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Insect pests of Brinjal and their natural enemies

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Abstract
Field fixed plot survey was conducted during *rabi* 2017-18 to investigate the insect pests and natural enemies of brinjal in the Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat. During the course of the investigation a total of six insect species under three order and six families *viz.*, aphid, *Aphis gossypii* (Glover); leafhopper, *Amrasca biguttula biguttula* (Ishida); Brinjal Shoot and Fruit Borer (BSFB), *Leucinodes orbonalis* (Guenee); epilachna beetle, *Henosepilachna vigintiopunctata* (F.); leaf roller, *Antoba* (*Eublema*) *olivaceae* (Walker) and flea beetle, *Monolepta signata* (Olive) were recorded. On the other hand, a total of four predators *viz*., coccinellid beetle, syrphid fly (*Episyrphus balteatus* De Geer), green lacewing (*Chrysoperla carnea* Stephens) and spider (*Oxyopes* sp.) were recorded as major natural enemies on insect pests of brinjal. However, 5 species of coccinellid predators *viz*., *Coccinella transversalis* (Fab.), *Harmonia dimidiata* (Fab.), *Adalia bipunctata* (L.) *Cheilomenes propinqua* (Muls.), and *Brumoides* sp. (Fab.) were observed out of which, *C. transversalis* was dominant and considered as major predators of aphids and leafhoppers.

Keywords: Brinjal, Insect pests, natural enemies, predator, coccinellids

1. Introduction
Brinjal (*Solanum melongena* L.) is a solanaceous vegetable also known as "King of vegetables". Being a major vegetable crop in India, brinjal is cultivated in about 7.27 Lakh hectares with an annual production of 123.23 Lakh tonnes during 2016-17 [1]. In Assam, brinjal is extensively cultivated in all the districts as a major cash crop in an area of 0.17 Lakh hectares with an annual production of 2.9 Lakh tonnes during 2016-17 [1]. However, kitchen garden cultivation of brinjal is also a common practice in each and every household of Assam [2]. But the production of the crop is regulated by different biotic and abiotic factors and amongst those factors, insect pests plays a pivotal role for lowering the yield of brinjal, by attacking the crop right from the nursery stage to till harvesting [3]. Generally farmers are depending on synthetic chemical pesticides to control insect pests which leads to the development of resistance by target pests with also a negative impact on natural enemies [4]. Therefore, identification and conservation of natural enemies to control insect pests is very much essential. Therefore present investigation was carried out to record the insect pests and natural enemies fauna of brinjal ecosystem. The brinjal is attacked by more than 70 number insect species [5], of which BSFB (L. *orbonalis* Guen), leafhopper (*A. bigutulla bigutulla* Ishida), aphid (*A. gossypii* Glover), stem borer (*Euzophera perticella* Ragonotl), epilachna beetle (*H. viginitoctopunctata* Fab.), white fly (*Bemisia tabaci* Gennadius), lacewing bug (*Urantitus hystricellus* Distant) with non insect pest red spider mite (*Teranychus macfurlanei* Baker) were the major pests. From another experiment, it was revealed that 80-90% yield loss had been recorded due to attack of BSFB [6, 7, 8].

2. Materials and Methods
The study was conducted to survey the diversity of insect pests and their natural enemies at weekly interval starting from 15 days after transplanting of the brinjal crop at Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat during *rabi* 2017-18. The experimental site is situated at 26°47′ latitude and 94°12E′ longitude at an altitude of 86.6m above mean sea level. A suitable and uniform site of organic farm was selected for the fixed plot survey. Different species of insect pests and natural enemies were photographed and collected by hand picking, using aspirator, pit fall trap, pheromone trap and insect collecting net. After killing the arthropods were preserved in 70 per cent alcohol in glass vials for small and soft bodied insects. However, pinning was done for comparatively large insects. The preserved specimens were sent to National Bureau of Agricultural Insects Resources (NBAIR),

Bangalore and other expert taxonomist for appropriate identification.

3. Results and Discussion

During the course of present investigation a total of six insect species (Table 1 and Plate 1-11) under three orders and six families *viz.,* aphid, *A. gossypii* (Glover); leafhopper, *A. biguttula biguttula* (Ishida); BSFB, *L. orbonalis* (Guenee); epilachna beetle, *H. vigintiopunctata* (F.); leaf roller, *A.* (*Eublema*) *olivaceae* (Walker) and flea beetle, *M. signata* (Olive) were recorded as insect pests of brinjal crop. Out of six insect pests attacked the brinjal, BSFB, aphid, leafhopper were dominant and considered as major insect pests of brinjal whereas the flea beetle was occurred in a negligible manner and it was considered as minor pest of brinjal. In present investigation, among different insect pest encountered in the brinjal field, *A. gossypii* showed the highest occurrence followed by *A. biguttula biguttula*. Moreover the major insect pest were observed frequently during each observation period, but minors were observed only one or two times. Total of four predators (Table 2 and Plate 12-22) *viz*., coccinellid beetle, syrphid fly (*E. balteatus* De Geer), green lacewing (*C. carnea* Stephens) and spider (*Oxyopes* sp.) were recorded as major natural enemies on insect pests of brinjal. Five species of coccinellid predators *viz*., *C. transversalis* (Fab.), *H. dimidiata* (Fab.), *A. bipunctata* (L.) *C. propinqua* (Muls.), and *Brumoides* sp. (Fab.) were recorded out of which, *C. transversalis* was dominant and considered as major predators of aphids and leafhoppers.

Earlier, several workers from different regions of India reported a number of insect pests attacking the brinjal crop during different growth stages. Mote [9] from Maharashtra, reported leafhopper, *A. bigutulla bigutulla* and BSFB, *L. orbonalis* were the serious pests of brinjal. Subbarathnam and Butani [5], recorded 70 insect pests on brinjal, of which the major ones were the *L. orbonalis* Guen, *A. bigutulla bigutulla* Ishida, *A. gossypii* Glover, *E. perticella* Ragonotl, *H. viginitoctopunctata* Fab., *B. tabaci* Gennadius, *U. hystricellus* Distant and *T. macfurlanei*. Bhadauria *et al.* [10] from Madhya Pradesh, recorded 13 species of insect pests on brinjal during the summer and *kharif* season. Similarly, from Himachal Pradesh, Patial *et al.* [11] reported that, 27 insect pest species were associated with brinjal crop during different stages of crop growth in an overlapping manner. All the insect pests recorded in the field during the present investigation were also reported by different workers from India, as insect pests of brinjal crop [9, 5, 12, 13]. A number of insect pests of brinjal were reported from Assam which included *A. bigutulla bigutulla* Ishida, *H. vigintiopunctata* (F.), *A. scutellatus* Baly, *D. flavocincta* (Hope), *M. signata* Olive, *A. cyanea* (Webber), *P. brettinghami* Baly, *T. indicus* (Faust), *A. ipsilon* (Hfn.), *L. orbonalis* Guen., *A. olivacea* (Walker), *P. bipunctalis* (F.), *A. gossypii* Glover, *T. neocaledonicus* Andre [2, 14, 15, 16, 17, 18, 19]. During the present investigation, the 5 species of coccinellid predators *viz*., *C. transversalis* (F.), *H. dimidiata* (F.), *A. bipunctata* (L.), *C. propinqua* (Muls.) and *Brumoides* sp. (Fab.) in addition to these, syrphid fly (*E. balteatus* (De Geer), green lacewing (*C. carnea* Stephens) and spider, *Oxyopes* sp. (Hentz) were recorded as predators on insect pests of brinjal. NCIPM [20] also conducted field trial in a farmer's field and recorded the natural enemies like *C. carnea, C. septumpunctata, C. sexmaculatus, Syrhid* flies, spiders and praying mantis when brinjal intercropped with cowpea and coriander. Elanchezhyan and Muralibaskaran [21] from TNAU, Tamilnadu, recorded the predators like coccinellids, syrphids and spiders from the intercropping system of brinal + cluster bean (4:1) and brinjal + onion (4:1). However, the recorded species of coccinellids in the present experiment were also reported from Assam, as natural enemies associated with sucking pests of brinjal [22, 23].

Plate 1: Adult of *Aphis gossypii*

Plate 2: Adult of *Amrasca biguttula biguttula*

Plate 3: Larva of *Leucinodes orbonalis*

Plate 4: Shoot damage by *Leucinodes orbonalis*

Plate 5: Bored holes on fruit caused by *Leucinodes orbonalis* **Plate 6:** Damage symptom of *Leucinodes orbonalis* on fruit

Plate 7: Adult of *Henosepilachna vigintioctopunctata*

Plate 8: Larva of *Antoba (Eublema) olivacea*

Plate 9: Damage symptom of *Antoba (Eublema) olivacea*

Plate 10: Adult of *Monolepta signata*

Plate 11: Shot hole caused by *Monolepta signata*

Plate 12: Eggs of *Coccinellid predator*

Plate 13: Grub of coccinellid predator

Plate 14: Pupa of coccinellid predator

Plate 15: Adult of *Coccinella transversalis*

Plate 16: Adult of *Hormonia dimidiata*

Plate 17: Adult of *Adalia bipunctata*

Plate 18: Adult of *Cheilomenes propinqua*

Plate 19: Adult of *Brumoides* sp.

Plate 20: Eggs of *Chrysoperla carnea*

Plate 21: Adult of *Episyrphus balteatus*

Plate 22: Adult of *Oxyopes* sp.

Table 1: Insect pest complex associated with brinjal (cv. Hazari)

Common name	Scientific name	Order: Family	Feeding site	Status
Brinjal Shoot and Fruit Borer	*Leucinodes orbonalis* (Guenee)	Lepidoptera: Pyralidae	Shoot and Fruit	+++
Aphid	*Aphis gossypii* (Glover)	Homoptera: Aphididae	Leaf	+++
Leafhopper	*Amrasca biguttula biguttula* (Ishida)	Homoptera: Cicadellidae	Leaf	+++
Epilachna beetle	*Henosepilachna vigintioctopunctata* (F.)	Coleoptera: Coccinellidae	Leaf	+++
Leaf roller	*Antoba (Eublema) olivacea* (Walker)	Lepidoptera: Noctuidae	Leaf	+
Flea beetle	*Monolepta signata* (Olive)	Coleoptera: Chrysomelidae	Leaf	+

+ observed 1 or 2 times/ +++ observed frequently almost all time

Table 2: List of natural enemies (predators) of insect pests of brinjal

Species	Order	Family	Prey	Prey stage
Coccinella transversalis (Fab.)	Coleoptera	Coccinellidae	*A. gossypii* and *A. biguttula biguttula*	Nymph and adult
Harmonia dimidiata (Fab.)	Coleoptera	Coccinellidae	*A. gossypii*	Nymph and adult
Adalia bipunctata (L.)	Coleoptera	Coccinellidae	*A. gossypii*	Nymph and adult
Cheilomenes propinquq (Muls.)	Coleoptera	Coccinellidae	*A. gossypii*	Nymph and adult
Brumoides sp. (Fab.)	Coleoptera	Coccinellidae	*A. gossypii*	Nymph and adult
Episyrphus balteatus (De Geer)	Diptera	Syrphidae	*A. gossypii*	Nymph and adult
Chrysoperla carnea (Stephens)	Neuroptera	Chrysopidae	*A. gossypii*	Nymph and adult
Oxyopes sp.	Araneae	Oxyopidae	*A. gossypii*	Nymph and adult

4. Conclusion

From the present investigation, it can be concluded that, the BSFB, *L. orbonalis;* aphid, *A. gossypii;* leafhopper, *A. biguttula biguttula* and flea beetle, *M. signata* were recorded as insect pests of brinjal found abundantly on crop right from transplanting till harvesting of the crop. These insects were the actual key pests in the reduction of the brinjal yield in all over nation. Various efforts have been made to manage these serious pests by applying many conventional insecticides which in turn results in the creation of various problems like

environment pollution, development of pest resistance against insecticides, pest outbreak, pest resurgence and unacceptable higher level of pesticide residue on the crop besides human health risk. Therefore, conservation of bio control agent in order to reduce the use of chemical pesticides in brinjal.

5. References

1. Anonymous. Horticultural statistics at a Glance-2017, Department of Agriculture, Co operation and Farmer's Welfare, 2017, 196.
2. Isahaque NMD. Studies on brinjal shoot and fruit borer, *Leucinodes orbonalis* Guen. Under Assam condition. Ph.D. Thesis, Gauhati University, Gauhati, 1979.
3. Regupathy A, Palanisamy S, Chandramohan N, Gunathilagaraj K. A guide on crop pests. Sooriya Desk Top Publishers, Coimbatore, 1997, 264.
4. David PMM, Kumaraswami TL. Influence of synthetic pyrethroids on the population of red spider mite *Tetranchus dnnabarinus* Boisduval in bhendi. J Tamilnadu Agril. Univ. 1989; 17(2): 271-274.
5. Subbarathnam GV, Butani DK. Chemical control of Insect pest complex of brinjal. *Entomon*, 1982; 7:97-100.
6. Patnaik HP. Flower and fruit infestation by brinjal shoot and fruit borer, *Leucinodes orbonalis* Guen damage potential vs. weather. Veg. Sci. 2000; 27:82-83.
7. Misra HP. Bio-efficacy of chlorantraniliprole against shoot and fruit borer of brinjal, *Leucinodes orbonalis* Guenee. Journal of Insect Science. 2008; 24(1):60-64.
8. Jagginavar SB, Sunitha ND, Biradon AP. Bioefficacy of flubendiamide 480SC against brinjal shoot and fruit borer, *Leucindoes orbonalis* (Guen.). Kar. J Agri. Sci. 2009; 22(3):712-713.
9. Mote UN, Bhavikatti S. Efficacy of chemical and non-chemical insecticides against major pests of brinjal in *kharif* season. J of Appl. Z. Res. 2003; 14(1):54-56.
10. Bhadauria NKS, Bhadauria NS, Jakhmola SS. Insect pest complex of brinjal, *Solanum melongena* Linn. in north-west Madhya Pradesh. Advances in Plant Sciences. 1999; 12(2):607-608.
11. Patial A, Mehta PK. Pest complex of brinjal and their succession under mid hills of Himachal Pradesh. Journal of Insect Science. 2008; 21(1):67-71.
12. Chandrakumar HL, Chakravarthy AK, Putta Raju TB. Seasonal occurrence of major insect pests and their natural enemies on brinjal. Current Biotica. 2008; 2(1):66-69.
13. Mall NP, Pandey RS, Singh SV, Singh SK. Seasonal incidence of insect pests and estimation of the losses caused by shoot and fruit borer on brinjal. Indian J Entomol. 1992; 63(2):137-143.
14. Deka SN, Saharia D. Effectiveness of some insecticides against shoot and fruit borer of brinjal. J Res. Assam. Agric. Univ. 1981; 2(2):250-253.
15. Borah B. External morphological studies on the adults of some Coleopteran and Lepidopteran pests of brinjal (*Solanum melongena* L.) at Jorhat, Assam. M.Sc. (Agri.) Thesis, Assam Agricultural University, Jorhat, 1990.
16. Shaw KK. Biology and chemical control of vegetable red spider mite, *Tetranychus neocaledonicus* Andre on brinjal. M. Sc. (Agri.) Thesis, Assam Agricultural University, Jorhat, 1990.
17. Borah RK. Influence of planting dates on the incidence of insect pests of brinjal in a hilly area of Assam. JASS. 1994; 7(2):209-211.
18. Kalita BJ. Biology of *Maruca testulalis* Geyer and its distribution pattern with special reference to sampling technique evaluation in pigeonpea. M.Sc. (Agri.) Thesis, Assam Agricultural University, Jorhat, 1996.
19. Kalita DN, DevRoy TC, Gupta MK. Incidence of *Psara bipuncatlis* (Fab.) on brinjal in Assam. J Agric. Sci. Soc. NE India. 1997; 10(2):271-272.
20. Anonymous. National Centre for Integrated Pest Management (NCIPM). Annual Report, 2005-06, 2006, 41-42.
21. Elanchezhyan K, Muralibaskaran RK. Evaluation of intercropping system based modules for the management of major insect pests of Brinjal. Pest management in Horticultural Ecosystem. 2008; 14(1): 67-73.
22. Kalita DN, DevRoy TC, Khound JN. Coccinellid predator on *Aphis gossypii*. Insect Environ. 1998; 3(4):107-108.
23. Borah N, Saikia DK. Seasonal incidence of major insect pests of brinjal and their natural enemies. Indian Journal of Entomology. 2017; 79(4):449-455.