



## RESEARCH ARTICLE

## ABUNDANCE OF INSECT PESTS AND THEIR NATURAL ENEMIES ASSOCIATED WITH BRINJAL (*SOLANUM MELONGENA*) CROP

Muhammad Ramzan<sup>a\*</sup>, Ghulam Murtaza<sup>b</sup>, Muhammad Nauman<sup>c</sup>, Aqsa Zainab<sup>d</sup>, Ahmad Ali<sup>e</sup>, Muhammad Umair<sup>e</sup>, Mamoon Shafiq<sup>e</sup>

<sup>a</sup>State Key Laboratory for Biology of Plant Diseases and Insect Pests, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Beijing 100193, China

<sup>b</sup>Department of Entomology, College of Plant Protection, China Agricultural University, Beijing, China

<sup>c</sup>Institute of Plant Protection, MNS University of Agriculture, Multan

<sup>d</sup>Department of English Language and Literature, University of Punjab Lahore Pakistan

<sup>e</sup>Department of Entomology, University of Agriculture, Faisalabad

\*Corresponding author email: [ramzan.mnsua@gmail.com](mailto:ramzan.mnsua@gmail.com)

This is an open access article distributed under the Creative Commons Attribution License CC BY 4.0, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ARTICLE DETAILS

## Article History:

Received 10 October 2020  
Accepted 12 November 2020  
Available online 30 November 2020

## ABSTRACT

An experimental study was conducted to check the abundance of insect pests and biological fauna in brinjal crop (*Solanum melongena* L.) during 2018. One acre of brinjal was cultivated for this purpose and data was recorded on weekly basis from ten tagged plant. In this study, biological fauna such as hover fly, honey bee, butterfly, green lacewing, praying mantis and ladybird beetle were recorded. The insect pests such as brinjal fruit borer, leafhopper, whitefly, leaf roller, thrips, stem borer, aphid and mealybug were recorded during the present study.

## KEYWORDS

Eggplant, Pollinators, Predators, Abundance, Chewing, Sucking insect pests.

## 1. INTRODUCTION

Brinjal belongs to Solanaceae family and commonly known as eggplant or baigan. It is economically an important vegetable that grown the year round in the world. It is native to India and grown in Asian countries. In Pakistan, it is mostly grown in plain areas (8325 ha) of Punjab with 82999 tons annual production (GoP, 2015). As worm season crop, susceptible to frost and 13-21°C temperature is favorable for its growth and development. It is grown in small and large scales, source of income for farmers community and poor people. It is main source of several nutrients such as proteins, carbohydrates, vitamins and minerals (Pugalendhi et al., 2010). There are two main brinjal varieties (elongated and round) that grown in Pakistan such as barbarella, Pusa purple round, nubia, Pusakranti, Punjab moti, Jamunigola, Pusa purple cluster, Pusa purple long, dancer, black Nadia, Punjab bahar. The round cultivars such as Round Black, Pusa Purple Round and Dilnasheen are high yielding varieties with better taste and nutrients.

The quality and quantity of brinjal is reducing due to biotic and abiotic factors (Dadmal et al., 2004). Abiotic factors include temperature, humidity and rainfall while insect pests, diseases and pathogens include biotic factors (Thapa, 2010). There are several sucking as well as chewing insect pests attacked on the various parts of brinjal crop including whitefly, jassid, aphid, mealybug and brinjal shoot and fruit borer (Sardana et al., 2004). The sucking insect pests can suck the cell sap while

chewing pests chew the plant parts (leaves and fruits) (Jayaraj and Manisegaran, 2010; Ramzan et al., 2019<sup>a</sup>). The photosynthetic phenomena of plant can affect by the severe attack of insect pests. The transfer of nutrients in the plant body can also affected and resulting the cell death even death of whole plant occurs (Rosaiah, 2001; Saad et al., 2013; Kalaiyarasi and Livingstone, 2015).

Integrated pest management approached have been applied to control the pest population in laboratory and field conditions by many scientists and farmers throughout the world. The predators and parasitoid are plying key role in management of insect pests in agricultural and horticultural crops in the globe. The application of chemicals can cause hazardous substances that pollute the environment and health problems. The biological fauna can reduce due to excessive application of insecticides on various crops against insect pests. The safety/presence of natural enemies is a key point to reduce the pest population below economic injury level (ETL). To avoid the harmful effects of chemicals on natural enemies and environment, the correct information about pest and their biological fauna is very important. For this purpose, a current study was conducted to check the pest of brinjal and their natural enemies.

## 2. MATERIAL AND METHODS

The current study was conducted in farmer field during 2018 at District Bahawalnagar. The study was performed in an acre of brinjal. Ten plants from study area were tagged and the population of insect pests and natural

## Quick Response Code



## Access this article online

Website:  
[www.rfna.com.my](http://www.rfna.com.my)

DOI:  
10.26480/rfna.01.2021.01.03

enemies was recorded from tagged plants. On weekly basis, data were recorded early in the morning from germination to crop harvesting. Both natural enemies and insect pests were collected by using different collecting methods such as insect collecting net, aspirator and hand picking. The soft bodies specimens were preserved in 70% Ethyl Alcohol while large size insects were pinned. The pinned and preserved insects were identified by an expert on visual basis and under microscope.

### 3. RESULTS AND DISCUSSION

Agriculture is the source of income for farmers and consider backbone of Pakistan (Ramzan et al., 2019<sup>b</sup>). Brinjal is commonly known as eggplant, consider king of vegetables grown in several areas of the world including Pakistan, India, Bangladesh and many other countries (FAO, 2014). Brinjal is the major source of various nutrients such as minerals, vitamins and carbohydrates etc. The crop production is reducing due to attack of many insect pests such as chewing and sucking insect pests. Many scientists have reported more than 70 number of insect species on brinjal (Borkakati et al., 2019). Different control measures (cultural, physical, mechanical, biological, botanicals, entomopathogenic fungi and chemicals) had been adopted by national and international scale to control pest population under laboratory as well as field conditions (Ramzan et al., 2019<sup>a</sup>; Murtaza

et al., 2019). Each and every control measure has its own advantage and disadvantage. The current study was conducted to check the abundance of brinjal insect pests either sucking and chewing and their natural enemies. The abundance of pests and their natural enemies were recorded by using different techniques on brinjal till harvesting.

During the study, 8 insect pests and their 6 natural enemies or biological fauna was recorded. under field conditions. The insect pests can cause huge losses of brinjal crop annually. Some researchers have reported that leafhopper, *Amrasca biguttula biguttula* a serious pest of brinjal among all sucking insect pests while brinjal fruit borer, *Leucinodes orbonalis* is damaging chewing pest (Anwar et al., 2015; Thakur et al., 2012). In the current study, jassid population was recorded maximum during the whole study while thrips found minimum (Anwar et al., 2015). Jassid population was recorded highest in August-September months. Similar findings have been reported by many early researchers (Meena et al., 2010). The insect pests such as brinjal fruit borer (*Leucinodes orbonalis*), leafhopper (*Amrasca devastans*), whitefly (*Bemisia tabaci*), leaf roller (*Eublemma olivacea*), thrips (*Thrips palmi*), stem borer (*Euzophera perticella*), aphid (*Aphis gossypii*) and mealybug (*Coccidohystrix insolita*) were recorded during the current study (Table 1). The complete description of brinjal insect pests have given in Table 2.

**Table 1:** Insect pests recorded on brinjal *Solanum melongena*

Sr. No.	Common name	Scientific name	order	family	Destructive stage	Site/Nature of damage
1	Aphid	<i>A. gossypii</i>	Hemiptera	Aphididae	Adults/ nymphs	Suck cell sap, yellow, wrinkled leaves
2	Leafhopper	<i>A. devastans</i>	Hemiptera	Cicadellidae	Adults/ nymphs	Suck cell sap, cause yellowing, crinkling, curling "hopper burn"
3	Whitefly	<i>B. tabaci</i>	Hemiptera	Aleyrodidae	Adults/ nymphs	Suck cell sap, poor fruit formation, stunted growth
4	Mealybug	<i>C. insolita</i>	Hemiptera	Pseudococcidae,	Adults/ Nymphs	Suck cell sap from tender leaves, roots, excrete honeydew, cause sooty mould
5	Leaf roller	<i>E. olivacea</i>	Lepidoptera	Noctuidae	Larvae	Rolled leaves from tip, feed by scarping
6	Brinjal fruit borer	<i>L. orbonalis</i>	Lepidoptera	Pyralidae	Larvae	Bores into tender shoots, drying of tip
7	Brinjal stem borer	<i>E. perticella</i>	Lepidoptera	Pyralidae	Larvae	Bore into stem, plant wilt
8	Thrips	<i>T. palmi</i>	Thysanoptera	Thripidae	Adults/ nymphs	Suck contents of the epidermal cells of the plant, "flecking"

The biological fauna including pollinators and predators such as hover fly (*Eristalis* sp.), honey bee (*Apis florae*), butterfly (*Danaus plexippus*), Green lacewing (*Chrysoperla carnea*), Preying mantis (*Stagmomantis carolina*) and ladybird beetle (*Coccinella septempunctata*) were recorded in the current study on brinjal crop (Table 2). The complete description of natural enemies or biological fauna have given in Table 2.

**Table 2:** Biological fauna recorded on brinjal *Solanum melongena*

Sr. No	Common name	Scientific name	order	family	stage	Status	Prey
1	Green lacewing	<i>C. carnea</i>	Neuroptera	Chrysopidae	Adult and larva	Predator	Soft bodies insect, Aphid
2	Ladybird beetle	<i>B. septempunctata</i>	Coleoptera	Coccinellidae	Adult, egg, larva, pupa	Predator	Soft bodies insect, Aphid
3	Preying mantis	<i>S. carolina</i>	Dictyoptera	Mantidae	Adult and nymph	Predator	Flies, moths, grasshoppers, crickets
4	Butterfly	<i>D. plexippus</i>	Lepidoptera	Danaidae	Moth	Pollinator	
5	Hover fly	<i>Eristalis</i> sp.	Diptera	Syrphidae	Adult and larva	Predator	Aphid
6	Honey bee	<i>A. florae</i>	Hymenoptera	Apidae	Adult	Pollinator	

### 4. CONCLUSION

The current study concluded that various sucking and chewing insect pests can attack on the brinjal crop and decrease its production. The biological fauna such as predators and pollinators are playing key role in suppression of pest population and enhance the crop production. The various management strategies are adopted against insect pests all over the world that resulting resistance and environmental pollution. The biological fauna like pollinators and predators are highly affecting by the application of these chemicals. It is concluded that conservation of

biological fauna is very important for improving yield and reduction of pest population.

### AUTHORS CONTRIBUTION

Muhammad Ramzan and Ghulam Murtaza wrote the manuscript. Muhammad Adnan and Dilawar Abbas helped in write up. Aqsa Zainab edit the manuscript while Ahmad Ali, Muhammad Umair and Muhammad Umar helped in data recording.

## REFERENCES

- Anwar, S., Mari, J.M., Khanzada, M.A., Ullah, F., 2015. Efficacy of insecticides against infestation of brinjal fruit borer, *Leucinodes orbonalis* Guenee (Pyralidae: Lepidoptera) under field conditions. Journal of Entomology and Zoology Studies, 3, Pp. 292-295.
- Borkakati, R.N., Venkatesh, M.R., Saikia, D.K., 2019. Insect pests of Brinjal and their natural enemies. Journal of Entomology and Zoology Studies, 7 (1), Pp. 932-937.
- Dadmal, S.M., Nemade, S.B., Akhare, M.D., 2004. Field screening of brinjal cultivar for resistance to *Lesucinodes orbonalis* Guen. Pest Manage Hort Ecosys., 10, Pp. 145- 150.
- FAO, 2014. FAOSTAT. Available at: <http://www.fao.org>
- GoP. 2015. Fruit, vegetables and condiments statistics of Pakistan. Government of Pakistan Ministry of National Food Security and Research Economic Wing Islamabad, Pp.11-14.
- Jayaraj, J., Manisegaran, S., 2010. Management of fruit and shoot borer in brinjal, The Hindu: Sci-Tech Agri College and Re. Inst Madurai.
- Kalaiyarasi, L., Livingstone, A.R., 2015. Potential Effects of Herbal Preparation of Eucalyptus globulus and Anacardium occidentale on Sustainable control of grubs of *Henosepilachna vigintioctopunctata* (Fab.) on *Solanum melongena* Plant. Journal of Entomology and Zoology Studies, 3 (2), Pp. 374-376.
- Murtaza, G., Ramzan, M., Ghani, M.U., Munawar, N., Majeed, M., Perveen, A., Umar, K., 2019. Effectiveness of Different Traps for Monitoring Sucking and Chewing Insect Pests of Crops. Egyptian Academic Journal of Biological Sciences. A, Entomology, 12 (6), Pp. 15-21.
- Obho, G., Ekperigin, M.M., Kazeem, M.I., 2005. Nutritional and hemolytic properties of eggplant (*Solanum macrocarpon*) leaves. J. Fd. Compos. Analys., 18, Pp. 153-160.
- Pugalendhi, L., Veeraragavatham, D., Natarjan, S., Praneetha, S., 2010. Utilizing wild relative (*Solanum viarum*) as resistant source to shoot and fruit borer in brinjal (*Solanum melongena*). J. Plant Breed., 1 (4), Pp. 643-648.
- Ramzan, M., Murtaza, G., Javaid, M., Iqbal, N., Raza, T., Arshad, A., Awais, M., 2019<sup>a</sup>. Comparative Efficacy of Newer Insecticides against *Plutella xylostella* and *Spodoptera litura* on Cauliflower under Laboratory Conditions. Indian Journal of Pure Applied Biosciences, 7 (5), Pp. 1-7.
- Ramzan, M., Murtaza, G., Naeem, U.U., Qayyum, M.A., Nawaz, A., Azmi, U.R., Ali, M., 2019<sup>b</sup>. Population Dynamics of Cotton Jassid (*Amrassica Biguttula*) in Relation to Weather Parameters in Multan. Acta Scientific Agriculture, 3, Pp. 212-215.
- Rosaih, R., 2001. Evaluation of different botanicals against the pest complex of brinjal. Pestology, 25, Pp. 14-16.
- Saad, K.A., Roff, M.N., Shukri, M.A., Mirad, R., Mansour, S.A.A., Abuzid, I., Anifah, M.Y., Idris, A.B., 2013. Behavioral responses of whitefly, *Bemisia tabaci* (Hemiptera: Aleyrodidae), in relation to sex and infestation status of their host plants. Academic Journal of Entomology, 6, Pp. 95-99.
- Sardana, H.P., Arora, S., Singh, D.K., Kadu, L.N., 2004. Development and validation of adaptable IPM in eggplant, *Solanum melongena* L. in a farmer's participatory approach. Indian J. Pl Prot., 32, Pp. 123-128.
- Thakur, N.S.A., Firake, D.M., Behere, G.T., Firake, P.D., Saikia, K., 2012. Biodiversity of agriculturally important insects in north eastern Himalaya. Indian Journal of Hill Farming, 25, Pp. 37-40.
- Thapa, R.B., 2010. Integrated management of brinjal fruit and shoot borer, *Leucinodes orbonalis* Guen: An overview. J. Agric. Anim. Sci., 30, Pp. 1-16.

