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# Influence of Clusterbean as an intercrop in the management of egg plant shoot and fruit borer, *Leucinodes orbonalis* Guenee (family: Crambidae, order: Lepidoptera)

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**Abstract**
Eggplant, *Solanum melongena* (L) is an ecomonically important vegetable crop cultivated throughout India. Though eggplant is found to be affected by several insect pests, the eggplant fruit and shoot borer, *L. orbonalis* is the more destructive pest. The present investigation was taken upto test verify the influence of clusterbean intercropping as cultural practices to manage *L. orbonalis* in egg plant. The average shoot damage was 22.66 per cent in clusterbean intercropped plot, while in solecrop brinjal damage was 29.61 per cent respectively. The maximum fruit damage was noted in sole cropped plot 35.81 per cent while fruit damage was 28.03 per cent in clusterbean intercropped plot.

**Keywords:** Egg plant, clusterbean, intercropping, damage

## Introduction
The important solanaceous vegetable brinjal also known as Eggplant is cultivated throughout the country in two seasons *viz*., kharif and Rabi. Extreme level of insect pest incidence is one of the major contributing factors towards the low productivity of the crops (Nayak *et al.*, 2016) [11]. According to Patial and Mehta (2008) [12] eggplant is mostly infested by 27 different insect pest belonging to eight orders, 20 families and one mite. Intercropping of field vegetables with other crops reduce the insect pest population there by reducing the number of chemical sprays and its environmentally acceptable and sustainable production practices (Mohanasundaram *et al.*,2012) [9]. Intercropping system alters microclimatic zone which provide favourable habitats and victims to predators and parasitoids through time as well as different food sources such as pollen and nectar (Emden, 1965) [15]. Intercropping is a farmer's level good adaptation and cultural practice to control insect pest population and economically benefits the farmers. Intercropping system reduces the pest incidence by increasing crop diversity (Trenbath, 1993). Intercropping system is a chemical ecology approach like repelling insect pests and attracting natural enemies in an eco-friendly approach. The brinjal+ clusterbean intercropping module recorded low shoot and fruit damage (Elanchezhyen, 2007) [4].

## Material and Methods
Impact of cluster bean as push component in *L. orbonalis* management in brinjal crop was studied in field trial conducted at Pulutheri village of Manikandan block in one acre area. The brinjal crop was raised with a Manaparai local variety and field was divided into four equal quarters in which cluster bean (var. MDU 1) was sown as intercrop at 4:1 ratio in diagonal quarters. Remaining diagonal quarters having sole brinjal crop formed the control plots. The intercrop cluster bean variety of MDU1 was maintained as seed crop upto 100 days and harvested the mature pods. The effect of intercrop on *L. orbonalis* was assessed in terms of percentage eggplant fruit and shoot damage at 15 days interval.
Observations on the shoot damage was recorded from 15 DAT to 75 DAT in 0.25/ac plot size, at random from ten plants in a plot, where 100 plants were monitored with a total of 400 samples representing the entire four blocks of one acre brinjal crop. The fruit damage was taken from 70 DAT to till harvest of crop at ten days interval. The impact of cluster bean as push component in *L. orbonalis* management was validated based on the extent of fruit damage in sole cropped plot as well as in intercropped plot. For Statistical analysis the per cent

shoot and fruit damage was transformed to arc sinc values. The field trail data was analyses using Random Block Design.

## Results

### Influence of *C. tetragonoloba* intercrops on *L. orbonalis*

### Shoot damage

The experiment taken up during November 2018 to April 2019 revealed, that the brinjal + clusterbean reduced the EFSB (Table 1). In the Intercropped plot, the extent of shoot damage ranged from 4.18 percent to 22.66 percent as against 6.13 percent to 29.61 percent on 15 DAT respectively in sole crop of brinjal (Fig 1). The shoot damage recorded at 45 DAT in the sole crop of brinjal was 36.95 percent while 32.07 percent in intercropped with cluster bean. The shoot damage in the control sole crop continued to increase and reached to the maximum of 36.39 per cent at 75 DAT and during this period a significantly low level of 20.92 per cent was noticed in cluster bean intercropped brinjal. Over all mean of 29.61 per cent in brinjal sole crop and minimum level of 22.66 per cent recorded in brinjal intercropped cluster bean.

### Fruit damage

The cluster bean intercrop plot fruit damage ranged from 28. 74 per cent to 37.62 at 70 DAT to 160 DAT (Table 2). In respectively the cluster bean intercropping fruit damage was from 28.46 per cent to 41.25 per cent at 80 DAT to 120 DAT (Fig 2). Respectively compared to a higher level of damage from 29.40 per cent to 51.42 per cent at 90 DAT to 120 DAT recorded in brinjal sole crop. The fruit damage was 28.74 per cent in the sole crop and 26.23 per cent in cluster bean intercropping of 70 DAT. The subsequent observation made at 90 DAT fruit damage was noticed to be 29.40 per cent in sole crop of brinjal and was only 27.30 per cent in cluster bean intercropping. When the crop was at the in terminal stage 150 DAT fruit damage level of 40.32 per cent was noticed in sole crop of brinjal plot and comparatively low level of fruit damage 21.95 percent was noticed in cluster bean inter cropped. At the end of the crop period, the fruit damage continued to increase and reached to a maximum of 51.42 per cent during 120 DAT in brinjal sole crop and in cluster bean intercropped plot a significantly low level of 41.25 per cent fruit damage.

## Discussion

In intercropping system the intercrops have repellent activity against the adult moths and alters the oviposition preference of the adult moths in the main crops. The brinjal + cluster bean intercropping system benefits the farmer by giving higher economic returns. Earlier report cluster bean intercropping system might have alter the microclimatic and the presence of allelochemical in intercrops worked well in reducing incidence of herbivores Mahadevan and Chelliah (1986). Mumford and Baliddawa (1982) [8, 10] revealed that minimum pest population development in intercropping system, reasons for unfavourable environment of intercrops to pests. Gangwar *et al*., (1994) [6] reported the change in microclimatic conditions of particular ecosystem due to intercrops influence the host selection by the pest through masking effects or chemical repellents. Kavitha (2003) [7] noticed that maize plants harboured large number of the natural enemies like Coccinellids, Spiders and Chrysopids. Amin (2004) [1] found that shoot incidence caused by brinjal shoot and fruit borer was maximum in the brinjal mono cropping than in brinjal + onion, brinjal + garlic, brinjal + chilli and brinjal + coriander. Elanchezhyan *et al.,* (2008) [5] observed brinjal intercropped with cluster bean 4:1 ratio pest population of the brinjal shoot and borer damage reduced and attract coccinellides and syrphids. Cluster bean report to be the companion crop in cotton to attract the natural enemies and minimize the incidence of insect pest population (Balasubramanian *et al*., 1998) [2]. Brinjal intercropped with coriander at 3:1 ratio reduced the fruit borer damage by 55.54 %. Egg plant+ sorghum intercropping system had high number of the undamaged fruits/plots because sorghum stays longer in the field to provided protection and barrier to the base crop like egg plants (Singh 2010) [6]. Egg plant + cereals intercropping systems suppress the incidence of the fruit borer (Ram and Singh, 2010) [13]. Relay intercropping with coriander in the standing crop of brinjal caused reduction of *L. orbonalis* damage in the main crop and also elucidated oviposition effect (Dominic *et al*., 2018) [3].

## Conclusion

Brinjal intercropping system with crops had not only cluster bean repellent activity towards adult moths depends and suppress the *L. orbonalis* incidence in the brinjal. But also reduce the shoot and fruit damage in brinjal.

**Table 1:** Influence of cluster bean *C. tetragonoloba* intercropping on shoot damage in brinjal by *L. orbonalis*

| Treatments | 15 DAT | 30 DAT | 45 DAT | 60 DAT | 75 DAT | Mean |
|---|---|---|---|---|---|---|
| | Shoot damage (Percent) | | | | | |
| Brinjal alone | 6.13 (14.32) | 21.39 (27.51) | 36.95 (37.42) | 47.21 (43.39) | 36.39 (37.09) | 29.61 (32.96) |
| Brinjal + cluster bean | 4.18 (11.71) | 14.84 (22.65) | 32.07 (34.49) | 41.28 (39.96) | 20.92 (27.22) | 22.66 (28.42) |
| SEm | 0.123 | 0.087 | 0.248 | 0.147 | 0.108 | |
| CD (0.01) | 0.805 | 0.568 | 1.619 | 0.958 | 0.708 | |

DAT- days after transplanting, Figure in parentheses are arc sign transformed values n = 400

**Table 2:** Influence of cluster bean *C. tetragonoloba* intercropping on fruit damage in brinjal by *L. orbonalis*

| Treatments | 70 DAT | 80 DAT | 90 DAT | 100 DAT | 110 DAT | 120 DAT | 130 DAT | 140 DAT | 150 DAT | 160 DAT | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fruit damage (Percent) | | | | | | | | | | |
| Brinjal alone | 28.74 (32.41) | 31.30 (34.02) | 29.40 (32.83) | 26.6 (31.04) | 43.9 (41.49) | 51.42 (45.81) | 36.92 (37.42) | 31.92 (34.40) | 40.32 (39.42) | 37.62 (37.83) | 35.816 (36.76) |
| Brinjal + cluster bean | 26.23 (30.81) | 28.46 (32.24) | 27.30 (31.49) | 24.03 (29.35) | 38.60 (38.41) | 41.25 (39.96) | 26.98 (31.29) | 23.85 (29.23) | 21.95 (27.93) | 21.70 (27.76) | 28.036 (31.97) |
| Sem | 0.120 | 0.081 | 0.059 | 0.097 | 0.085 | 0.173 | 0.064 | 0.138 | 0.015 | 0.110 | |
| CD (0.01) | 0.783 | 0.530 | 0.386 | 0.636 | 0.558 | 1.132 | 0.421 | 0.899 | 0.102 | 0.720 | |

DAT- days after transplanting, Figure in parentheses are arc sign transformed values

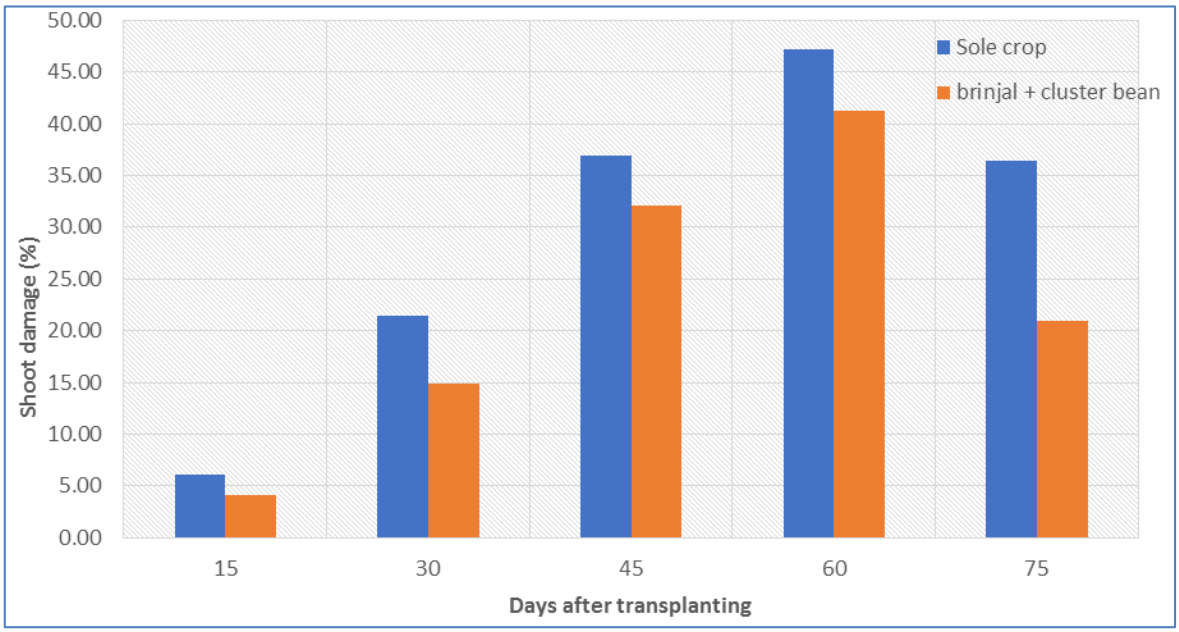


**Fig 1:** Influence of *C. tetragonoloba* intercrops on shoot damage by *L. orbonalis*

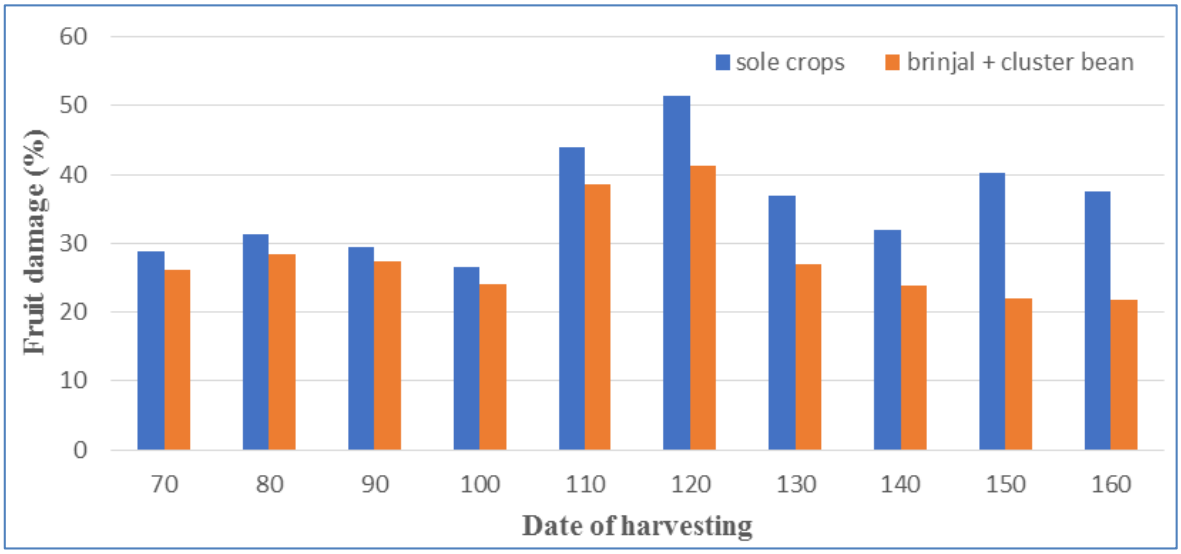


**Fig 2:** Influence of *C. tetragonoloba* intercrops on fruit damage by *L. orbonalis*

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