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# Study on the succession of insect pests of brinjal

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**Abstract**
During the studies on the insect pests succession revealed that a total of eight insect species were found associated with brinjal crop at different crop growth stages. The first attack on the crop appeared in the one week after transplantation and continued up to till crop harvested. Pests were found attacking on the crop were jassids *(Amrasca biguttula biguttula)*, aphids*(Aphis gossypii)*, white fly *(Bemisia tabaci)*, leaf roller (*Eublemma olivacae*), shoot and fruit borer (*Leucinodes orbonalis*), epilachna beetle (*Epilachna vigintioctopunctata*), leaf webber (*Psara bipunctalis*) and grass hopper(*Chrotogonus spp.*). Among them, brinjal shoot and fruit borer (*L. orbonalis*) was recorded as major pest. Jassids (*A. biguttula biguttula* Ishida), aphid (*A. gossypii* Glov.) and epilachna beetle (*E. viginitioctopunctata* F.) were found to damage the crop moderately. Other insects pests recorded on the crop were of less importance and extent of damage caused by them was found without much economic loss.

**Keywords:** Pest succession, *Leucinodes orbonalis*, *Solanum melongena*, damage

## Introduction
Brinjal, *Solanum melongena* L. is one of the most important vegetables in South Asia which accounts for almost fifty per cent of the world's area under cultivation. (Alam *et al.* 2003) [1]. In India in the area of 512,800 hectares of land area the production was 8,450,200 tons according to FAO Agriculture Database, 2007; BBS, 2005.Whereas area under brinjal cultivation was 55811 hectares in Jharkhand and production of brinjal was 67864 tons in the year 2011-2012. Due to its versatility in use in Indian food, brinjal is often described as the '*King of vegetables'* (Choudhary and Gaur, 2009) [6]. It is one of the popular vegetables, which belongs to Solanaceae family and it is grown in all parts of the country specially in Jharkhand throughout the year, mainly due to its adaptability to variety of agroclimatic conditions and assured market. It is a normally self fertilized annual crop of uncertain origin, but cultivated brinjal is undoubtedly of Indian origin (Thompson and Kelly, 1957) [19]. Brinjal is known as eggplant in United states and aborigine in France and England (Ansari and Singh, 2014) [2]. In the brinjal field, various pests prevailed during seed-ling to harvesting stage and the loss caused by brinjal pests vary from season to season depending upon environmental factors (Anjali *et al.*, 2012) [3]. A thorough knowledge of seasonal activity of insect-pest helps in developing efficient pest management strategies in a particular set of climatic conditions.

## Materials and methods
The experiment was conducted at the Commercial Horticulture Unit under Birsa Agricultural University, Kanke, Ranchi, Geographically, Kanke (Ranchi) is situated at 23º 17ˈN latitude and 85º19 'E longitude having an elevation of 625 metre above mean sea level. 21 varieties of brinjal were taken for this experiment i.e. Pusa Kranti (OP), Round Green Katedar
KUR BR-112(op), Brinjal green Round, Green long (op), F1 Hybrid PK-133, Green long F1 Hybrid, F1 Kusuma, F1 Hybrid KBRH-PK, F1 Hbrid Rajkiran, Brinjal-Sinduri F1 Hybrid, F1 Pratima, F1 Hybrid KBRH-Blue Magic, Brinjal Green Long, F1 Hybrid Super Chhaya, Swarna Pratibha palandu, Hybrid JK 8031, Swarna Shyamli palandu, F1 Hybrid utkal Hybrid F1 Mali-128 and F1 Hybrid Brinjal No. 704. This experiment was laid out in randomized block design with three replications. Each plot size was 5m ×1m. Randomly five plants from three central rows in each plot were tagged and an observation on population of insect pests of brinjal was recorded on randomly five selected tagged plants in each plot in the morning hour at weekly interval right from germination till harvest of crop. The nature and extent of damage caused by various insect pests was also recorded to assess the economic status of the pests.

The insect-pests were collected and reared up to adult stage wherever necessary. Adult insects were preserved and identified.

## Results and Discussion

### Pest succession in brinjal crop

The insect pest species associated with brinjal crop along with their nature of damage, seasonal incidence, damaging stage and economic status have been studied and shown damaging stage and economic status have been studied and shown in Table 1. 13 insect species were found attacking the brinjal crop at different stage of crop growth at BAU, kanke, These were brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee (Pyraliade: Lepidoptera), whitefly, *Bemesia tabaci* Gennadius (Aleyrodidae: Hemiptera), Leafhopper, *Amrasca biguttula biguttula* Ishida (Cicadellidae: Hemiptera); aphid, *Aphis gossypii* Glover (Aphididae: Hemiptera) grasshopper, *Chrotogonus sp.* (Acrididae: Orthoptera), Leaf roller, *Eublemma olivacae* W. (Noctuidae: Lepidoptera), The epilachna beetle, *Epilachna vigintioctopunctata* (Coccinellidae: Coleoptera). Patial *et al*. 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. Keeping this in view the importance of different pests of brinjal. It was desirable to study the succession of insect pests and its effect on brinjal fields.

### Lepidoptera

**Brinjal shoot and fruit borer:** *Leucinodes orbonalis* (Guenee) is the major pest causing severe damage to the brinjal fruits. During 2016-17, it was found that the shoot and fruit borer was active throughout the cropping season from transplanting to reproductive stage of the crop (Table 9).The peak shoot infestation of 9.8 per cent was recorded at 2nd SMW while the maximum (20.5%) fruit infestation was recorded at 35 SMW. The present results are in agreement with the results of Shukla and Khatri (2010) [18] who reported the infestation of fruit borer from October to December. Mehto *et al.,* (1980) [14] also observed this pest round the year on the brinjal crop. The incidence of the pest on kharif crop started from the last week of August and remained till last week of December, thus this pest was found infesting the crop throughout the crop season. The extent of apparent losses of the borer was only 21.3%, but the total losses in production were as high as 48.3%. Atwal. A.S. (1976) [4] reported the abundance of *L. orbonalis* e during monsoon period. Pawar *et al.,* (1986) [16] reported incidence of this pest during kharif crop and summer season.

**Table 1:** List of insect pest succession observed in the brinjal field

| Common Name | Scientific Name | Order | Family | Period of occurrence | Site of damage |
|---|---|---|---|---|---|
| Cotton Jassid(Leafhopper) | *Amarasca biguttula biguttula* | Hemiptera | Cicadellidae | August to end December | Leaf |
| whitefly | *Bemesia tabaci* | Hemiptera | Aleyrodidae | August to December | leaf |
| Rice green leaf hopper | *Nephotettix depunctatus Fab.* | Hemiptera | Cicadellidae | August end to December end | Leaf |
| Cotton Aphid | *Aphis gossypii Glover* | Hemiptera | Aphididae | Aug end to December | Leaf, shoot, flower, bud |
| Epilachna beetle | *Epilachna 28 punctata Fab.* | Coleoptera | Coccinellidae | July end to mid December | Leaf |
| Brinjal shoot and fruit borer | *Leucinodes orbonalis Guen.* | Lepidoptera | Pyralidae | Aug end to December | Shoot and fruit |
| Grasshopper | *Hieroglyphus banian* | Orthoptera | Acrididae | July end to December end | Leaf |
| Leaf roller | *Eublemma olevacea* | Orthoptera | Noctuidae | Aug to mid November | Leaf |

**Leaf roller:** *Eublemma olivacae* remained active on brinjal from the first week of August to mid

November. During this period the caterpillar of the pest feed inside the leaves by folding with the help of white resinous secretion and skeletonize by this activity reducing photosynthesis which have indirect effect on fruit yield. 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*., 1995) [5].

### Coleoptera

**The epilachna beetle:** *Epilachna vigintioctopunctata*. The activity of this pest was noticed in kharif season July end to mid-December. According to Natekar *et al.* (1987) [15], during this period, the grubs and adults feed upper and lower surface of leaves. However, it was reported that for a short period its activity on summer brinjal, but on kharif crop up to August with the population level of 136grubs/ 150 plants.

### Hemiptera

**Leafhopper:** *Amrasca biguttula biguttula* Ishida, commonly known as cotton leafhopper is a polyphagous pest comes under order Hemiptera (Homoptera); Being a sucking pest, causes considerable damage to brinjal crop. Both nymphs and adults of this pest suck the sap from the lower surface of leaves and growing tips. The incidence of this pest was observed during August to December i.e. the population appeared in the first week after transplanting and continued building up throughout the crop growth. Dhamdhere *et al.*, (1995) [7] studied the activity of leafhopper on brinjal at Madhya Pradesh, Gwalior and revealed that the pest was active throughout both kharif and summer seasons. Peak population of leafhopper was observed in the third week of September. Similar activity was observed by Prakash, O. (1978) [17] when highest population was noticed during late September to mid-November.

**Aphid:** *Aphis gossypii* Glover is one of the important pest of brinjal crop. It is a polyphagous pest, having wide host range. The nymphs and adults suck sap from leaves and tender shoots. The brinjal plant infested by *A. gossypii* became pale, weak and stunted in growth which consequently results in reduced fruit size. The infestation of aphid was reduced from August to last week of December. Ghosh, *et al*. (2004) [10] also reported that *A. gossypii* is an important pest of brinjal crop. Mall *et al*. (1992) [13] studied the activity of aphid on brinjal and concluded that pest incidence was observed from 3rd week of August to the 3rd week of December and the population was high during the first week of November. They further reported that average temperature between 20 to 25 ºC with average relative humidity 50 to 72 per cent were found

to be more favourable for maximum activity of this pest. Moist and warm weather favours for the growth and development of this insect. Kadam *et al*., 2006 [11]; Elanchezhyan *et al.,* 2008 [8] also reported the occurrence of *Aphis gossypii* on brinjal.

**Whitefly:** *Bemesia tabaci* was also recorded as important pest of brinjal. The small sized fly and their nymph are mostly seen in cluster on underside of the leaves. They feed on the leaves by sucking the cell sap. Warm and moist weather favors the development and multiplication of these insect. The occurrence of this pest was recorded from last week of July to mid-December. Natekar *et al.,* (1987) [15] reported considerably high population level of this pest.
A study on activity of the whitefly, on cotton revealed that pest appeared in the first week after germination and its population continued to build up throughout the growth stage of the crop which attained a peak during third week of September (Borah, 1995) [5]. According to Parmar (1991), the incidence of this pest commenced in 2nd week of July during kharif season and remained active till maturity of the brinjal crop

**Orthoptera**
**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 has earlier been reported by (Gangwar *et al*., 2014). [9]

**Coleoptera**
**Hadda beetle**, *Henosepilachna vigintioctopuntata* Fabriciusis (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 [8]; Latif *et al.,* 2009 [12]).

**Conclusion**
Therefore, through the result obtained and analyzed during the present investigation, it was concluded that all the eight insects viz. Brinjal shoot and fruit borer, Leaf roller, Leafhopper Aphid, Whitefly, Grasshopper, Hadda beetle were active at proper period and showed the succession in the brinjal field. The pests are so destructive leading to reduction of brinjal production.

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