

REPELLING PERFORMANCE OF DIFFERENT UMBELLIFER CROP IN REDUCING BRINJAL SHOOT AND FRUIT BORER INFESTATION ON BRINJAL

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ABSTRACT: Repelling performance of some selected umbellifer crop in reducing BSFB infestation on brinjal was studied during 2004-2005 at the experimental farm of Bangabandhu Shiekh Mujibur Rahman Agricultural University, Gazipur. It was observed that all the repellent crop reduce shoot fruit infestation. Significantly lowest number of shoot and fruit infestation (2.56%,34.65%) was found when brinjal grown with soluk (*Peucedanum graveolens*). Generally a higher number of spider (1.59) and lady bird beetle (4.55) were found in crop association with umbellifer in comparison to brinjal monoculture.

KEY WORDS: Repelling performance, umbellifer crop, brinjal, India

Among the Solanaceous vegetables brinjal is one of the most popular and principal vegetables crops in Bangladesh. It is also a popular in other countries of the world. The brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenee) is one of the most destructive pest of brinjal in Bangladesh (Alam, 1969) and India (Tewari & Sandana, 1990) and also a major pest in the other countries of the world (Dhankar, 1988). It is very active during the rainy and summer seasons and often causes more than 90% damage (Ali et al., 1980; Kallou, 1988). The yield loss has been estimated up to 86% (Ali et al., 1980) and 67% (Islam & Karim, 1991) in Bangladesh and up to 95% (Naresh et al., 1986) and 63% (Dhankar et al., 1977) in Haryana, India. For the management of this pest brinjal grower of Bangladesh mostly depends on chemical insecticides. Traditionally insect pest are controlled by insecticide but the indiscriminate use of insecticide creates several adverse effects such as development of resistance, outbreak of secondary pests (Hagen & Franz, 1973), health hazards (Bhadhury et al., 1989) and environmental pollution (Kavadia et al., 1984). Moreover it leads a negative effects on natural enemies and other beneficial and disrupting biodiversity. Among the non chemical control measures although references on abiotic factors, such as relative humidity, rainfall, temperature, fertilizer etc. and biotic factor such as parasitoid and pathogen (Alam et al., 1969) were available only. Some progress in the host plant resistance research against this pest has been achieved (Dhanker, 1988). But it has not yet been to formulate any effective management strategy for the pest. As such chemical control measure has remained as the key control tectice BSFB. Simmonds et al. (1992) reported plants with anti-feedant activities. Among them, *Allium* spp. are reportedly very effective. Kirtikar & Basu (1975) reported that onion, garlic, coriander (*Coriandrum sativum* L.) have also strong pungent repellent action.

Intercropping of tomato (Annon., 1985; Roltsh & Gage, 1990), garlic (Annon., 1985; Halepyatic et al., 1987), onion and ginger (Chowdhury 1988) with different

crops have been reported to reduce the population of different target pests. Hussain & Samad (1993) reported that intercropping chili with brinjal reduces the population of *Aphis gossypii* in brinjal. Umbellifer crop has strong pungent repellent action. Presence of umbellifer crop within the row of target crop produces masking effect. So the BSFB become confused for selecting its host. Repelling performance of umbellifer except coriander for reducing of BSFB has never been evaluated. So the present study was under taken with the following objectives:

1. to observe the performance of different umbellifer crop in reducing BSFB infestation and
2. to identify best umbellifer crop against BSFB management.

MATERIALS AND METHODS

The study was conducted at the experimental farm of Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur from September 2004 to March 2005. Umbellifer were used in this experiment are Coriander (*Coriandrum sativum*), Radhuni (*Carum roxburghianum*), Soluk (*Peucedanum graveolens*), Mouri (*Foeniculum vulgare*) and brinjal variety BARI brinjal -1 was used for the study. Intercrop combination of Brinjal+Coriander, Brinjal+Radhuni, Brinjal +Soluk, Brinjal +Mouri and sole brinjal were considered as treatments. The design was RCBD with 3 replications. The unit plot size was 3m X 3m. The distance between plots and block was .5 m and 1 m, respectively. After establishment of brinjal (25 DAT) all the umbellifer seeds were shown in a line between brinjal row continuously. All intercultural operation and crop management were done following standard horticultural practices.

Data Collection

After the incidence of brinjal shoot and fruit borer 5 plants were randomly selected in each plot for observing the number of infested shoot healthy shoot at every 7 days interval and data on the number of infested fruit and healthy fruit were recorded per plot per treatment. At harvested data on the number of healthy and infested fruits and their weight were recorded separately per plot. The cumulative healthy, infested and total fruit yield per plot was calculated. Natural enemies roaming in the plot were counted at the same time.

Data were analyzed by MSTAT-C software and discussed the results through interpretation. The data recorded on different parameters were subjected to ANOVA and the means were compared using LSD test at 5% level of significance.

RESULTS AND DISCUSSION

The results on the effect of repellent crop with Radhuni, Soluk, Mouri and Coriander with brinjal compared to its monoculture sole brinjal on insect pest particularly brinjal shoot and fruit borer and its natural enemies complex are presented and discussed under the following sub-headings:

Infestation of brinjal shoot by BSFB

The comparative effectiveness of various repellent crop on percent shoot infestation by BSFB has been evaluated in terms of their efficiency in reducing the shoot infestation over control is presented in Table (1.1). Significantly, the lowest number of shoot infestation (2.56) by BSFB in brinjal plant was recorded in brinjal+Soluk plot (Table 1.1) which is statistically similar to all other repellent crop. On the other hand, the highest number of shoot infestation (6.59) by BSFB was recorded where brinjal grown alone. In terms of percent shoot infestation

reduction over control, brinjal+soluk had 61.15% reduction in shoot infestation followed by 58.11% and 40.44% in brinjal+Coriander and brinjal+ radhuni, respectively.

Infestation of brinjal fruit by BSFB

The comparative effectiveness of various repellent crop on percent fruit infestation by BSFB has been calculated in terms of percent fruit infestation by number and weight as well as the percent reduction infestation over control (Table 1.1). The lowest fruit infestation by number (34.65%) and weight 30.01% recorded from the plots of brinjal+soluk they were significantly different from that of brinjal monoculture plot. However the highest fruit infestation by number (62.32%) and by weight 57.59% was observed in brinjal when grown as sole crop. In terms of reduction in fruit infestation over control, brinjal+soluk planted plots provided the highest reduction in fruit infestation (44.39%) by number and 47.89% by weight over the untreated control. This was followed by those of brinjal + coriander (32.62%), brinjal+mouri (32.04%) and brinjal +radhuni (30.76%) planted plot in respect of reduction in fruit infestation by weight.

Umbellifer repellent crop grow with brinjal and its effect on the yield performance of brinjal

Effect of different treatment consisting of brinjal grown with various umbellifer on total fruit yield, healthy fruit yield and BSFB infested fruit yield on the basis of number and weight of fruit per plant was evaluated and presented in Table 1.2 and 1.3. The highest number of infested fruit per plant was recorded in brinjal sole (44.00) followed by brinjal + Radhuni (32.44) (Table 1.2). Result showed that significantly the lowest (20.00) fruit infestation was observed when brinjal grown with soluk. Fruit infestation by weight ranged from 1.30 kg to 0.59 kg (Table 1.3) and followed a similar trend with that of infestation by number (Table 1.2). The percent reduction of infestation by weight over sole brinjal was the highest in brinjal + soluk (54.61%) planted plots followed brinjal + coriander (43.85%) and the lowest was recorded from brinjal + radhuni (26.15%) planted plots (Table 1.3).

The incidence of brinjal shoot and fruit borer in presence of repellent crop with brinjal plot in the present study is in conformity with the findings of several studies conducted elsewhere. Kartikar & Bashu (1975) reported that onion garlic, coriander have strong pungent repellent action on different insect pest. Lal (1991) revealed that the larval infestation of *Phthorimea operculella* on potatoes were consistently reduced when potatoes were grown with chillies, onion and peas compared to potato alone. The present study the brinjal shoot and fruit damage due to BSFB infestation was less in brinjal when grown with repellent crop such as soluk, radhuni, mouri and coriander compared to that of brinjal grown alone. Rabindra & Prashad (2001) observed significant reduction of the incidence of shoot and fruit borer when brinjal was grown in association with Marigold. Percent shoot damage was 15.60 in brinjal +Marigold planted plots compared with 22.86% in the brinjal monoculture. In all the repellent crop of the present study, the abundance of BSFB was lower as compared to brinjal monoculture which might be due to physical barriers to insect movement, plant quality affected by repellent crop, adverse environmental factors or less abundance of food sources etc.

Effect of different umbellifer crop on the abundance of natural enemies

Effect of different umbellifer crop on the abundance of natural enemies in brinjal crop has been observed per plant in each crop combination during the entire crop period and are presented in Table 1.4. The mean number of spider per

plant differed significantly among the treatments. The highest incidence of spider was observed in brinjal when grown with soluk (1.59) followed by brinjal+Radhuni (1.54) (Table 1.4). Significantly lower number of spider were observed in brinjal sole. The mean number of lady bird beetle per plant recorded from different crop combinations are also shown in Table 1.4. The highest number of lady bird beetle recorded in brinjal +Soluk (4.55) followed by brinjal + coriander (4.33) and lowest in brinjal alone (1.54) other crop association also found statistically similar number of LBB.

It is evident from Table 1.4 that generally a higher number of spider and LBB were found in multicrop situation in comparison to that of monocrop. This might be due to the fact that diversity of plant species provided important resources for natural enemies such as alternate prey, nectar and pollen or breeding site as pointed by Russel (1989). Dempster and Choker (1974) found that the predatory activities of ground beetles were enhanced when cabbage was under shown with white and red clover resulting in regulation of population of *Erioschia brassicae* and *Pieris rapae*.

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Table 1.1. Different umbellifer crops grown with brinjal and its effect on shoot and fruit infestation of brinjal by brinjal shoot and fruit borer during December (2004) through February (2005).

Treatments	Shoot infestation (%)	Shoot infestation reduction over control (%)	Fruit infestation (%)		Reducing fruit infestation over control (%)	
			By number	By weight	By number	By weight
Brinjal (control)	6.59a (2.55)		62.32a (7.88)	57.59a (7.57)		
Brinjal + Radhuni	3.91ab (1.97)	40.44	45.44b (6.74)	39.87b (6.31)	27.08	30.76
Brinjal + Soluk	2.56b (1.59)	61.15	34.65b (5.88)	30.01b (5.48)	44.39	47.89
Brinjal + Mouri	4.88ab (2.18)	25.94	42.35b (6.49)	35.35b (5.93)	32.04	38.61
Brinjal + Coriander	2.76b (1.66)	58.11	41.99b (6.48)	38.10b (6.17)	32.62	33.84

Figures in the column bearing the same letter (s) are not significantly different at 5% level using Least Significant Difference test (LSD)

Values are means of three replications.

Values within parentheses are the transformed values based on Square root transformation $\{\sqrt{(x+0.5)}\}$.

Table 1.2. Different umbellifer crops grown with brinjal and its effect on the yield. Performance of brinjal suppressing BSBFB infestation by number during winter 2004.

Treatments	Number of fruit per plant			Healthy fruit (%)	Reduction of fruit infestation over control
	Healthy	Infested	Total		
Brinjal (control)	26.00b	44.00a	70.00	37.14	
Brinjal + Radhun	35.27ab	32.44ab	67.71	52.09	26.27
Brinjal + Soluk	43.00a	20.00b	63.00	68.25	54.54
Brinjal + Mouri	36.24ab	28.89b	65.13	55.64	34.34
Brinjal + Coriander	33.16ab	24.64b	57.80	57.37	44.41

Figures in the same column bearing the same letter(s) are not significantly different at 5% level using Least Significant Difference test (LSD)

Values are means of three replications.

Table 1.3. Different umbellifer crops grown with brinjal and it effect on yield performance of brinjal by weight during winter 2004.

Treatment	Weight of fruit per plant(kg)			Yield increase over control	Reduction of fruit infestation over control
	Healthy	Infested	Total		
Brinjal (control)	0.77b	1.30a	2.06		
Brinjal + Radhuni	1.04ab	0.96ab	1.99	35.06	26.15
Brinjal + Soluk	1.27a	0.59b	1.86	64.93	54.61
Brinjal + Mouri	1.07ab	0.85b	1.92	38.96	34.62
Brinjal + Coriander	0.98ab	0.73b	1.71	27.27	43.85

Figures in the same column having the same letter(s) are not significantly different at 5% level using Least Significant Difference test (LSD)

Values are means of three replications.

Table 1.4. Umbellifer crops grown with brinjal and its influence on the incidence of natural enemies of brinjal shoot and fruit borer during winter 2004.

Treatment	Number of natural enemies recorded per plant	
	Spider	Lady bird beetle
Brinjal sole (control)	0.53b	1.54b
Brinjal + Radhuni	1.54a	3.29ab
Brinjal + Soluk	1.59a	4.55a
Brinjal + Mouri	0.88ab	4.04ab
Brinjal + Coriander	1.04ab	4.33a

Figures in the same column accompanied by the same letter(s) are not significantly different at 5% level using Least Significant Difference test (LSD)

Values are means of three replications.