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Sushil Kumar

Department of Entomology,
College of Agriculture, Sardar
Vallabhbhai Patel University of
Agriculture and Technology,
Meerut, Uttar Pradesh, India

SK Sachan

Department of Entomology,
College of Agriculture, Sardar
Vallabhbhai Patel University of
Agriculture and Technology,
Meerut, Uttar Pradesh, India

Vinod Kumar

Department of Entomology,
College of Agriculture, Sardar
Vallabhbhai Patel University of
Agriculture and Technology,
Meerut, Uttar Pradesh, India

MP Gautam

Department of Entomology,
College of Agriculture, Sardar
Vallabhbhai Patel University of
Agriculture and Technology,
Meerut, Uttar Pradesh, India

Correspondence**Sushil Kumar**

Department of Entomology,
College of Agriculture, Sardar
Vallabhbhai Patel University of
Agriculture and Technology,
Meerut, Uttar Pradesh, India

Abundance of insect pests associated with brinjal (*Solanum melongena* L.) crop

Sushil Kumar, SK Sachan, Vinod Kumar and MP Gautam

Abstract

The present investigation entitled “Study on abundance of Insect Pests associated with Brinjal (*Solanum melongena* L.) Crop” was carried out in randomized block design with three replication at Crop Research Center of Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut during *kharif* 2017. During the crop season 10 insect species, belonging to four orders and 9 families: Lepidopterans with *Leucinodes orbonalis*, *Eublemma olivacea*, and *Euzophera perticella*, Hemipterans with *Amrasca biguttula biguttula*, *Bemisia tabaci*, *Urentius histicellus* and *Aphis gossypii*, Orthoptera with *Melanoplus differentialis* and Coleopterans with *Trachys herilla* and *Henosapilachna vigintioctopuncata* were found attacking the brinjal crop from vegetative to reproductive stage. Among them jassid (*Amrasca biguttula biguttula* Ishida), whitefly (*Bemisia tabaci* Gennadius), jassid (*Amrasca biguttula biguttula* Ishida) and fruit borer (*Leucinodes orbonalis* Guenee) were recorded as major pests. Other insects pests recorded on the crop were of less importance and less damage caused by them was found without much economic loss.

Keywords: Abundance, insect pests, brinjal and *Solanum melongena*

1. Introduction

The brinjal (*Solanum melongena* L), also known as egg plant or aubergine belonging to the family solanaceae, is one of the most important and popular vegetables grown throughout the world including India. In India, brinjal being a major vegetable crop is cultivated in about 7.27 lakh hectares with an annual production of 123.23 lakh tones during 2016-17 (Anonymous, 2017) [1]. The major brinjal growing states in India are Andhra Pradesh, Karnataka, west Bengal, Tamil Nadu, Maharashtra, Orissa, Uttar Pradesh, Bihar and Rajasthan. Due to its nutritive value, consisting of minerals like iron, phosphorous, calcium and vitamins like A, B and C, unripe fruits are used primarily as vegetable and dried shoots are used as fuel in rural areas in the country. It is low in calories and fats, contains mostly water, some protein, fiber and carbohydrates (Gopalan *et al.*, 2007) [9]. Among the various causes of low productivity of the brinjal, one of the most important factors is the damage inflicted by the insect pests. It is subjected to attack by number of insect pests right from nursery stage till harvesting (Regupathy *et al.*, 1997) [14]. Among the insect pests infesting brinjal the major ones are shoot and fruit borer, *Leucinodes orbonalis*, whitefly, *B. tabaci*, leafhopper *A. biguttula biguttula*, and non insect like red spider mite, *T.macfurlanei*. The shoot and fruit borer has a specific nature of feeding. After hatching, the larvae bore in the growing tips of young shoots during vegetative stage of crop. Yellowing and wilting of affected shoot is the common symptoms of attack (Hedge *et al.*, 2009) [11]. During flowering and fruiting stage, the larvae prefers flower buds and young fruits. It bore into the young fruits by making a very small hole around the calyx. Thereafter, it completes larval stage within the developing fruits and the mature larvae come out from the fruit for pupation. The yield loss due to the pest is to the extent of 70-92 per cent (Chakraborti and Sarkar, 2011) [6].

2. Materials and Methods

2.1 Climate and weather

The experiment was conducted at Crop Research Centre (CRC) of Sardar Vallabhbhai Patel University of Agriculture and Technology, Modipuram, Meerut, Uttar Pradesh during *kharif* 2017-18. The general climate of Meerut is semi-arid, sub-tropical, characterized by very hot summer and cold winters. In summer, the temperature goes up to 45° C in the month of June. The winters are severe with a minimum temperature of about 2-3° C with occasional ground

frost. The annual rainfall is about 863 mm, of which about 75-80 per cent is received from July to September at the time of monsoon. The daily meteorological data pertaining to rainfall, relative humidity and temperature during the experimental period obtained from Meteorological Observatory of Department of Soil Science, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut - 250110 (U.P.).

2.2 Observation

Randomly five plants from three central rows in each plot were tagged and an observation on population of insect pests of brinjal was recorded in the morning hour at weekly interval right from germination till harvest of crop. Different species of insect pest were collected by hand picking, 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 large size insects. The preserved specimens were sent to Indian Agriculture Research Institute (IARI) New Delhi for appropriate identification.

3. Results and Discussion

The insect species associated with brinjal crop were studied during *Kharif* 2017 at different stage of crop growth. During the period of investigation, 10 insect species which belong to 4 orders (Hemiptera, Lepidoptera, Coleoptera and Orthoptera) and 9 families were found associated with brinjal in Meerut region and these have been listed in (Table-1). Efforts have been made to arrange the insect pests with their damaging stage and period of infestation. These were jassid, *Amrasca biguttula biguttula* Ishida; white fly, *Bemisia tabaci* Gennadius; Aphid, *Aphis gossypii* Glover; Leaf roller, *Eublemma olivacea* Walker; Shoot and fruit borer, *Leucinodes orbonalis* Guenee; Leaf miner, *Trachys herilla* Obenberger; Hadda beetle, *Henosepilachna vigintioctopunctata* Fabricius; Lace wing bug, *Urentius hystericellus* Richter; Stem borer, *Euzophera perticella* Ragonot and Grass hopper, *Melanoplus differentialis* Thomas. Jassid: *Amrasca biguttula biguttula* Ishida (Cicadellidae: Hemiptera) is an important sucking pest of brinjal crop recorded from July to November. Both nymphs and adults of jassid have a piercing and sucking type of mouth parts and suck the sap from the lower surface of the leaf. When the several insect suck the sap from same leaf, yellow spot appear on the leaf, followed by crinkling, curling and destroying or "hopper burn". The damage caused by jassid on brinjal have also reported by (Gangwar *et al.*, 2014; Singh M, 2015; Borah *et al.*, 2017) [8, 15, 5]. White fly: *Bemisia tabaci* Gennadius (Aleyrodidae: Hemiptera) is also an important sucking pest of brinjal crop had also been recorded major sucking pest in this region. The yellowish small size whitefly and their nymphs were seen in cluster on lower surface of the leaves. Both nymphs and adults of whitefly sucked the cell sap from lower surface of leaves and growing tips of plant resulting in stunted growth and poor fruit formation. They also excrete honey dew which promotes the growth of black sooty mold that affect the photosynthesis activity of the plant. They were found active from July to November. Whitefly is an economically pest and the damage by *Bemisia tabaci* on brinjal crop has also been

reported by (Latif *et al.*, 2009; Gangwar *et al.*, 2013) [11, 9]. Aphid: *Aphis gossypii* Glover (Aphididae: Hemiptera) was also recorded another important pest of brinjal from August to November. They were found in colonies on leaves and tender shoots of the plant. The nymphs and adults sucked the sap and affected leaves turn yellow, get wrinkled and destroyed. Moist and warm weather favours for the growth and development of this insect. Kadam *et al.*, 2006; Elanchezhyan *et al.*, 2008 [12, 7] also reported the occurrence of *Aphis gossypii* on brinjal crop. Leaf roller: *Eublemma olivacea* Walker (Noctuidae: Lepidoptera) was recorded in brinjal from mid July to November as minor pest in this region. Caterpillars of this insect roll the leaves and fed inside by scrapping the green matter. The folded leaves withered and dried. The incidence of this insect was also reported by (Borah *et al.*, 2017) [5]. Brinjal shoot and fruit borer: *Leucinodes orbonalis* Guenee (Pyralidae: Lepidoptera) was most destructive and major insect pest of brinjal in this region. The incidence of this insect starts soon after transplanting of the seedlings and continued till the harvest of crop. The larvae of this insect initially bore the tender shoot and fed internally resulting in weathering and drying of the shoot. In later stage, the caterpillars bore into young fruits by making holes and fed inside the fruit. This resulted fruit become unfit for human consumption and fetch fewer prices in the market. Bharadiya *et al.*, 2005; Kadam *et al.*, 2006 [2, 12] have also reported this insect as major pest of brinjal crop from different parts of country. Leaf miner: *Trachys herilla* Obenberger (Buprestidae: Coleoptera) was also seen on brinjal crop. Larvae mine into the leaves by scrapping the leaf tissues and in cases of severe damage leaves dry up. The appearance of this insect was recorded during July –September. Bhumita *et al.*, 2015; Singh M, 2015 [4, 15] also reported this insect as minor pest in brinjal. Hadda beetle, *Henosepilachna vigintioctopunctata* Fabricius (Coccinellidae: Coleoptera) was recorded as minor insect pest of brinjal in this region during *Kharif*, 2017. Grubs were yellowish with spines over body. Adults were pale yellowish brown mottled with black spots. Both grubs and adults caused damage by scrapping of chlorophyll from leaves. Occurrence of this pest was recorded during the month of July to November. Similarly, the incidence of this pest on brinjal was also reported by (Elanchezhyan *et al.*, 2008; Latif *et al.*, 2009) [7, 13]. Lace wing bug: *Urentius hystericellus* Richter (Tingidae: Hemiptera) was recorded as a minor pest of brinjal. Its occurrence was found from July – November. Both nymphs and adults sucked the sap from leaves and affected leaves turn yellow. Singh M, 2015; Borah *et al.*, 2017 [15, 5] reported the occurrence of this insect on brinjal variety Pusa Purple Round. Stem borer: *Euzophera perticella* Ragonot (Pyralidae: Lepidoptera) was found as a minor pest of brinjal. The yellowish-white colour larvae bore in to stem near the ground. As a result the plant withered and dried. (Singh M, 2015) [15] also reported the damage of this insect on brinjal crop. Grasshopper: *Melanoplus differentialis* Thomas (Acrididae: Orthoptera) was also found as minor pest of brinjal during *Kharif* season. Both nymphs and adults of this insect fed on leaves by making holes. The occurrence of this insect was noticed from June to November. It is a polyphagous pest and have earlier been reported by (Gangwar *et al.*, 2014) [7] on brinjal crop.

Table 1: Insect pests recorded on brinjal during *Kharif*, 2017

Common name	Scientific name	Order	Family	Damaging stage	Nature of damage	Period of infestation	Status of the pest
Jassid	<i>Amrasca biguttula biguttula</i> Ishida	Hemiptera	Cicadellidae	Nymphs and adults	Both nymphs and adults suck the sap from the lower surface of the leaf causing yellowing leaf followed by crinkling, curling and destroying or "hopper burn"	July to November	High
Whitefly	<i>Bemisia tabaci</i> Gennadius	Hemiptera	Aleyrodidae	Nymphs and adults	Sucked the cell sap from lower surface of leaves and growing tips of plant resulting in stunted growth and poor fruit formation	July to November	High
Aphid	<i>Aphis gossypii</i> Glover	Hemiptera	Aphididae	Nymphs and adults	Nymphs and adults sucked the sap and affected leaves turn yellow, get wrinkled and destroyed.	August to November	Low
Leaf roller	<i>Eublemma olivacea</i> Walker	Lepidoptera	Noctuidae	Larvae	Caterpillars rolled leaves from tip and feed inside by scarping them	July to November	Moderate
Shoot and fruit borer	<i>Leucinodes orbonalis</i> Guenee	Lepidoptera	Pyralidae	Larvae	Caterpillar bores into tender shoots resulting in drying of tip and in developing fruits bore hole plucked with excreta	August to November	High
Leaf miner	<i>Trachys herilla</i> Obenberger	Coleoptera	Buprestidae	Grubs	Larvae mine into the leaves by scrapping the leaf tissues and in cases of severe damage leaves dry up	July to September	Low
Hadda beetle	<i>Henosepilachna vigintioctopunctata</i> Fabricius	Coleoptera	Coccinellidae	Grubs and adults	Grub and adults feeding on the upper surface of leaves. <i>Skeletonization of leaves and lace like appearance</i>	July to November	Low
Lace wing bug	<i>Urentius hystricellus</i> Richter	Hemiptera	Tingidae	Nymphs and adults	Both nymph and adult suck sap from upper surface of leaves and cause yellowing of leaves in patches	July to November	Low
Stem borer	<i>Euzophera perticella</i> Ragonot	Lepidoptera	Pyralidae	Larvae	Caterpillar bore into stem, attack plant wither and wilt	July to October	Low
Grasshopper	<i>Melanoplus differentialis</i> Thomas	Orthoptera	Acrididae	Nymphs and adults	Eating the leaves of plants and cause damage to newer leaves.	July to November	Low

4. Conclusion

From the present investigation, it can be concluded that, *L. orbonalis*, *E. olivacea*, *E. perticella*, *A. biguttula biguttula*, *B. tabaci*, *U. hystericellus*, *A. gossypii*, *M. differentialis*, *T. herilla* and *H. vigintioctopunctata*. Among these pest, Jassid, whitefly and brinjal shoot and fruit borer were recorded as major pests. 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 result in the creation of various problems likes environmental pollution, development of pest resistance against insecticides, pest outbreaks, pest resurgence, and unacceptable higher level of pesticides residues on the crop besides human health risks. Therefore, conservation of bio-control agent in order to reduces the use of chemical pesticides in brinjal.

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