens.

Weekly observation carried out between 7:00-10:00 Am from the beginning of growing season to the harvest time. A few moths were collected during night with electric lamp posts. The adult specimens were caught mainly by means of an insect collection net and a few were picked up by hand.

3.5 Killing and Preservation of the Specimens

The specimens were placed in a killing bottle containing some cotton socked with a few drops of chloroform.

Moth specimens were transferred to the spreading board. Prior to spread on the spreading board, a pin was inserted through the middle of the thorax from the dorsal side of the body and placed into the groove of the spreading board.

The plant bugs were inserted on the right side of the scutellum and beetles were inserted on the right side of the elytra. Under each specimen there was a label which bears the name of the species, locality and date of capture speciment and they were transferred into the insect box. The box was applied with creosote fluid or naphthalene powder to prevent from ants and fungus contamination.

3.6 Measuring of the specimens

Body lengths were measured from head to end of the abdomen and width were measured at the widest part of the body. Wingspans were measured from the apex of the forewing to that of another side after spreading of the wings.

3.7 Identification of the specimens

The specimens were identified according to Hampson (1894 and1896), Ghosh (1940), Borrer and Delong (1954), Panthak (1977), Hill (1983), Distant (1902), Morris and Waterhouse (2001).

3.8 Data Calculation

The following calculations of the data were based on the formulae given by Thrusfield (1995).

$$\text{Average percentage} = \frac{\text{Total number of each species}}{\text{Total number of all studied species}} \times 100$$

$$\text{Occurrence rate} = \frac{\text{Total number of specific species}}{\text{Total number of all examined species}} \times 100$$

Results

A total of 17 species of insect pest confined to the five orders, only one suborder and included among 11 families and 16 genera were identified during the study period.

A. *O. sativa* (older plants field) (Site A)

B. *O. sativa* (older plants field) (Site B)

Plate 3.1 Study sites of the specimen collection on Patheingyi Township

A. *Oryza sativa* (Deadheart symptom)

B. *O. sativa*, (Whiteheads symptom)

C. Oryza sativa (Deadheart symptom)

Plate 3.2 Damaged host plants and insect pests

Table 4.6 Comparison of total number of individual occurrence of insect species from two study sites.

No	Family	Scientific Name	Total number of individual		Total	Occurrence Percentage (%)
			Site (A)	Site (B)		
1	Tettigoniidae	*Atractomorpha crenulata*	81	36	117	5.02%
2	Acrididae	*Cantantops argustulus*	83	41	124	5.32%
	Total		164	77	241	10.34%
3	Coreidae	*Stenocoris southwoodi*	73	43	116	4.98%
4	Pentatomidae	*Oebalus pungnax*	51	25	76	3.26%
		Nezara viridula	70	34	104	4.46%
	Total		194	102	296	12.70%
5	Cicadellidae	*Recilia dorsalis*	138	73	211	9.06%
6	Pseudococcidae	*Brevennia rebj*	101	54	155	6.65%
	Total		239	127	366	15.71%
7	Scarabaeidae	*Heteronychus sp*	49	24	73	3.14%
8	Pyralidae	*Maruca testutalis*	65	31	96	4.12%
		Nymphula depunctalis	110	65	175	7.51%
		Tryparyza incertulas	183	100	292	12.53%
		Marasmia trapezalis	46	22	68	2.92%
		Cnaphalacrocis medinalis	85	48	133	5.71%
9	Crambidae	*Scirpophaga innotata*	141	77	218	9.36%
10	Noctuidae	*Spodoptera mauritia*	100	58	158	6.78%
		Spodoptera litura	101	70	171	7.33%
11	Saturniidae	*Melantis leda ismene*	27	16	43	1.85%
	Total		858	496	1354	58.11%

All	total	1504	826	2330	100%

Table 4.8 Percentage of recorded families from two study sites

No	Family	Site (A)	Site (B)	Total Occurrence Percentage
1	Tettigoniidae	5.39%	4.36%	5.02%
2	Acrididae	5.5%	4.96%	5.32%
3	Coreidae	4.85%	5.21%	4.98%
4	Pentatomidae	8.04%	7.15%	7.72%
5	Cicadellidae	9.18%	8.84%	9.06%
6	Pseudococcidae	6.7%	6.54%	6.65%
7	Scarabaeidae	3.25%	2.91%	3.14%
8	Pyralidae	32.57%	33.29%	32.79%
9	Crambidae	9.37%	9.32%	9.36%
10	Noctuidae	13.35%	15.49%	14.11%
11	Saturniidae	1.8%	1.93%	1.85%
	Percentage each two sites	64.55%	35.45%	100%

Table 4.9 Composition of insect species in different Order on rice at Patheingyi Township

Order	Family	Genus	Species	Total (%)
Orthoptera	2	2	2	11.76
Heteroptera	2	3	3	17.65
Homoptera	2	2	2	11.76
Coleoptera	1	1	1	5.88
Lepidoptera	3	8	9	52.9
Total	10	16	17	100

5 Orders, 2 Suborders, 10 Families, 16 Genera, 17 Species.

Table 4.11 Monthly rainfall, humidity and temperature of Patheingyi Township during from Jun 2015 - Jan 2016

No	Month	Mean Maximum temperature (°C)	Mean Minimum temperature (°C)	Humidity (%)	Rainfall (inches)
1	June	36.7	26.4	66	1.3
2	July	34.3	25.6	76	6.28
3	August	34.2	25.6	77	4.23
4	September	35.8	25.6	75	3.17
5	October	32	23	81	7.17
6	November	30.9	20	81	1.11
7	December	29.1	16.7	84	0.12
8	January	29.9	16.6	79	0.64

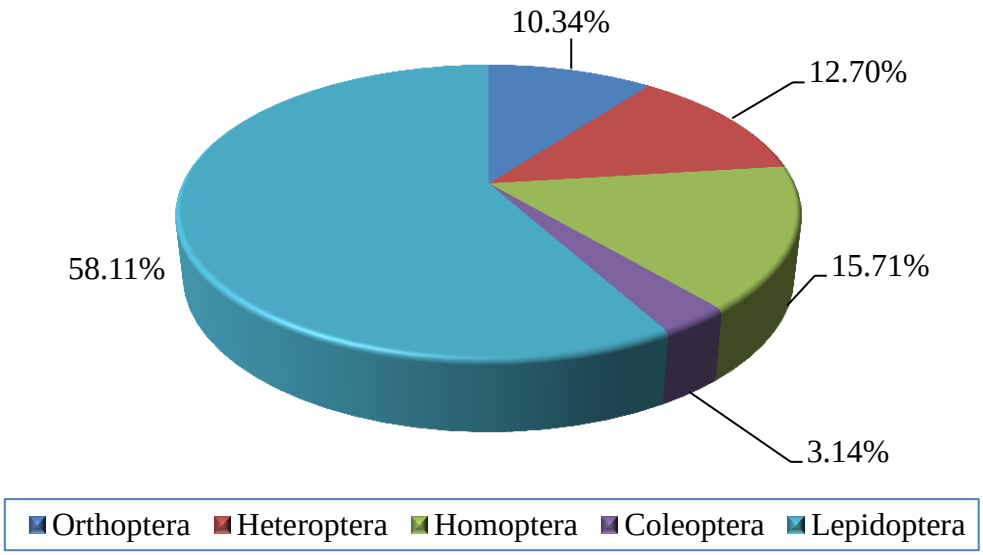


Fig 4.1 Percentage of insect species order on rice at the study sites (A, B)

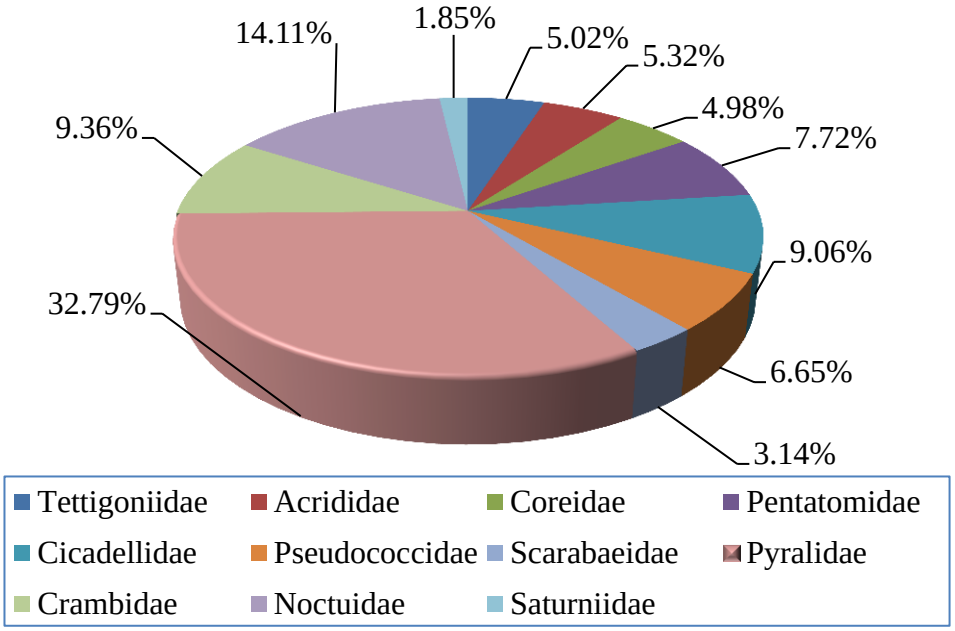


Fig 4.2 Percentage of insect species family on rice at the study sites (A,B)

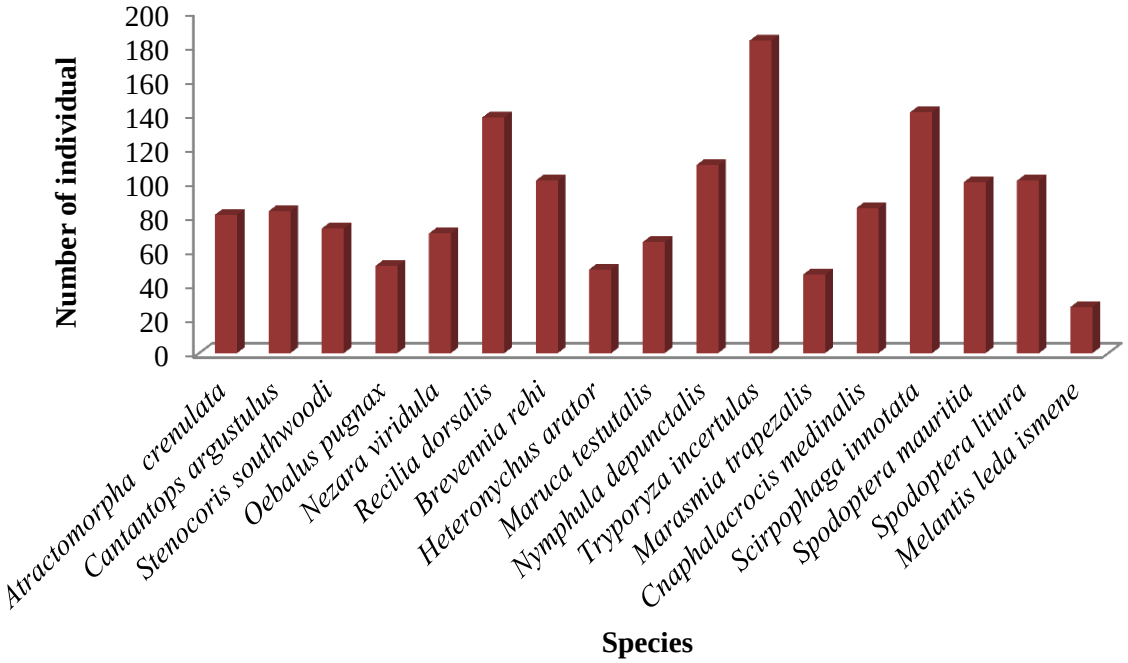


Fig4.3.Total number of insect species from Gwaygyigone Village (Site A)

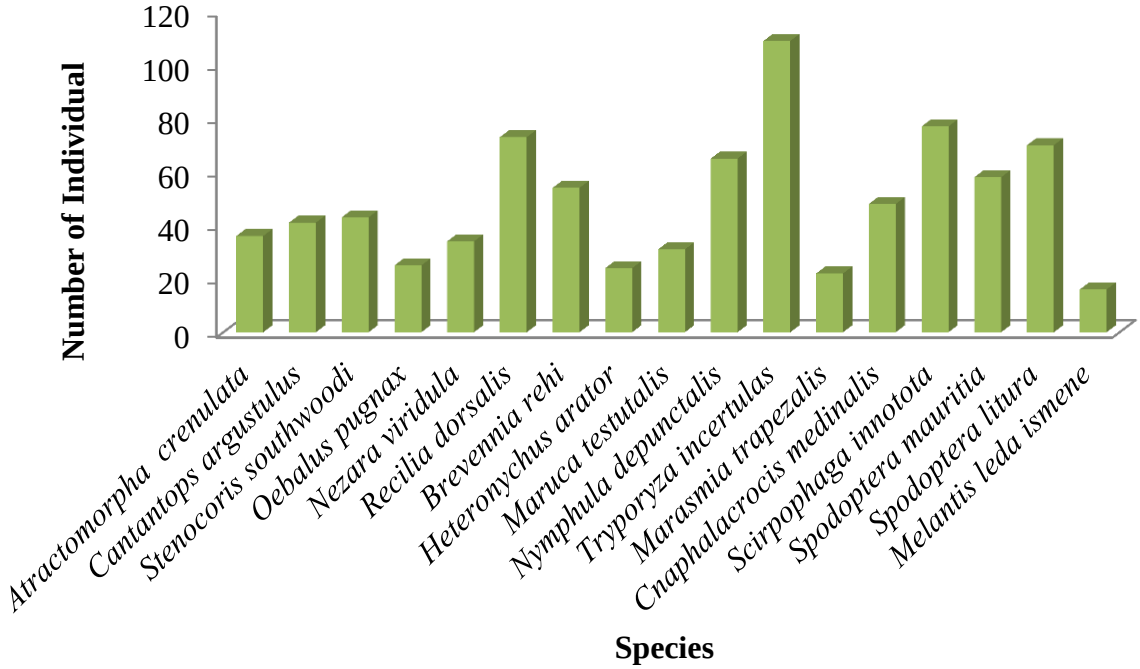


Fig 4.4 Total number of insect species from Thamadaw Village (Site B)

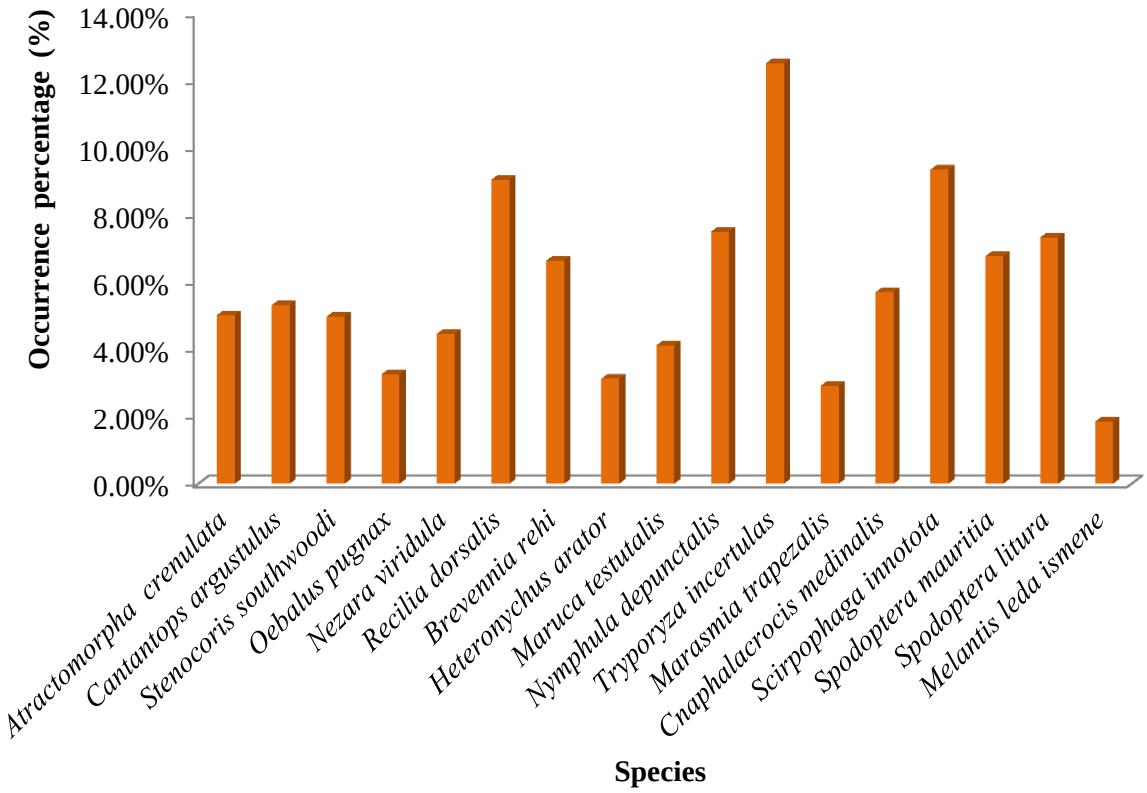


Fig 4.5 Occurrence of Individual percentage insects species from the twostudy sites.

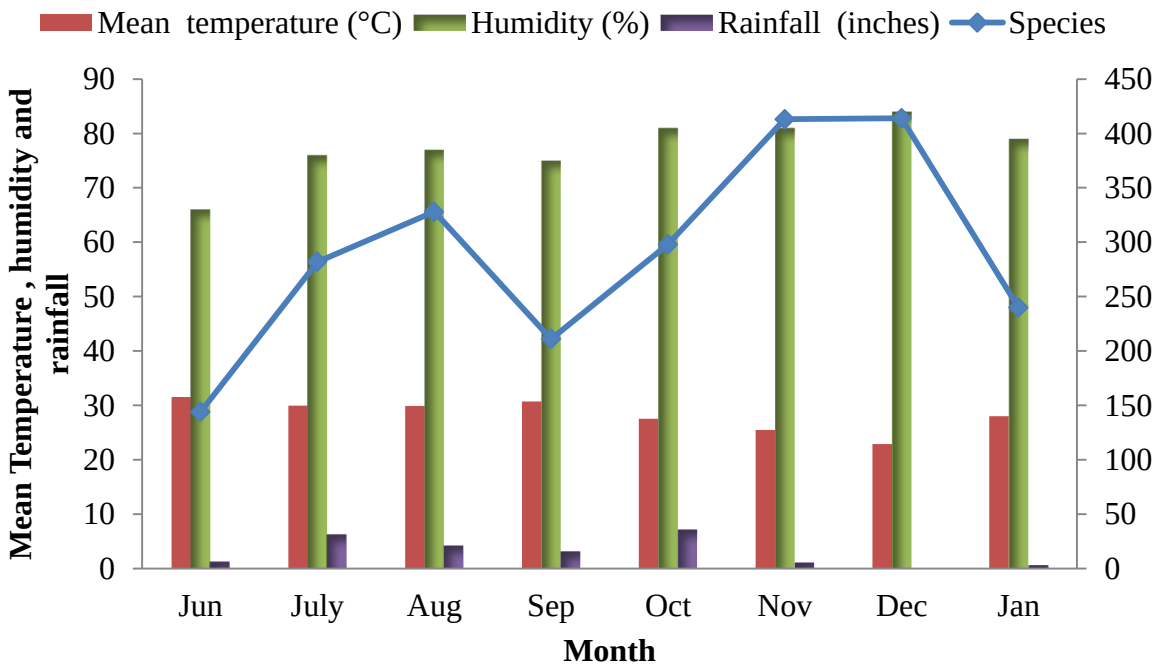


Fig 4.6 Relation between species and weather conditions. the study area (June 2015 to January 2016)

Plate 4.1 The recorded species of Order Orthoptera and Heteroptera

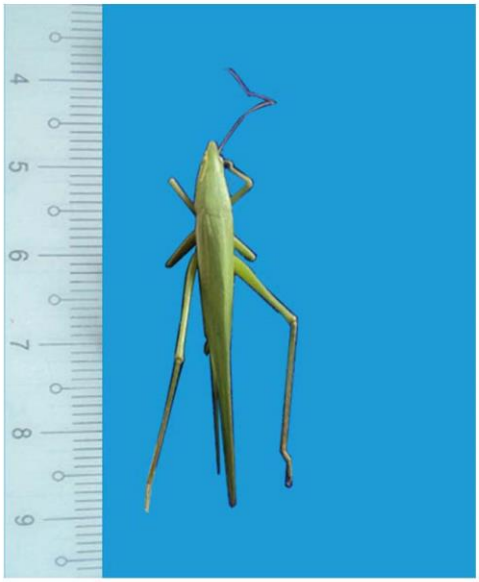
A. *Atractomorpha crenulata*

B. *Cantantops argustulas*

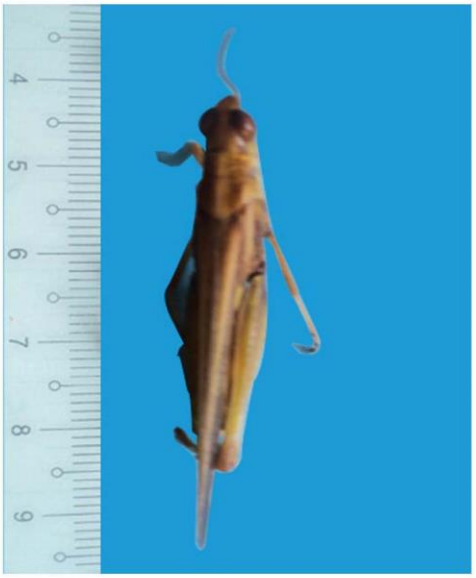
C. *Stenocoris southwoodi*

D. *Oebalus pugnax*

E. *Nezara viridala*



A



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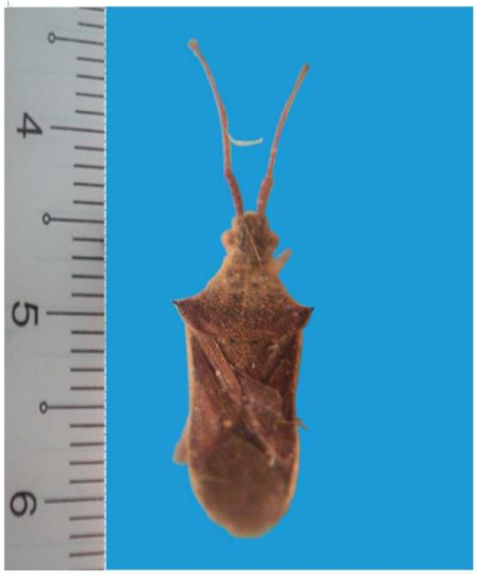

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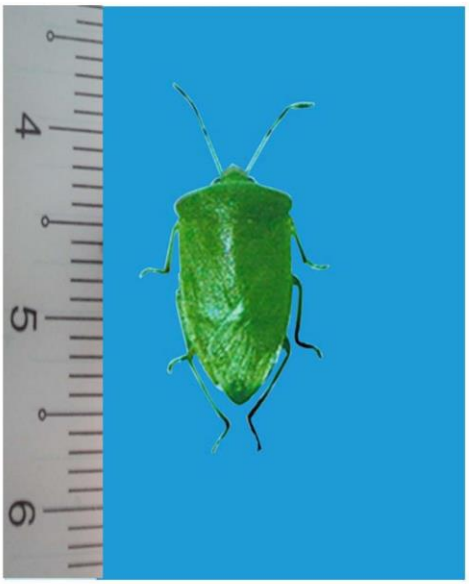


E

Plate 4.1

Plate 4.2 The recorded species of Order Homoptera ,Coleoptera and Lepidoptera

A. *Recilia dorsalis*

B. *Brevennia rehi*

C. *Heteronychus arator*

D. *Maruca testutalis*

E. *Nymphula depunctalis*

F. *Tryporyza incertulas*

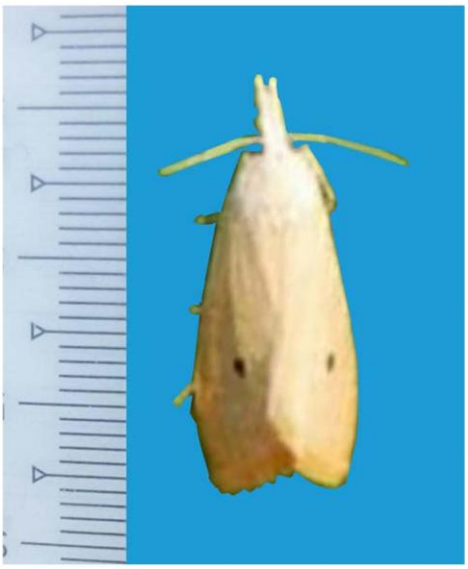
A

B

C

D

E



F

Plate 4.2

G. *Marasmia trapezalis*

H. *Cnaphalocrocis medinalis*

I. *Scirpophaga innotota*

J . *Spodoptera mauritia*

K *Spodoptera litura*

L *Melantis leda ismene*

G

H

I

J

K

L

Plate 4.2

Discussion

In the present study, a total of 17 species of insect pests were collected and identified. The occurrence of 17 species of insect pests were recorded from the two study sites, Site (A) Gwaygyigone village and site (B) Thamadaw village in Patheingyi Township, during July, 2015 to March, 2016.

A total of 2330 specimens were recorded from the two study sites during the study period. Among the orders, the highest number of individual (5.811%) were found in Lepidoptera and the lowest number of individual (3.14%) in Coleoptera.

In addition to among the families, the highest number of individual (32.79%) were observed in Pyralidae and the lowest number of individual (1.85%) belong to family Saturniidae .

Morris and Waterhouse (2001) reported that yellow stem borer, rice army worm, cut worm and rice case worm were very widespread and important pests of rice in Myanmar. In this study, yellow stem borer, *Tryporyza incertulas*, white stem borer *Scirpophaga innotata*, rice leaf hopper, *Recilia dorsalis*, rice army worm, *Spadoptera litura* , Cluster caterpillar, *S. mauritia* and rice case worm,*Nymphula depunctalis* were found to be major significance and of regular occurrence. This finding agrees with Morris and Watershous (2001).

Yellow stem borer is generally considered to be the most serious pest of rice. It is world widely distribution and infested plants from seedling stage to maturity (Pathak, 1977). During the vegetative stage, stem borer damage results in dead hearts or discolored apical shoots feeding during the reproductive stage, can result in white heads. In the present study, *Tryporyza incertulas* and *Scirpophaga innotata* were found as dominant due to their highest occurrence as 12.53% and 9.36% as repectively. *Recilia dorsalis* damage plant by sucking the sap and their occurrence is 9.06%. This finding coincided with (Pathak, 1977).

Spadoptera litura and *S.mauritia* are destructive pests of rice seedling and after heavy infestation could seriously defoliate the plants. Wai Lwin (2010) recorded that *S. maurita* has highest mean percentage (23%) of infestation, followed by *S. litura* with a (14%) mean percentage of infestation in Shwebo Township. In this study *S.litura* was more abundant (7.34%) than *S.maurita* (6.78%). It contrasts with the finding of Wai Lwin (2010).

Me Me Thet Htwe (2005) recorded that stem borer, rice hispa, rice leaf folder, skipper, stink bug are serious pests on rice plant in Kyaukse District. In this study, rice hispa and skipper were not found in rice field. It also contrasts with the finding of Me Me Thet Htwe (2005).

In the present study, when heavily infested by rice leaf folder, *Cnphalocnocis medinalis* the plant appeared scorched, sickly and twig –like. Nair (1995) stated that rice leaf folder damaged vegetative stage after transplating on new field. When they fall on paddy field, the terminal leaves are folded and turned white. This finding agrees with Nair (1995).

Aye Thida Than (2007) reported that Green horned caterpillar, *Melantis leda ismene* fed on the margin and tip of the leaves, leaf tissues and veins and rarely occurred in large numbers. It was found as miner pest on rice field in Thanlyin Township. In the present study *M. leda ismene* was the least occurred species of (1.85%) adult feeding mainly on nectar and is restricted to particular host plant. This finding agrees with Aye Thida Than (2007).

During the study period, the occurrence of insect pest species was highest (64.55%) in Site (A) than the other site. Because this study site is closely located near the grass field. After that paddy cultivating season, the surviving adult migrated to the grass field adjacent to the paddy field. Some pests also migrated to the rice nseries and transplanted crop.

Site (B) showed the lowest occurrence (35.45%).Because, the farmers from this study site used a large amount of pesticides than the acceptable amounts for agricultural plants.

Hill (2005) described that climate plays a great part in regulating insect life.

In this study, monthly recorded data indicated that significant correlation was observed in the population of insect pest population and weather condition. The population of insect pest species (14.07%) was increased in August, 2015.

Peak population of insect pests were observed in December (17.76%). In this month, temperature (27.9°C) relative humidity (84%) and rainfall (0.12 inches) were recorded. This optimum temperature, median relative humidity and rainfall seemed to be favourable to insect species to survive and reproduce reaching a certain level of population size.

The occurrence of insect species decreased in June (6.18%) when the mean temperature is (23.75°C), relative humidity is (79%) and rainfall (0.64 inches) respectively. It shows that Temperature and rainfall have significant effect on the occurrence of the insect pest species.

The present study had provided information on some insect pests of rice in Patheingyi Township. The great number of insect pest species observed were yellow stem borer and white stem borer. It is an evidence that these stem borer are capable of damaging a great number of plants which are economically important.

It could be concluded that abundance of insect pest species depend on the development of the plants, the climatic condition and the abundance of predators.

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