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KING PESTS IN BRINJAL ECOSYSTEM AT HOMESTEAD GARDEN

MD. MOHASIN HUSSAIN KHAN*

Department of Entomology, Patuakhali Science and Technology University, Patuakhali-8602, Bangladesh.

Abstract

The study was carried out in homestead garden of Patuakhali Science and Technology University (PSTU) campus to observe the occurrence and abundance of sucking pests of brinjal during the period from December 2017 to March 2018. Results revealed that five sucking pests namely leafhopper (*Amrasca biguttula biguttula*), whitefly (*Bemisia tabaci*), aphid (*Aphis gossypii*), mealybug (*Coccidohystrix insolita*) and mite (*Tetranychus malaysiensis*) were observed on brinjal grown in homestead garden. The highest abundance (23) was recorded in *A. gossypii* which was followed by *T.malaysiensis* (18) and *B. tabaci* (17) and the lowest abundance was observed in *A. biguttula biguttula* (11) followed by *C. insolita* during the period from December 2017 to March 2018. At vegetative stage, the highest number of aphid and whitefly (31 and 7) was recorded in top canopy followed by middle canopy (22 and 5) and the lowest was in bottom canopy (17 and 3) while at flowering and fruiting stages, the highest number was in middle canopy. In case of jassid, the highest number of jassid (7) was recorded in middle canopy followed by top canopy (5) and the lowest was in bottom canopy (4) at vegetative and flowering stages while at fruiting stage, the highest number of jassid was in middle canopy.

Key words: Brinjal, Sucking pests, Occurrence, Abundance

Introduction

Brinjal, *Solanum melongena* L. is one of the most important vegetables in South Asia which covered for all most 50% of the world's area (Alam *et al*., 2003). Brinjal occupies an area of 1.72 m ha with a production of 43.17 m MT with an average productivity of 25 MT per ha in the world (FAOSTAT, 2011). Brinjal cultivation in Asia accounts for about 94 percent of the total world area, with about 92 percent of world production (FAO, 2007). Brinjal contains nutrients such as dietary fiber, folate, ascorbic acid, vitamin K, niacin, vitamin B6, pantothenic acid, potassium, iron, magnesium, manganese, phosphorus, and copper (USDA, 2008); it provides nutrients to the diets of the poor people during summer when other vegetables are in short supply.

*Corresponding author: E-mail: mohasin1965@pstu.ac.bd

Though a summer crop, it is being grown throughout the year under irrigated conditions. It is subjected to attack by a number of insect pests from the nursery stage till harvesting (Reghupathy *et al.*, 1997). Apart from the shoot and fruit borer, sucking pests such as aphid [*Aphis gossypii* (Glover), leafhopper, *Amrasca biguttula biguttula* (Ishida), whitefly, *Bemisia tabaci* (Gennadius), mealybug, *Coccidohystrix insolita* (Green) and lacewing bug, *Urentius hystricellus* (Richter)] have assumed the status of serious pests in brinjal (Swaminathan *et al*., 2010). Besides causing direct damage by sucking the cell sap and prohibiting the normal growth, they also act as vectors for virus diseases. Jassids or leaf hopper became second major pest of brinjal after brinjal shoot and fruit borer due to the severity of damage to the plants (Das and Islam, 2014). *Amrasca biguttula biguttula* (Ishida) was important in the tropics and subtropics because environmental conditions were conducive for growth and development of host and pest (Iqbal *et al*., 2008). Latif *et al.* (2009) mentioned shoot and fruit borer (*Leucinodes orbonalis*), leafhopper [*Amrasca biguttula biguttula* (Ishida)], epilachna beetle (*Epilachna* sp.), whitefly (*Bemisia tabaci*) and aphid (*Aphis gossypii*) as the most common and major pests of brinjal and ranked jassid *Amrasca biguttula biguttula* as top in respect to the frequency followed by whitefly whitefly (*Bemisia tabaci*), aphid (*Aphis gossypii*) and epilachna beetle (*Epilachna* sp.). Zaini *et al*. (2013) reported that high number of were found scattered over the underside of leaves particularly during early growth of the plants. Both nymphs and adults of mealybugs suck the sap from leaves causing withering and yellowing of leaves and sometimes resulted in sooty mould on the upper surface of the leaves (Janaki *et al*., 2012). Both nymphs and adults of aphid suck sap from young twigs, leaves and young fruits and hamper the normal growth of brinjal crop. The infested plants become weak, pale and stunted in growth which consequently resulted in reduced fruit size (Konar *et al*., 2011). A phytophagous two-spotted spider mite, *Tetranychus urticae*, causes significant yield losses in brinjal raised under protected conditions (Bhullar *et al.*, 2021). Nuruzzaman *et al*. (2018) identified Tetranychus malaysiensis mite as pest of brinjal collected from the sourthern part of Bangladesh. Considering above facts the present research work was aimed to document the occurrence and abundance of sucking pests of brinjal grown in homestead.

Materials and Methods

Field experiment was carried out in homestead garden of Patuakhali Science and Technology University (PSTU) campus, Dumki, Patuakhali during the period from December 2017 to March 2018. The singnath variety of brinjal was planted as study

material. The incidence and abundance of selected pests were recorded from planting to harvesting of the brinjal crop. Observations on the population of sucking pests (viz., aphid, jassid, whitefly, mealy bugs and mites) were recorded on three randomly selected plants. On each plant, five leaves (one from top and two from middle and bottom canopy of the plant) were observed from lower side to record insect and mite pests for different months and dates of observations for each plot in each replication. In case of aphid and mealybug, both nymphs and adults were gently transferred onto white paper using a soft brush, and counted using a magnifying lens. Jassid and whitefly infested leaves were also observed by using a magnifying lens for counting the number of jassid and whitefly. In case of mite, mite infested leaves were brought at entomology laboratory and each leaf was observed under trinocular stereo microscope for counting the number of mite per leaf. In such a way 5 leaves were observed and mites were counted. Data on insect and mite were taken at 7 days interval.

Results and Discussion

Occurrence of sucking pests on brinjal: The sucking pests observed infesting brinjal raised in the homestead area of PSTU campus were leafhopper (*Amrasca biguttul abiguttula*), whitefly (*Bemisia tabaci*), aphid (*Aphis gossypii*), mealybug (*Coccidohystrix insolita*) and mite (*Tetranychus malaysiensis*). The sucking insect pests belong to 4 different families such as Cicadellidae, Aleyrodidae, Aphididae and Pseudococcidae under a single order Hemiptera (Table 1 & Plate 1).

Table 1. List of sucking insect pests recorded in brinjal ecosystem in homestead garden of PSTU campus.

Sl. No.	Common name	Scientific name	Family	Order
1	Jassid/leaf hopper	*Amrasca biguttula biguttula* Ishida	Cicadellidae	Hemiptera
2	Whitefly	*Bemisia tabaci* Gennadius	Aleyrodidae	Hemiptera
3	Aphid	*Aphis gossypii* Glover	Aphididae	Hemiptera
4	Mealybug	*Coccidohystrix insolita* (Green)	Pseudococcidae	Hemiptera
5	Brinjal mite	*Tetranychus malaysiensis* Ehara	Tetranychidae	Trombidiformes

Abundance of sucking pests on brinjal: The number of insect and mite pests per 5 leaves of brinjal plant from December 2017 to March 2018 is presented in Figure 1. In December, *Aphis gossypii* exhibited the highest abundance (42), followed by *Amrasca biguttula biguttula* (10) and *Bemisiatabaci* (10), while *Tetranychus malaysiensis* had the

lowest occurrence. No population of *Coccidohystrix insolita* was found in this month. In January, *A. gossypii* (20) was also observed highest followed by *C. insolita* (12) and *A. biguttula biguttula* (12) while *T. malaysiensis* and *B. tabaci* was recorded as the lowest (7 and 3). In February, *A. gossypii* showed the highest abundance (23) followed by *T. malaysiensis* (18) and *B. tabaci* (17). The lowest abundance was observed in *A. biguttula biguttula* (11) followed by *C. insolita* (8). In March, *T. malaysiensis* as the highest abundance (33) was observed followed by *A. gossypii* (31). *A. biguttula biguttula* showed the lowest abundance (8) was observed followed by *B. tabaci* (11) and *C. insolita* (14).

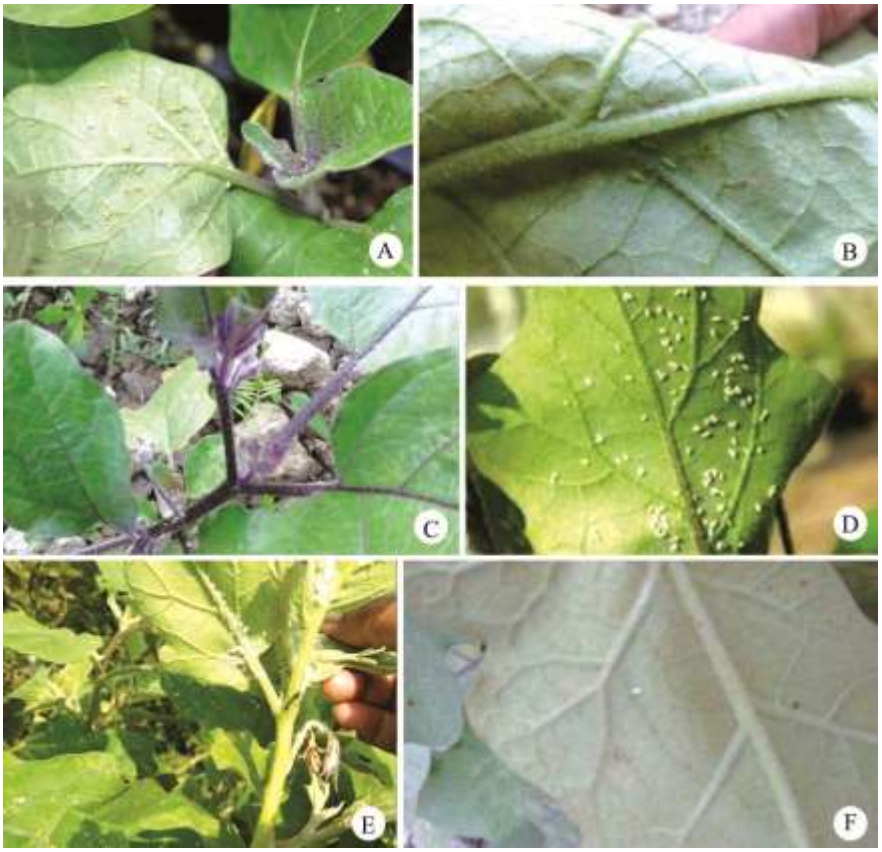


Plate 1. Attacked brinjal leaves by sucking pests (A-Aphids (*Aphis gossypii*), B-Jassids (*Amrasca biguttula biguttula*), C&D- Whiteflies (*Bemisia tabaci*), E- Mealybug (*Coccidohystrix insolita*), F-Red spider mites (*Tetranychus malaysiensis*).

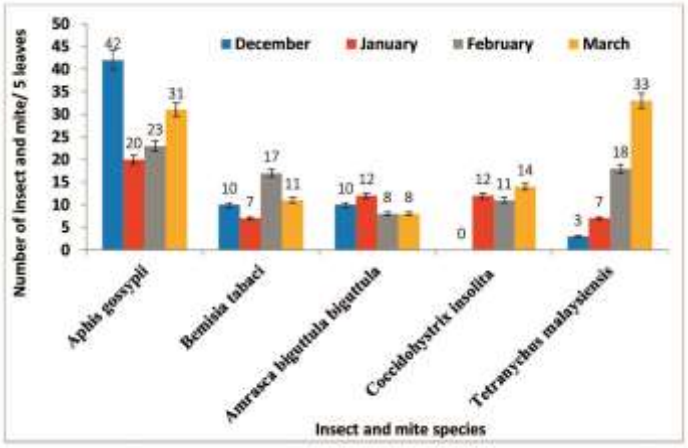


Fig. 1. Mean number of sucking pest species per 5 leaves of brinjal plant during December 2017 to March 2018

Number of aphid at different growth stages of brinjal: Number of aphid per three leaves in different plant canopies at various growth stages of brinjal is presented in Figure 2. At vegetative stage, the highest number of aphid (31) was recorded in top canopy followed by middle canopy (22) and the lowest was in bottom canopy (17). At flowering stage, the highest number of aphid (37) was observed in middle canopy followed by bottom canopy (25) while the lowest was in top canopy (8). At fruiting stage, the highest number of aphid (13) was observed in middle canopy followed by top canopy (9) and the lowest was in bottom canopy (6).

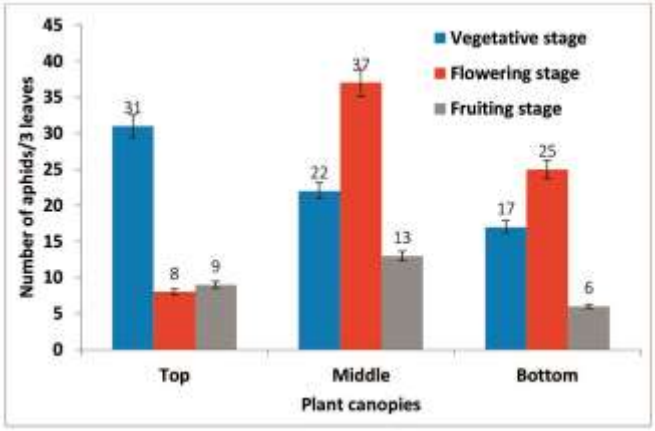


Fig. 2. Number of aphid in different plant canopies at various growth stages of brinjal

Number of whiteflies at different growth stages of brinjal: Number of whiteflies per three leaves in different plant canopies at various growth stages of brinjal is presented in Figure 3. At vegetative stage, the highest number of whiteflies (7) was recorded in top canopy followed by middle canopy (5) and the lowest was in bottom canopy (3). At flowering stage, the highest number of whiteflies (5) was observed in top canopy followed by middle canopy (1) while no population was in bottom canopy (0). At fruiting stage, the highest number of whiteflies (3) was observed in middle canopy followed by top canopy (2) and the lowest was in bottom canopy (1).

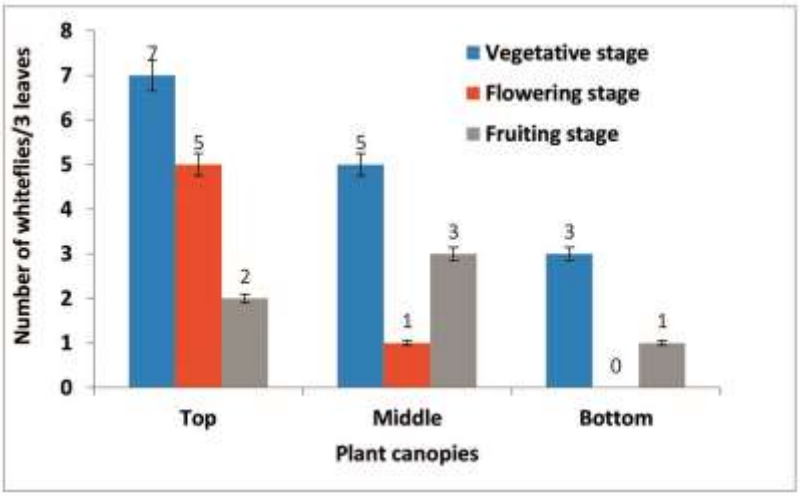


Fig. 3. Number of whiteflies in different plant canopies at various growth stages of brinjal

Number of jassid at different growth stages of brinjal: Number of jassid per three leaves in different plant canopies at various growth stages of brinjal is presented in Figure 4. At vegetative stage, the highest number of jassid (7) was recorded in middle canopy followed by top canopy (5) and the lowest was in bottom canopy (4). At flowering stage, the highest number of jassid (8) was observed in middle canopy followed by top canopy (2) while no population was in bottom canopy (0). At fruiting stage, the highest number of jassid (6) was observed in middle canopy followed by bottom canopy (5) and the lowest was in top canopy (4).

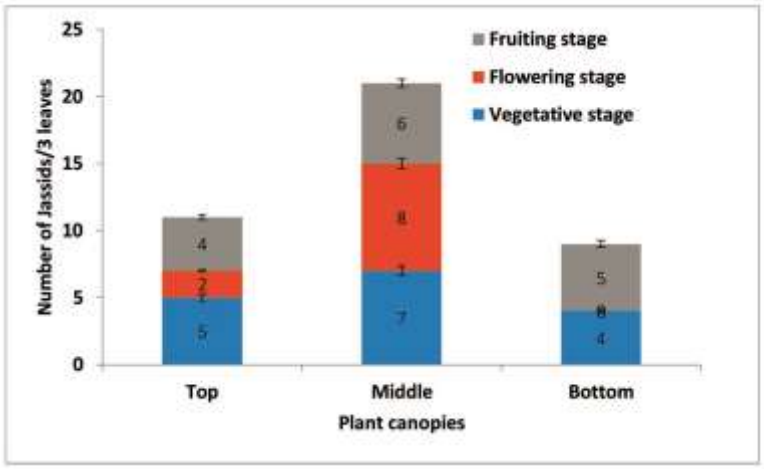


Fig. 4. Number of jassid in different plant canopies various growth stages of brinjal

The study clearly indicated the predominance of the sucking pests in the homestead area. The results of the present study were in conformity with the findings of Suresh *et al.* (2007) who had observed the sucking pests of major importance in brinjal were whitefly, jassid and aphid. Mourya *et al*. (2023) observed that sucking insect pests such as aphids, whiteflies, and jassids threaten crop health and productivity by sucking sap from plants. Latif *et al*. (2009) reported that the arthropod biodiversity in the brinjal field showed that jassid and whitefly were the most common and major insect pests of brinjal crop. Whitefly (*Bemisia tabaci* Gennadius) is an important sucking pest of brinjal that caused considerable damage to the brinjal plants (Mandal *et al.*, 2010). The present investigation has also been supported by Meena *et al*. (2017). Peak population of whitefly was recorded higher during 5th week of October reported by Berani and Patel, 2020). Sudhakar *et al*. (1998) and Bernice (2000) observed that brinjal suffered mainly from the attack of the shoot and fruit borer, whitefly, jassids, and aphids. Leafhoppers were the predominant sucking pests in brinjal and it was observed earlier by Malini *et al*. (2013). Kataria and Kumar (2012) reported that the sap sucking pests like aphids, whiteflies and mealybug as serious pest in India. Zaini *et al.* (2013) reported that high number of whitefly were found scattered over the underside of leaves particularly during early growth of the plants. Leaf strata strongly determine the distribution of the whitefly larvae during various cropping's due to interaction between strata and different cropping was highly significant. The population pattern of *B. tabaci* changed in the middle stratum. These indicated that the sampling of *B. tabaci* might be represented at the middle part of

brinjal plant. Kapil et al. (2022) found that the population of whitefly nymphs and adults, aphids, jassids and red spider mite on brinjal was initiated in 28th and 30th, 31st, 48th and 30th standard week, respectively. The population build-up of whitefly adults arrived at peak in 42nd SMW when temperature (maximum and minimum) and relative humidity (morning and evening) were 34.2 and 13.7 0C and 76.4 and 22.2 per cent, respectively.The distribution of immature whiteflies varied significantly among the leaf strata. The upper stratum harbored lower number of whitefly larvae. This part of brinjal plant consisted of young leaves, a preferred place for egg oviposition (Butler *et al*., 1984). The upper stratum, provided a favorable place for whitefly adults to lay eggs confirming similar finding with the previous study carried out by McAuslane (1995). The main reason was that, the larvae emerged a week after the eggs have been oviposited on the under surfaces of the leaves, resulting in low number of *B. tabaci* larvae found in the upper stratum. The secondary leaves reached their maturity and changed their strata to the middle stratum after appearing of the new leaves.

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