The Seasonal Population Fluctuation of Insect Pests and Natural Enemies of Brinjal Cultivated in Hinthada Environs

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Abstract

The present study of insect pests of brinjal at Talokehtaw village, Hinthada Township, Ayeyawady Region was conducted during the period from June, 2010 to May, 2011. A total of seven species of insect pests and two species of natural enemies were recorded, *Amrasca devastans*, *Bemisia tabaci*, *Aphis gossypii* and *Eublemma olivacea*, were recorded throughout the year. *Leucinodes orbonalis* and *Epilachna dodecastigma* were recorded as major insect pests in the present study. The population fluctuation of insect pests was more abundant in second crop season than in first crop season. *Eocanthecona furcellata* and *Coccinella transversalis* were natural enemies and they were found in *Solanum melongena* and S. *ovigerum* respectively.

Keywords: Insect pests, brinjal, Talokehtaw village, natural enemies, population

Introduction

Brinjal, also called aubergine or eggplant, was one of the top ten vegetables in the world, and brinjal occupied an important position in everyday diet due to its high nutritive value. It contained Vitamin A, B, C and also rich minerals like iron, phosphorus and calcium Chandrakumar *et al*. (2008).

In Myanmar brinjal was consumed as curry and other food preparatory. It is extensively cultivated all over the country. In the tropic, brinjal production was severely constrained by several insect pests and mites pests.

The major pests included brinjal fruit and shoot borer, leaf roller, stem borer, blister beetle, red spider mite and little leaf disease (Gapud and Canapi, 1994). The losses caused from season to season depending upon environmental factors were reported by Gangwar and Sachen (1981).

The decrease or increase in the abundance of certain pest population not always depends on the availability of its host plant but also depends on the weather parameter (Stehr, 1991). The objective of the present study was to investigate the seasonal population succession of insect pests and predators in two different crop seasons.

Materials and Methods

Study site

Talokehtaw village, Hinthada Township, Ayeyawady Region was chosen as a study site, which is located at 17° 38′ N and 95°18′ E (Fig. 1).

Study period

Wet crop season lasted for five months, from June, 2010 to October, 2010 and dry crop season lasted for six months, from December, 2010 to May, 2011.

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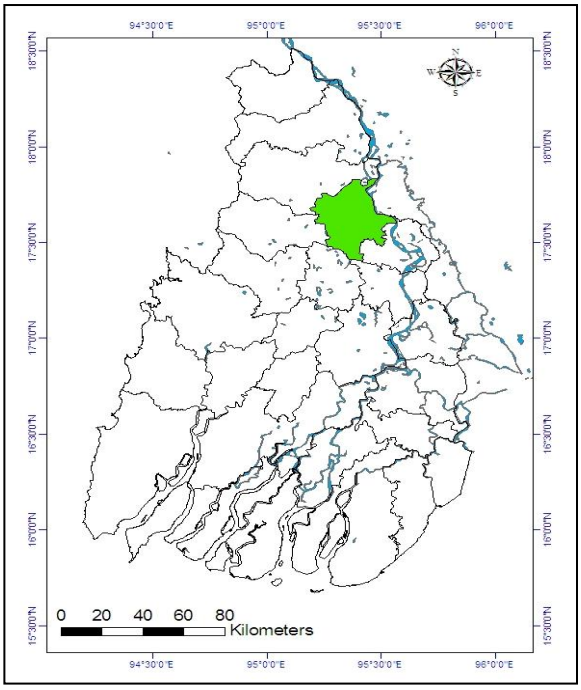

Figure (1) Map showing study site (Hinthada Township) (Source: Department of Geography, Hinthada University).

Collection of data

In the early morning, specimens were collected fortnightly. Two species of brinjal at different plots were studied respectively. There were 15 rows in each plot and 15 plants in each row, 60 cm apart between plants. The measurement of a row was 10 m (Length) x 1 m (Width). The measurement between rows was 1 m. Damaged fruit and six leaves were sampled per each five plants of middle three rows of plants. Among six leaves, each two leaves were taken from upper, middle, and lower plant strata. Collected specimens were brought with plastic boxes to the laboratory for identification and further biological investigation. Specimens were identified as well as classified according to Ghosh (1940), Roger (1978), Hill (1983), and Srinivasan (2009).

Results

Seasonal population fluctuation of insect pests and natural enemy of eggplant *Solanum melongena* in first crop season (2010)

Total of seven species of insect pests and one species of predator were recorded in first crop season.

The maximum population of whitefly, *B.tabaci*, leaf roller, *E.olivacea*. were recorded in June with 1.59 ±0.37 whitefly/plant and 0.81 ±0.96 larvae/plant, respectively. Minimum population of whitefly was recorded in August with 0.50 ±0.61 whitefly/plant and leafroller was recorded in October with 0.26 ±0 larva/plant.

Population of leafhopper, *A.devastans* and twelve spotted beetle, *E.dodecastigma* and cluster caterpillar, *S.litura* were recorded to be highest in July with 1.36 ±0.89 leafhopper/plant, with 0.66 ±0 beetles/plant and 0.90 ±0.42 larvae/plant, respectively. The

minimum population of leafhopper with 0.40 ±0 leafhopper/plant in October, with 0.25 ±0.07 beetles/plant from August to October and with 0.19 ±0.09 larvae/plant in June.

The peak population of Aphid, *A.gossypii* and fruit and shoot borer, *L.orbonalis* were recorded in August with 1.43 ±0.24 aphid/plant and with 0.90 ±0.14 larvae/plant, respectively. The least population was recorded with 0.23 ±0.04 aphid/plant in July and with 0.06 ±0.08 larvae/plant in October.

During June to October of 2010 wet crop season, the insect pests were recorded throughout the year but the predator, stink bug was recorded only in August.

Table (1) Recorded species of insect pests and natural enemy on eggplant variety *Solanum melongena* (Ka yan thee plant) (2010-2011).

No	Scientific Name	Common Name	Family	Order
1	*Eocanthecona furcellata*	Stink bug	Pentatomidae	Hemiptera
2	*Amrasca devastans*	Leafhopper	Cicadellidae	-
3	*Bemisia tabaci*	Whitefly	Aleyrodidae	-
4	*Aphis gossypii*	Melon aphid	Aphididae	-
5	*Epilachna dodecastigma*	Twelve spotted lady bird beetle	Coccinellidae	Coleoptera
6	*Leucinodes orbonalis*	Fruit and shoot borer	Pyralidae	Lepidoptera
7	*Spodoptera litura*	Cluster caterpillar	Noctuidae	-
8	*Eublemma olivacea*	Leaf roller	Tortricidae	-

Table (2) Recorded species of insect pests and natural enemy of white eggplant *Solanum ovigerum* (Ka yan kyut plant) (2010-2011).

No	Scientific Name	Common Name	Family	Order
1	*Amrasca devastans*	Leafhopper	Cicadellidae	Hemiptera
2	*Bemisia tabaci*	Whitefly	Aleyrodidae	-
3	*Aphis gossypii*	Melon aphid	Aphididae	-
4	*Coccinella transversalis*	Transverse lady bird beetle	Coccinellidae	Coleoptera
5	*Epilachna dodecastigma*	Twelve spotted lady bird beetle	Coccinellidae	-
6	*Leucinodes orbonalis*	Fruit and shoot borer	Pyralidae	Lepidoptera
7	*Spodoptera litura*	Cluster caterpillar	Noctuidae	-
8	*Eublemma olivacea*	Leaf roller	Tortricidae	-

(A)  (B) 

Plate (1) *Solanum* spp. at study sites (A) *S. melongena* (B) *S. ovigerum.*

(a) *Amrasca devastans*

(b) *Bemisia tabaci*

(c) *Aphis gossypii*

(d) *Epilachana dodecastigma*

(e) *Leucinodes orbonalis*

(f) *Spodoptera litura*

(g) *Eublemma olivacea*

Plate (2) Recorded insect pests on *Solanum* spp.

(a) *Eocamthecona furcellata*

(b) *Coccinella transversalis*

Plate (3) Recorded natural enemies on *Solanum* spp.

Seasonal population fluctuation of insect pests and natural enemy on eggplant *S.melongena* in second crop season (2010-2011)

Total of six species of insect pests were recorded in second crop season.

The maximum population of whitefly, *B.tabaci*, leaf roller, *E.olivacea* were recorded in February with 15.1 ±5.79 whitefly/plant and 0.29 ±0.04 larvae/plant, respectively. The minimum population of whitefly was recorded with 0.10 ±0.14 whitefly/plant in May. Population of leaf roller was not recorded in December and January of second crop season.

Population of leafhopper, *A.devastans* and aphid, *A.gossypii* and fruit and shoot borer, *L.orbonalis* were recorded to be highest in April with 1.76 ±0.98 leafhopper/plant, with 6.95 ±7.00 aphid/plant and with 0.43 ±0.14 larvae/plant, respectively. The least population of leafhopper was recorded with 0.66 ±0.09 in February. The population of aphid was not recorded in May, of second crop season.

No population of fruit and shoot borer was recorded in December and January.

Maximum population of twelve spotted beetle, *E.dodecastigma* was recorded with 3.78 ±3.93 beetle/plant in May. No population of twelve spotted beetle was recorded in December, January and March.

Population of cluster caterpila, *S.litur* and *E. furcellata* were not recorded throughout the second crop season in December, 2010 to May, 2011.

Table (3) Seasonal population fluctuation of insect pests and natural enemies on eggplant *S. melongena* (2010 to 2011).

Sr. No.	Species	First crop season (Mean number per plant)					Second crop season (Mean number per plant)					
		June	July	August	Sept;	October	Dec;	Jan;	Feb;	March	April	May
1	*Amrasca devastans* (Leafhopper)	1.33 ±0	1.36 ±0.89	0.46 ±0.19	0.76 ±0.61	0.40 ±0	1.60 ±0.28	0.83 ±0.06	0.66 ±0.09	0.73 ± 0.28	1.76 ±0.98	0.79 ±0.94
2	*Bemisia tabaci*(Whitefly)	1.59 ± 0.37	1.13 ±0.18	0.50± 0.61	0.73 ±0.46	0.63 ± 0.04	6.71 ±1.62	11.53 ±4.70	15.10 ±5.79	10.80 ±3.67	4.66 ±3.11	0.10 ±0.14
3	*Aphis gossypii*(Aphid)	0.53 ±0.18	0.23 ±0.04	1.43 ±0.24	0.79 ±0.19	1.16± 0.23	3.00 ±1.40	1.73 ±0.38	3.93±4. 05	4.50 ±6.36	6.95 ±7.00	Nil
4	*Epilachna duodecastigma* (Twelve spotted ladybird beetel)	0.59 ±0.37	0.66 ±0	0.25 ±0.07	0.25 ±0.07	0.25 0 0.07	Nil	Nil	0.19 ±0.19	Nil	0.06 ±0.09	3.78 ±3.93
5	*Leucinodes orbonalis*(fruit and Shoot borer)	0.30 ± 0.14	0.88 ±0.59	0.90 ±0.14	0.49 ±0.04	0.06 ±0.08	Nil	Nil	0.35 ±0.07	0.29 ±0.23	0.43 ±0.14	0.13 ±0.18
6	*Spodoptera litura* (cluster caterpillar)	0.19 ±0.09	0.90 ±0.42	0.80 ±0	0.23 ±0.04	Nil	Nil	Nil	Nil	Nil	Nil	Nil
7	*Eublemma olivacea* (Leafroller)	0.81 ±0.96	0.36 ±0.04	0.43 ±0.04	0.53 ±0.18	0.26 ±0	Nil	Nil	0.29 ±0.04	0.09 ±0.04	0.16 ±0.04	0.10 ±0.14
8	*Eocanthecona furcellata*(Stink bug)	Nil	Nil	1.85 ±0.21	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

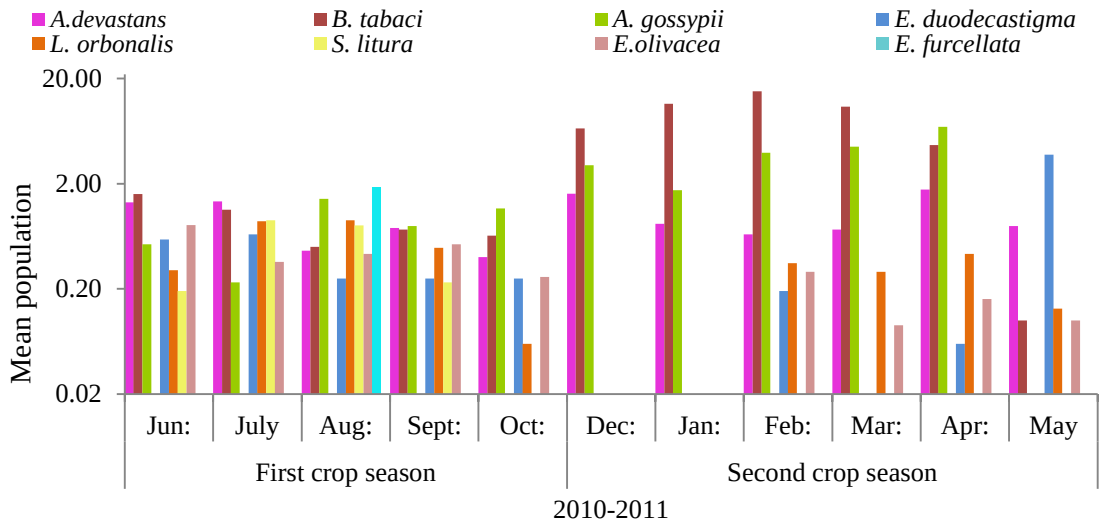

Figure (2) Seasonal population fluctuation of insect pests and natural enemies on eggplant *S. melongena* (2010-2011).

Seasonal population fluctuation of insect pests and natural enemy on white eggplant *S.ovigerum* in first crop season (2010)

Total of seven species of insect pests and one species of predator were recorded in first crop season.

The maximum population of leafhopper, *A.devastans* was recorded with 1.5 ±0.14 leafhopper/plant in September. The minimum population was recorded with 0.59 ±0.09 leafhopper/plant in June.

Maximum population of whitefly, *B.tabaci* and cluster caterpillar, *S.litura* were recorded in July with 1.56 ±0.14 whitefly/plant and with 0.60 ±0.28 larvae/plant, respectively. Minimum population of whitefly and cluster caterpillar in October with 0.52 ±0.20 whitefly/plant and 0.03 ±0.04 larvae/plant.

Population of aphid, *A.gossypii*, twelve spotted beetles, *E.dodecastigma* ,fruit and shoot borer, *L.orbonalis* were recorded to be the highest in October with 0.80 ±0 aphid/plant, though in August 0.53 ±0.18 beetles/plant and with 0.6 ±0.28 larvae/plant, respectively.

The maximum population of leafroller, *E.olivacea* was recorded with 0.39 ±0.37 larvae/plant in June. The minimum population of leaf roller was recorded with 0.09 ±0.04 larvae/plant in July.

During June to October of 2010 wet crop season, the insect pests were recorded throughout the year.

The maximum population of predator transverse lady bird beetle, *C.transversalis* was recorded with 0.30 ±0 beetle/plant in October. The population of predator was not recorded in June.

Seasonal population fluctuation of insect pests and natural enemy on white eggplant *S.ovigerum* in second crop season (2010-2011)

Total of six species of insect pests were recorded in second crop season (2010-2011).

The maximum population of leafhopper, *A.devastans* and fruit and shoot borer, *L.orbonalis* were recorded in April with 2.76 ±2.31 leafhopper/plant and 0.47 ±0.29 larvae/plant, respectively. The minimum population of leafhopper was recorded with 0.56 ±0.79 leafhopper/plant in May. The minimum population of fruit and shoot borer was not recorded in December.

The population of whitefly *B.tabaci* was recorded to be the highest with 15.73 ±0.46 whitefly/plant in March. The population of whitefly was not recorded in December and January.

The maximum population of aphid, *A.gossypii* was recorded with 1.93 ±0.28 aphid/plant in January. It was not recorded in May.

The peak population of twelve spotted beetle, *E.dodecastigma* was recorded with 2.50 ±2.90 beetle/plant in May. The population of beetle was not recorded in December, January and March.

The maximum population of leaf roller, *E.olivacea* was recorded with 1.66 ±2.35 larvae/plant in May. The minimum population of leaf roller was recorded with 0.10 ±0.14 larvae/plant in December.

Any predator was not recorded in second crop season.

Table (4) Seasonal population fluctuation of insect pests and natural enemies on white eggplant *S. ovigerum* (2010 to 2011).

Sr. No.	Species	First crop season (Mean number per plant)					Second crop season (Mean number per plant)					
		June	July	August	Sept;	October	Dec;	Jan;	Feb;	March	April	May
1	*Amrasca devastans* (Leafhopper)	0.59 ±0.09	0.79 ±0.47	1.39 ±0.19	1.50 ±0.14	0.79 ±0.19	0.66 ±0.65	1.29 ±0.23	0.89 ±0.33	0.69 ±0.51	2.76 ±2.31	0.56 ±0.79
2	*Bemisia tabaci* (Whitefly)	0.76 ±0.04	1.56 ±0.14	0.99 ±0.09	0.93 ±0.38	0.52 ±0.20	Nil	Nil	5.76 ±3.91	15.73 ±0.46	2.43 ±1.45	0.33 ±0.46
3	*Aphis gossypii* (Aphid)	0.53 ±0.18	0.60 ±0.28	0.79 ±0.19	0.63 ±0.24	0.80 ±0	0.73 ±1.03	1.93 ±0.28	1.53 ±0.66	0.43 ±0.6	1.06 ±0.37	Nil
4	*Epilachna dodecastigma* (Twelve spotted ladybird beetle)	0.33 ±0	0.26 ±0.09	0.53 ±0.18	0.29 ±0.04	0.01 ±0.04	Nil	Nil	0.13 ±0.09	Nil	0.06 ±0.09	2.50 ±2.90
5	*Leucinodes orbonalis* (fruit and Shoot borer)	0.20 ±0	0.43 ±0.04	0.60 ±0.28	0.56 ±0.04	0.39 ±0.09	Nil	0.13 ±0.18	0.20 ±0	0.33 ±0.09	0.47 ±0.29	0.23 ±0.14
6	*Spodoptera litura* (Cluster caterpillar)	0.19 ±0.09	0.60 ±0.28	0.43 ±0.04	0.13 ±0	0.03 ±0.04	Nil	Nil	Nil	Nil	Nil	Nil
7	*Eublemma olivacea* (Leafroller)	0.39 ±0.37	0.09 ±0.04	0.23 ±0.14	0.19 ±0.09	0.16 ±0.04	0.10 ±0.14	0.26 ±0.09	0.23 ±0.04	0.16 ±0.14	0.13 ±0.09	1.66 ±2.35
8	*Coccinella transversalis* (Transverse ladybird beetle)	Nil	0.23 ±0.04	0.26 ±0.09	0.19 ±0.09	0.30 ±0	Nil	Nil	Nil	Nil	Nil	Nil

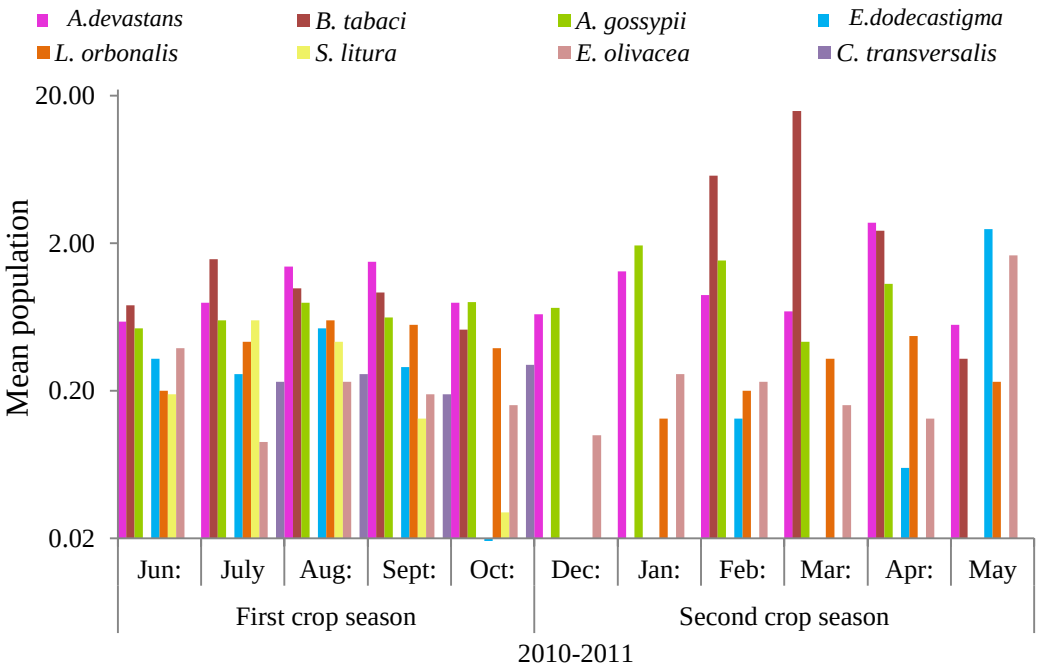

Figure (3) Seasonal population fluctuation of insect pests and natural enemies on white eggplant *S. ovigerum* (2010-2011).

Discussion

A total of seven species of insect pests and two species of natural enemies were recorded in the present study. Seven species of insect pests were collected from these two different species of brinjal *S.melongena* and *S.ovigerum*.

The insect pests population of brinjal, *S.melongena* (Ka yan thee) was more abundant than *S.ovigerum* (Ka yan kyut) because of more large surface area of leaves for pests in two crop seasons. Whitefly, *B.tabaci* was also found in wet crop season. It may be seen that they were the near by bamboos and the banana plants. The population of *B.tabaci*, *A.gossypii*, wase larger in second crop season than in first crop season. Srinivasan (2009) stated that whitefly favored hot and second conditions. While heavy rain showers drastically reduce, its population build-up. Bainbrigge and Flecher (1914) found that *E.dodecastigma* is often a serious pest on brinjal. In both two crop seasons the peak population of *E. dodecastigma* was recorded with 3.78 ±3.93 in May. Thus, the present study was agreed with the above authors.

The population of cluster catipilla, *S.litura* was recorded in first crop season but not in second season. Leafhopper and whitefly were found throughout two crop seasons.

Khin Thann Thann Soe (2007) reported that stink bus, *E.furcellata* was an important predator of larvae of *S.litura*. The population of predator *E.furcellata* was recorded in *S.melongena* (Ka yan thee plant) in first crop season but not in second crop season. It may be due to lack of preferred food for these species.

Shepard *et al*. (1999) stated that *C.transversalis* fed on aphids, eggs of lepidopteron and other soft bodies insect pests. The population of predator *C.transversalisl* was recorded in *S.ovigerum* (Ka yan kyut plant) in first crop season but not in second crop season.

Conclusion

In the present study, a total of seven species of insect pests and two species of natural enemies were recorded. The insect pests population of brinjal, *S.melongena* (Kayan thee) was more abundant *S.ovigerum* (Kayan Kyut). The population of *B.tabaci*, *A gossypii* was larger in second crop season than in first crop season. The peak population of *E.dodecastigma* was recorded in May. Natural enemies may be also maintained the incidence of insect pests population at level below economic injury.

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