

INFESTATION OF SOME INSECT PESTS AND PREDATORS ON CUCURBIT PLANTS FROM KONE-THAUNG VILLAGE, SALIN ENVIRONS

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Abstract

Infestation of some insects on cucurbit plants were observed from Kone-Thaung Village in Salin environs, during the study period from November, 2017 to June, 2018. A total of 26 insect species confined to 23 genera, 17 families and five orders were recorded. Among these 26 species recorded, 19 species were insect pest species and seven species were predators. The four species of cucurbit plants were *Lagenaria vulgaris* (bu), *Cucurbita maxima* (shwe-phayon), *Cucumis sativus* (thakwar) and *Citrullus vulgaris* (hpa-ye). Order Coleoptera was the most dominant agricultural insect pest species and beneficial species. Seven species are the most serious damaged on cucurbitaceous plants as agricultural pest species such as, *Xenocatanops humilis* Short-horned Grasshopper, *Arocatus melanocephalus* Elm Seed Bug, *Cletus bipunctatus* Leaf-footed Bugs *Epilachna varivestis* Mexican Bean Beetle, *Aulacophora foveicollis* Pumpkin Beetle, *A. frontalis* Black Cucurbit Beetle and *Bactrocera cucurbitae* Melon Fruit Fly were found in all study plants.

Keywords: pests, predators, cucurbit plants, Salin environs

Introduction

Insects are the most numerous and diverse group of animals. Over 790,000 species have been described, far more than for any other animal or plant group. The order Coleoptera (beetles) has 350,000 species, Diptera (flies) has 120,000 species, Lepidoptera (moths and butterflies) has 112,000 species and Hymenoptera (bees and wasps) has 108,000 species. Insects can be important pests in agriculture, forestry and homes, and can threaten human health (T.J. Lysyk, 1995).

Cucurbitaceae is of high economic value being a major source of food for man. Many species of *Cucurbita* (pumpkins, squashes, gourds, marrows, courgettes), *Cucumis* (melons, cucumbers), and *Colocynthis* (water melon) are cultivated for edible purposes (M. Ajuru, 2014). Watermelons, cucumber, squash, gourds, and pumpkins are cucurbits commonly grown in the area. These crop, are attacked by a variety of insects and related pests, including aphids, cucumber beetles, squash bug and squash vine borer (Ricky E. Foster, 2017).

Beneficial insects help field crop producers by reducing pests that can be economically important. Some predators, like lady beetles, feed on pest insects as both larvae and adults (Iowa Soybean Association, 2012). Insect may be helpful to humans by producing, directly or indirectly, materials of economic value, such as silk, honey, beeswax, the production of fruits, vegetables, flowers and seeds, because of pollenizing activity. Insect may be harmful to humans and causes great economic loss by damaging or destroying agricultural crops and other plants (Davidson, R. H. & W.F. Lyon, 1979).

Cucurbit crops are an important component of the processing and fresh market vegetation productivity in Salin environs. Cucumbers are consumed either raw or pickled. With the advancement of rualization and increase in agricultural production, the damages caused by insect pests have recently assumed serious status, which cannot be ignored. Thus, the present study with the following objectives;

- to classify and record the insect pests and predators on the cucurbit plants and
- to investigate the damage parts of the cucurbit plants

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Materials and Methods

Study Area and Period

The present study area was Kone-Thaung village, Salin environs. It is situated 21° 20' N and 95 ° 05' E and near the Ayeyarwaddy river. This area is about 2.0km² (Plate 1). The present study was conducted from November, 2017 to June, 2018.

Data Collection

Specimens were randomly collected fortnightly. Specimens were caught by using insect collection net and some were picked up by hand with the aid of plastic bugs and forceps. Collected specimens were noted and color photograph taken by digital camera.

Preparation and Preservation

The collected insects were killed with mild chloroform. The collection box was used with creosote solution or sprayed insecticide so as to repel the ants and fungus infection of the specimens. And then they were put into plastic boxes.

Identification of Species

The identification method and taxonomic designation of insect species were followed after the method of according to Borror and DeLong (1964), Davidson (1979), Hill (1983), Morris and Waterhouse (2001), and McDougall,S (2013).

Analysis of Data

The species composition of the insect species was analyzed following after Bisht, *et al.*, (2004).

Species composition = Number of particular species / Total number of all species × 100



Plate 1 Location map of study area (Source: Google Earth)

Results

A total of 26 insect species confined to 23 genera, 17 families and five orders were identified and recorded in Cucurbit plants in Kone-Thaung Village, Salin environs.

Descriptive characters of the studied species (Plate 2)

Atractomorpha similis (Green Grass Pyrgimorph Grasshopper) is a greenish in color and weak body is tapered at the shoulders and swollen at the abdomen.

Atractomorpha sp. (Grasshoppers) is brownish in color, with well-developed tegmina and rosy wings. The grasshoppers' bodies are medium-sized, their antennae are short.

Xenocatantops humilis (Short-horned Grasshopper) is body was medium size, brownish. Head was small, not prominent. Antenna was relatively short, filiform. Eyes were brown, a black bar immediately behind the eye.

Trimerotropis pallidipennis (Pallid-winged Grasshopper) is a moderately-sized tan or gray insect. The center of the hind wing has a relatively narrow but conspicuous black band; the wing disk ranges from white to pale yellow, and the apical area is transparent. The hind tibia is yellow.

Arocatus melanocephalus (Elm Seed Bug), the body is dark red in color, and covered in short hairs. The head is black, antennae are also mostly black and underbelly is orange.

Dysdercus cingulatus (Red Cotton Bug) is a mainly red but has a white colour and three black spots.

Rhynocoris fuscipes (Assassin Bug) is a moderately robust elongate bug, mixture of coral red and black coloration dorsally as well as ventrally. Head is wide at the eyes, narrowed anteriorly, reddish and eyes are black and antennae are slender. Abdomen is slightly convex with coral red in color.

Bagrada hilaris (Painted Bug), the adult bug is shield-shaped, and black with white and orange markings. It is bright orange-red and turns darker as it develops, becoming black by the last instar.

Nezara viridula (Green Stink Bug), the body is bright green and shield-shaped and the eyes are usually reddish. *N. viridula* is narrow and long in the green stink bug. *Riptortus pedestris* (Broad-headed Bug) is a moderately sized elongate bug, overall dorsal color brownish, ventral pale yellow with brownish tinge. Triangular head and eyes are large. Abdomen is narrow, U-shaped black band.

Riptortus pedestris (Broad-headed Bug), the head is triangular and eyes are large and antennae long, fourth joint longest. The body is a moderately sized elongate bug, overall dorsal color brownish, ventral pale yellow with brownish tinge. Thorax slightly broad at the base and abdomen is narrow.

Riptortus linearis (Bean Bug), the head is broad, often similar in length and width to the pronotum and the scutellum and that the last antennal segments are elongated and curved.

Cletus bipunctatus (Leaf-footed Bugs) is a small elongate bug, dorsal coloration reddish brown at places, pale yellowish at other places, ventrally pale cream in color, legs of the same color as abdomen ventrally, antennae reddish brown. Head are somewhat triangular. Thorax is pronotum much broad at the humeral angles. *Cheilomenes sexmaculata* (Ladybird Beetle) is the body outline broadly oval to subrounded, dorsum moderately convex and shiny. Head with a black marking in posterior half; pronotum with a T-shaped median marking connected to a broad black band along posterior margin. Ventral side is uniformly yellow. Antenna is short and compact.

Coccinella transversalis (Transverse Ladybird Beetle) is a transverse ladybird shows little variation across its wide range. It has a black head with bright red or orange elytra boldly marked with a black band down the midline and two lateral three-lobed markings.

Cycloneda sanguinea (Unspotted Elytra) is a large ladybird beetle with red, unspotted elytra. The color ranges from orange to deep red. The white and black marks are on the head.

Epilachna varivestis (Mexican Bean Beetle) of the head is pair of prominent black eyes. Head densely punctuate and hairy. The newly emerged adult is of a straw or cream-yellow color. Shortly after emergence, eight black spots of variable size appear on each wing cover arranged in three longitudinal rows on each wing cover.

Galerita janus (False Bombardier Beetle) is a black head and black elytra. The thorax and legs are red in color.

Aulacophora foveicollis (Pumpkin Beetle) is the colour of the elytra varies from pale orange-yellow to bright orange-red to medium brown, and the abdomen is black with soft white hairs.

Aulacophora frontalis (Black Cucurbit Beetle) have the longitudinal groove on the vertex. The color of this species is yellowish brown except elytron black and shining. The head vertical area is with a longitudinal groove on each side.

Dicranolaius sp. (Red and Blue Beetle) is a small shiny red and metallic blue banded beetle with a dark head.

Agelastica alni (Alder Leaf Beetle) is a relatively small beetle, black or metallic blue in colour. The larvae are normally black.

Mylabris variabilis (Blister Beetle) have a cylindrical, elongate body with relatively convex, yellow-orange elytra and wide transverse black wavy stripes. Head is square shaped, with a flat forehead. Antennae are black and long with eleven segments.

Bactrocera cucurbitae (Melon Fruit Fly), the body is mostly orange-brown with a faint black T-shaped mark on the abdomen, and the clear wings have a large brown spot at the tip and a brown stripe at the hind edge.

Efferia deserti (Robber Flies), have a short conical to slender wedge-shaped, its color is usually glossy black. Abdominal coloration is usually greyish to brownish in females. Wings are clear or uniformly tinted, with tints varying from transparent brown to dark black.

Syrphus ribesii (Hoverfly) is shiny black. The eye color is bare and face is yellow. Sternites have lateral and median black marks. Lateral margins of tergites are black except at the ends of the yellow bands.

Dolichomutilla sycorax (Velvet Ant) has a pair of white spots on the second metasomal tergum and an interrupted broad white band on the third tergum.

Composition of insect species

In the present study, 26 insect species confined to 23 genera, 17 families and five orders were identified and recorded in Cucurbit plants during the study period. Among these 19 species which are confined to 16 genera, 12 families are insect pest species. Seven species distributed among seven genera and five families are predator species (Table 1, Plate 2).

In the pest species, the highest numbers 17 species on shwe-phayon, 13 species on bu, eleven species on tha-kwar and ten species on hpa-ye. In predator species, five species each on bu, shwe-phayon and tha-kwar and four species on hpa-ye were occurred in the different host plants (Fig.1, Table 2 & Table 3). In the damaged parts of the plants, attacked by insect pest species

16 species most attacked damaged part of leaves followed by 14 species of flowers, 12 species in buds, nine species in fruits and six species in stems. Infestation of some predator species on various parts of the study plants five species each on leaves and fruits, four species each on buds and flowers and three species on stems were observed from the study area (Fig.2, Table 4 & Table 5).

The most dominant order Coleoptera (10 species, 38.46%), followed by Hemiptera (eight species, 30.77 %), Orthoptera (four species, 15.38 %), Diptera (three species, 11.54 %), and Hymenoptera (one species, 3.85%) were observed (Fig. 3, Table 6). The comparison of insect pests and predators, composition of insect pest species (19 species, 73.08%), and predators (seven species, 26.92 %) were recorded (Fig. 4, Table 7).

Table 1 List of insect species recorded from Kone-Thaung Village during the study period

No	Order	Family	Scientific Name	Common Name	Pest/ Predator		
1	Orthoptera	Pyrgomorphidae	<i>Atractomorpha similis</i>	Green Grass Pyrgimorph Grasshopper	Pest		
			<i>Atractomorpha</i> sp.	Grasshoppers	Pest		
		Acrididae	<i>Xenocatantops humilis</i>	Short-horned Grasshopper	Pest		
			<i>Trimerotropis pallidipennis</i>	Pallid-winged Grasshopper	Pest		
2	Hemiptera	Lygaeidae	<i>Arocatus melanocephalus</i>	Elm Seed Bug	Pest		
		Pyrrhocoridae	<i>Dysdercus cingulatus</i>	Red Cotton Bug	Pest		
		Reduviidae	<i>Rhynocoris fuscipes</i>	Assassin Bug	Predator		
		Pentatomidae	<i>Bagrada hilaris</i>	Painted Bug	Pest		
			<i>Nezara viridula</i>	Green Stink Bug	Pest		
		Alydidae	<i>Riptortus pedestris</i>	Broad-headed Bug	Pest		
			<i>R. linearis</i>	Bean Bug	Pest		
		3	Coleoptera	Coreidae	<i>Cletus bipunctatus</i>	Leaf-footed Bugs	Pest
				Coccinellidae	<i>Cheilomenes sexmaculata</i>	Ladybird Beetle	Predator
					<i>Coccinella transversalis</i>	Transverse Ladybird Beetle	Predator
<i>Cycloneda sanguinea</i>	Unspotted Elytra				Predator		
Carabidae	<i>Epilachna varivestis</i>			Mexican Bean Beetle	Pest		
	<i>Galerita janus</i>			False Bombardier Beetle	Predator		
Chrysomelidae	<i>Aulacophora foveicollis</i>			Pumpkin Beetle	Pest		
	<i>A. frontalis</i>			Black Cucurbit Beetle	Pest		
Melyridae	<i>Dicranolaius</i> sp.			Red and Blue Beetle	Pest		
	<i>Agelastica alni</i>			Alder Leaf Beetle	Pest		
4	Diptera	Meloidae	<i>Mylabris variabilis</i>	Blister Beetle	Pest		
		Tephritidae	<i>Bactrocera cucurbitae</i>	Melon Fruit Fly	Pest		
		Asilidae	<i>Efferia deserti</i>	Robber Flies	Predator		
		Syrphidae	<i>Syrphus ribesii</i>	Hoverfly	Predator		
5	Hymenoptera	Mutillidae	<i>Dolichomutilla sycorax</i>	Velvet Ant	Pest		

Table 2 Occurrence of some insect pest species in different cucurbit plants in the study area

No	Scientific Name	Common Name	Bu	Shwe-phayon	Tha-khwar	Hpa-ye
1	<i>Atractomorpha similis</i>	Green Grass Pyrgimorph Grasshopper	+	+	-	+
2	<i>Atractomorpha</i> sp.	Grasshoppers	-	+	-	-
3	<i>Xenocatantops humilis</i>	Short-horned Grasshopper	+	+	+	+
4	<i>Trimerotropis pallidipennis</i>	Pallid-winged Grasshopper	+	+	-	+
5	<i>Arocatus melanocephalus</i>	Elm Seed Bug	+	+	+	+
6	<i>Dysdercus cingulatus</i>	Red Cotton Bug	+	-	-	-
7	<i>Bagrada hilaris</i>	Painted Bug	-	+	+	-
8	<i>Nezara viridula</i>	Green Stink Bug	+	+	-	-
9	<i>Riptortus pedestris</i>	Broad-headed Bug	-	+	+	-
10	<i>R. linearis</i>	Bean Bug	+	+	-	-
11	<i>Cletus bipunctatus</i>	Leaf-footed Bugs	+	+	+	+
12	<i>Epilachna varivestis</i>	Mexican Bean Beetle	+	+	+	+
13	<i>Aulacophora foveicollis</i>	Pumpkin Beetle	+	+	+	+
14	<i>A. frontalis</i>	Black Cucurbit Beetle	+	+	+	+
15	<i>Dicranolaius</i> sp.	Red and Blue Beetle	-	+	+	-
16	<i>Agelastica alni</i>	Alder Leaf Beetle	+	+	-	-
17	<i>Mylabris variabilis</i>	Blister Beetle	-	-	-	+
18	<i>Bactrocera cucurbitae</i>	Melon Fruit Fly	+	+	+	+
19	<i>Dolichomutilla sycorax</i>	Velvet Ant	-	+	+	-
Total			13	17	11	10

Table 3 Occurrence of some predator species in different cucurbit plants in the study area

No	Scientific Name	Common Name	Bu	Shwe-phayon	Tha-khwar	Hpa-ye
1	<i>Rhynocoris fuscipes</i>	Assassin Bug	+	+	+	+
2	<i>Cheilomenes sexmaculata</i>	Ladybird Beetle	+	+	+	-
3	<i>Coccinella transversalis</i>	Transverse Ladybird Beetle	+	+	+	-
4	<i>Cycloneda sanguinea</i>	Unspotted Elytra	-	-	+	+
5	<i>Galerita janus</i>	False Bombardier Beetle	-	+	-	+
6	<i>Efferia deserti</i>	Robber Flies	+	-	-	+
7	<i>Syrphus ribesii</i>	Hoverfly	+	+	+	-
Total			5	5	5	4

Table 4 Damage parts of some cucurbit plants by some insect pest species from the study area

No	Scientific Name	Common Name	Leaf	Stem	Fruit	Bud	Flower
1	<i>Atractomorpha similis</i>	Green Grass Pyrgimorph Grasshopper	√	-	-	√	√
2	<i>Atractomorpha</i> sp.	Grasshoppers	√	-	-	√	√
3	<i>Xenocatantops humilis</i>	Short-horned Grasshopper	√	-	√	√	√
4	<i>Trimerotropis pallidipennis</i>	Pallid-winged Grasshopper	√	-	-	√	√
5	<i>Arocatus melanocephalus</i>	Elm Seed Bug	√	√	-	√	√
6	<i>Dysdercus cingulatus</i>	Red Cotton Bug	√	-	-	-	-
7	<i>Bagrada hilaris</i>	Painted Bug	√	-	-	-	-
8	<i>Nezara viridula</i>	Green Stink Bug	√	-	√	√	-
9	<i>Riptortus pedestris</i>	Broad-headed Bug	-	-	-	√	√
10	<i>R. linearis</i>	Bean Bug	-	-	-	√	√
11	<i>Cletus bipunctatus</i>	Leaf-footed Bugs	√	√	-	√	√
12	<i>Epilachna varivestis</i>	Mexican Bean Beetle	√	-	√	√	√
13	<i>Aulacophora foveicollis</i>	Pumpkin Beetle	√	√	√	√	√
14	<i>A. frontalis</i>	Black Cucurbit Beetle	√	√	√	√	√
15	<i>Dicranolaius</i> sp.	Red and Blue Beetle	√	-	√	-	√
16	<i>Agelastica alni</i>	Alder Leaf Beetle	√	√	-	-	-
17	<i>Mylabris variabilis</i>	Blister Beetle	√	-	√	-	-
18	<i>Bactrocera cucurbitae</i>	Melon Fruit Fly	-	√	√	-	√
19	<i>Dolichomutilla sycorax</i>	Velvet Ant	√	-	√	-	√
Total			16	6	9	12	14

Table 5 Infestation of some predator species on various parts of the study plants from the study area

No	Scientific Name	Common Name	Leaf	Stem	Fruit	Bud	Flower
1	<i>Rhynocoris fuscipes</i>	Assassin Bug	√	-	-	√	√
2	<i>Cheilomenes sexmaculata</i>	Ladybird Beetle	√	√	√	-	-
3	<i>Coccinella transversalis</i>	Transverse Ladybird Beetle	√	√	√	-	-
4	<i>Cycloneda sanguinea</i>	Unspotted Elytra	√	-	-	√	√
5	<i>Galerita janus</i>	False Bombardier Beetle	√	-	√	√	-
6	<i>Efferia deserti</i>	Robber Flies	-	√	√	-	√
7	<i>Syrphus ribesii</i>	Hoverfly	-	-	√	√	√
Total			5	3	5	4	4

Table 6 The percentage composition of insect species in different orders

No	Order	Number of species	Percentage %
1	Orthoptera	4	15.38 %
2	Hemiptera	8	30.77 %
3	Coleoptera	10	38.46%
5	Diptera	3	11.54 %
6	Hymenoptera	1	3.85%

Table 7 The percentage composition of insect pests and predators recorded from the study area

No	Pest/Predator	Number of species	Percentage %
1	Pest	19	73.08%
2	Predator	7	26.92%
Total			100

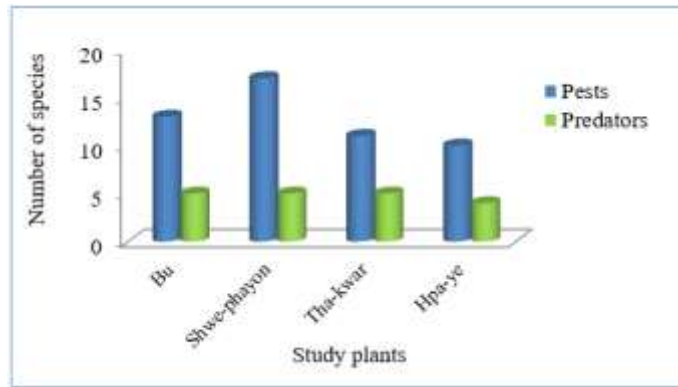


Figure 1 Comparison of some insect pests and predators in different cucurbit plants

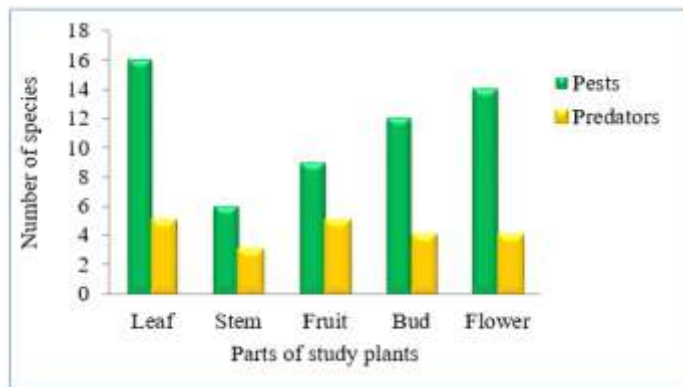


Figure 2 Infestation of some insect pests and predators on different parts of cucurbit plants

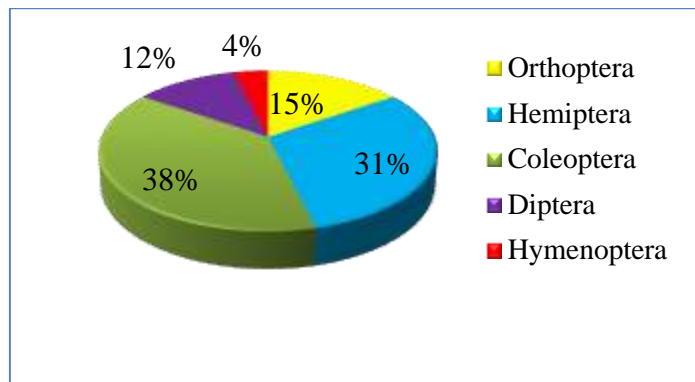


Figure 3 Percentage composition of insect species in different orders

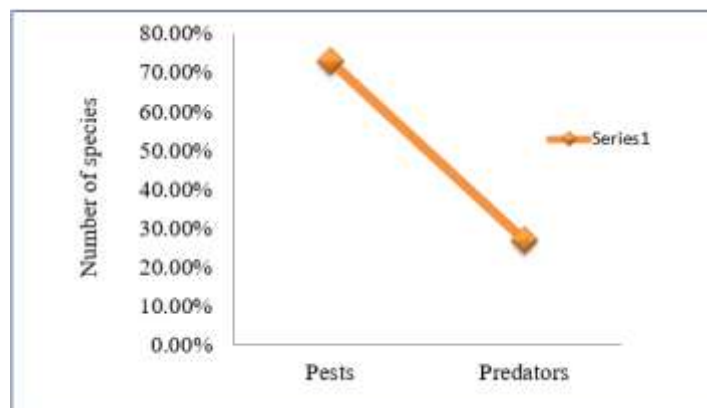
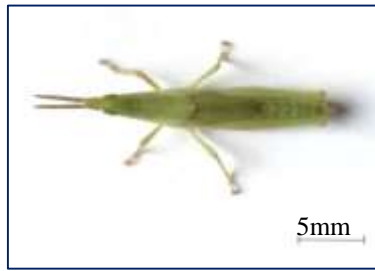


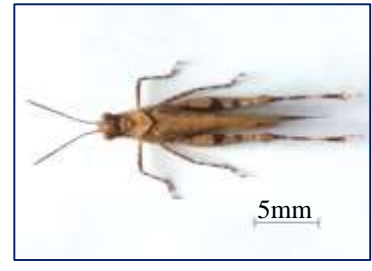
Figure 4 Percentage composition of insect pests and predators in the study area



(A) *Atractomorpha similis*



(B) *Atractomorpha* sp.



(C) *Xenocatantops humilis*



(D) *Trimerotropis pallidipennis*



(E) *Arocatus melanocephalus*



(F) *Dysdercus cingulatus*



(G) *Rhynocoris fuscipes*



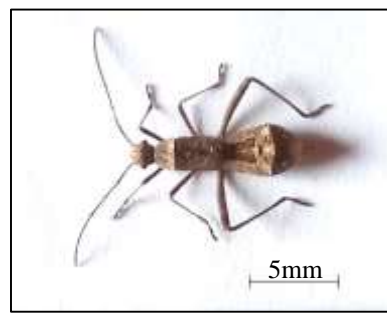
(H) *Bagrada hilaris*



(I) *Nezara viridula*



(J) *Riptortus pedestris*



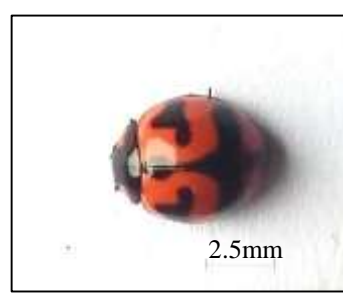
(K) *Riptortus linearis*



(L) *Cletus bipunctatus*



(M) *Cheilomenes sexmaculata*



(N) *Coccinella transversalis*



(O) *Cycloneda sanguinea*



(P) *Epilachna varivestis*



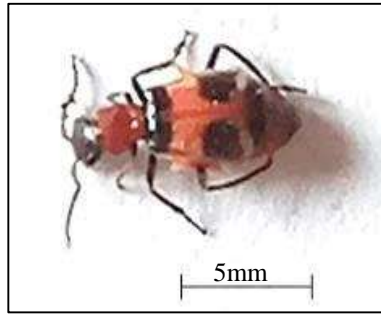
(Q) *Galerita janus*



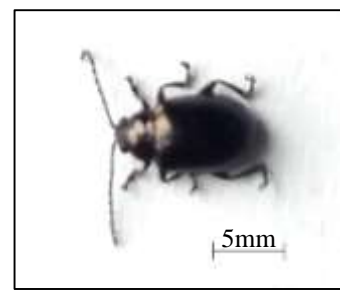
(R) *Aulacophora foveicollis*



(S) *Aulacophora frontalis*



(T) *Dicranolaius* sp.



(U) *Agelastica alni*



(V) *Mylabris variabilis*



(W) *Bactrocera cucurbitae*



(X) *Efferia deserti*



(Y) *Syrphus ribesii*



(Z) *Dolichomutilla sycorax*

Plate 2 Insect species recorded from the study area



(A) *Lagenaria vulgaris* (bu)



(B) *Cucurbita maxima* (shwe-phayon)



(C) *Cucumis sativus* L. (tha-khwar)



(D) *Citrullus vulgaris* (hpa-ye)

Plate 3 Cucurbitaceous plants from the study area



(A) Damage parts of bu



(B) Damage parts of shwe-phayon



(C) Damage parts of tha-khwar



(D) Damage parts of hpa-ye

Plate 4 Cucurbitaceous plants damaged by some insect pest

Discussion

Watermelons, cucumber, gourds, and pumpkins are cucurbits commonly grown in the tropical areas. These crop, are attacked by a variety of insects. A total of 26 insect species confined to 23 genera, 17 families and five orders were recorded in Cucurbit plants. Among these, 19 species (73.08%) are pest species and seven species (26.92%) are predators. From the 26 species, two species could be identified up to genus level, such as *Atractomorpha* sp. and *Dicranolaius* sp. The remaining type of insects was identified down to species level.

Hemiptera true bugs represent the largest order of insects. Most bugs are plant feeders, which they pierce to suck the sap. Other bugs are predators, piercing prey. Many species are agricultural pests while others are beneficial stated that Bertone, M., (2013). In the present study, eight bug species were occurred in order Hemiptera. Among these, seven species were pest species and one species is as predator such as *Rhynocoris fuscipes* Assassin Bug was observed.

Many species of order Orthoptera were crop pest while order Diptera included numerous species of predators stated that Hill (1983). From the study area, all species are as pest in these Orthoptera as well as all species are as predators in Diptera were observed. This results the same with the Hill's report.

Bertone M., (2013) stated that order Hemiptera with 90,000 species true bugs represent the largest order of insects as well as Coleoptera are the largest group of organisms on Earth, making up over 25% of all animal species. With the results, the most dominant order Coleoptera (10 species, 38.46%), followed by Hemiptera (eight species, 30.77 %), Orthoptera (four species, 15.38 %), Diptera (three species, 11.54 %), and Hymenoptera (one species, 3.85%) were observed.

Gerald Brust (2009) mentioned a large variety of cucurbits most have a few very important pests in common such as cucumber beetles, squash bugs, mites and aphids. Some pests are more specific such as squash vine borer, which attacks pumpkins and squash, but rarely watermelon, cucumber. In the study, the insect pest species, 17 species on shwe-phayon, 13 species on bu, eleven species on tha-kwar and ten species on hpa-ye were occurred in the different host plants. Among these, seven species are the most serious damaged on cucurbitaceous plants as agricultural pest species such as, *Xenocatantops humilis* Short-horned Grasshopper, *Arocatus melanocephalus* Elm Seed Bug, *Cletus bipunctatus* Leaf-footed Bugs *Epilachna varivestis* Mexican Bean Beetles, *Aulacophora foveicollis* Pumpkin Beetle, *A. frontalis* Black Cucurbit Beetle and *Bactrocera cucurbitae* Melon Fruit Fly attacked in all study plants.

Hill (1983) described that pest damage is probably most conveniently considered according to the part of the plant body attacked, and in the following account it is studied under headings; damaged leaves, flowers and buds, fruit and stems. In the present study, the damaged parts of the plants, attacked by insect pest species 16 species most attacked damaged part of leaves followed by 14 species of flowers, 12 species in buds, nine species in fruits and six species in stems were occurred. Shepard, *et al.* (1987) stated that the natural balance between insect pests and their natural enemies is often disrupted by indiscriminate use of chemical insecticides. Although insecticides are needed in some cases, they must be used judiciously to save these vulnerable natural control agents. In the present observation, seven predator species infest on cucurbits as beneficial insect. The beneficial species often control insect pests, especially in the places use of pesticides is avoided.

Spotted beetles are distributed from East Asia to South Asia and Australia. They are polyphagous, and feed predominantly on cucurbits, tomato, potato, and kidney bean as well as eggplant. These beetles are considered to be one of the most serious groups of pests damaging eggplant stated that David (2001). During the study period, three spotted beetles such as *Menochilus sexmaculatus* Six-spotted Zigzag Ladybird, *Coccinella transversalis* Transverse

Ladybird Beetle *Epilachna varivestis* Mexican Bean Beetles were occurred. Of these three spotted beetles, two species are predators and one species is a pest. *Epilachna varivestis* Mexican Bean Beetles is a quite serious pest of many crops found in all study plants. Both adults and larvae feed on the leaves and fruits of cucurbits.

Metha and Sandhu (1989) stated that Pumpkin beetles are the major pest of cucurbit plants. In the present study, two types of Pumpkin beetles such as *Aulacophora foveicollis* Pumpkin Beetle and *A. frontalis* Black Cucurbit Beetle which can cause serious damage to cucurbit. Dhillon *et al.*, (2005) reported that *Bactrocera cucurbitae* Melon Fruit Fly is distributed widely and is a major pest of cucurbitaceous vegetables. From the results, this species attacked by all study plants and serious damaged parts of the cucurbit plants.

In conclusion, Cucurbitaceae is of high economic value being a major source of food for man. Many species of Cucurbit plants as Bu, Shwe-phayon, Tha-khwar and Hpa-ye are cultivated for edible purposes. This is an attempt to compile on the different uses of these plants and to recommend that increased in production of these plants will be profitable and will contribute to food security and livelihood sustainability in Salin environs.

Acknowledgements

We would like to express our gratitude to Dr Thet Lwin, Rector, Pakokku University for his kind permission to conduct this research. We are deeply indebted to Professor and Head Dr Htwe Htwe, Zoology Department, Pakokku University, for her suggestion and encourage my research work.

References

- Bertone, M., (2013). *Guide to Common Insects and Other Arthropods Found in and Around North Carolina Homes*.
- Bisht, M.S., Kukreti, M. and Shantikhuson, (2004). *Relative abundance and distribution of bird fauna of Garhwal Himalaya*. *Eco. Env and cons.*, 10(4);451-460
- Borror, D.J., Charles A. Triplehorn and Norman F. Johnson, (1964). *An introduction to the study of insect*. Saunders College Publishing, New York.
- Davidson, R. H. & W.F. Lyon, (1979). *Insect Pests of Farm, Garden and Orchard*. Seventh edition, in the united State of America.
- David BV. (2001). *Elements of Economic Entomology (Revised and Enlarged Edition)*. Popular Book Depot, Chennai, India. 590 p.
- Dhillon, M.K., Singh, R., Naresh, J.S., and Sharma, H.C., (2005). The melon fruit fly, *Bactrocera cucurbitae*; A review of its biology and management. *Journal of Insect Science*. ISSN;1536=2442
- Gerald Brust, (2009). *Cucurbit Pest Management*. IPM Vegetable Specialist, University of Maryland Extension.
- Hill, D. S., (1983). *Agricultural insect pest of the tropic and their controls*. Second Edition, Cambridge University.
- Iowa Soybean Association, (2012.) *Field Crop Insects*. Iowa State University of Science and Technology.
- M. Ajuru and G. Ajuru, (2014). *Indigenous and Exotic Cucurbits in Nigeria*, *Current Advances in Plant Sciences Research*, 1 (1), 12-17.
- McDougall S., Watson A., Stodart B., Napier T., Kelly G., Troidahl D. and Tesoriero L. (2013). *A field guide for the identification of insect pests, beneficials, diseases and disorders in Australia and Cambodia*. Australian Centre for International Agricultural Research: Canberra.
- Metha, P.K and G.S.S Sandhu., (1989). Studied on host preference and rate of feeding by Red Pumpkin Beetle (*Aulacophora foveicollis*) on different cucurbit Veg. *Sci*. 16 (1): 66.74.
- Morris, H., and Waterhouse, D. F., (2001). *The Distribution and Importance of Arthropod Pests and Weeds of Agriculture in Myanmar*. Australian Centre for International Agricultural Research, Canberra.
- Ricky E. Foster, (2017). *Vegetable Insects. Cucurbit insect management cucurbit insect management*. Department of Entomology, Purdue University.
- Shepard BM, Barrion AT, Lisinger JA. *Helpful insects, spiders, and pathogens*. International Rice Research Institute Los Baños, Laguna, Philippines, 1987.
- T.J. Lysyk, (1995). *The Insect Collector's Guide*. Entomological Society of Alberta.