EFFECT OF ORGANICMANURES ON INCIDENCE OF SHOOT AND FRUIT BORER, *Leucinodesorbonalis*GUENEE AND NATURAL ENEMIES ON BRINJAL

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ABSTRACT

Field trialswere conducted in two seasons of rabi 2011 and 2012 to study the effect of various organic manures on incidence of shoot and fruit borer, LeucinodesorbonalisGuenee and natural enemies on brinjal.Significantly the lower shoot infestation (1.41 %) was recorded in the treatment, where maximum nitrogen requirement (75%) was supplied through neem cake combined with remaining 25 per cent through chemical fertilizers. Similarly, significantly lower fruit infestation on number basis (1.41%) as well as on weight basis (6.73%) due to shoot and fruit borer, L. orbonalis was observed in the same treatment. The maximum shoot and fruit infestation was recorded in the treatment where only the chemical fertilizers were applied. Significantly maximum population of natural enemies (5.52 natural enemies/ 3 leaves / plant) was recorded in the treatment where only farm yard manure (FYM) was provided to meet the nutritional requirement of the crop.

KEY WORDS: Brinjal, natural enemies, organic manures, shoot and fruit borer

INTRODUCTION

Brinjal, *Solanum melongena* Linnaeus, commonly known as egg plant,is an important vegetable cropcultivated since ages.It is widely grown all over the globe including India for its immature tender fruits. South-East Asia, probably India, is the native of brinjal. In Gujarat,the crop is cultivated in almost all the districts occupying an area of about 0.62lakhhectareswith production of about 10.46lakhmetric tones. In Junagadh, the area under cultivation of brinjal is about 0.082 lakh hectares with production of about 1.16 lakh metric tones (Anonymous, 2009). Shoot and fruit borer, *Leucinodesorbonalis* Guenee (Lepidoptera: Pyralidae) is the key pest throughout Asia (Purohit and Khatri, 1973; Kuppuswamy and Balasubramanian, 1980; Allam*et al.*, 1982). In India, this pest has a countrywide distribution and has been categorized as the most destructive and the most serious pest causing huge amount of losses of brinjal (Patil, 1990). The use of organic amendments in the pest management is considered an ecologically viable proposition which avoids environmental pollution and is economically feasible (Rajendran, 1993). Organic

amendments and plant products are known to leave no toxic residues and non-phytotoxic. They have varied insect controlling properties *viz.*, antifeedant, repellent, attractant, reproduction retardant, etc., (Urs, 1987) and hence, chances of pest developing resistance to such substances are remote.Presently, more emphasis is being given to the development of suitable integrated pest management strategies, based on ecological principles.

The trend of organic farming has driven the search for effective and eco-friendly alternative to manage the pest. Several workers have explored the utility of organic manures and bio-pesticides as a potential source to manage the brinjal shoot and fruit borer. Available literature shows that very little work has been carried out on effect of organic manures on brinjaland fruitborer and natural enemies. Keeping this view, studies were carried out on the management of brinjal fruit and shoot borer.

MATERIALS AND METHODS

The experiments were laid out in Randomized Block Design for two consecutive *rabi* seasons 2011 and 2012 with three replications and twelve treatments. The plot size was 3.6 x 3.0 m with spacing of 90 x60 cm between rows and plants, respectively. Organic manures *viz.*, vermicompost, neem cake and poultry manure were applied 15 days before transplanting of brinjal crop for proper decomposition. Phosphatic and potashic fertilizers were applied before sowing as basal, while doses of nitrogenous fertilizer were applied in two equal splits i.e. half dose after one week of transplanting and remaining half dose at six weeks after transplanting, as per the requirement. The FYM was applied as per the recommendation @ 20 t/ha. The crop was not sprayed with any type of chemical or insecticides, but routine cultural operations and irrigation was made as and when required to grow the healthy crop. Uniform plant population was maintained in all the experimental plots.

Calculation of the quantity of organic manures

The recommended dose of fertilizers for brinjal is 100: 37.5: 37.5 (NPK kg/ha). The composition of various organic manures is as under (Yellamanda Reddy and Sankara Reddi, 2004; Katyayan, 2006):

Sr	Organic manure	N	P	K
1	Vermi-compost	3.00	1.00	1.50
2	Neem cake	5.20	1.00	1.40
3	Poultry manure	3.03	2.63	1.40

The formula to calculate the required quantity of organic manure is as follow:

$$\text{Quantity of organic manure required (kg/ha)} = \frac{100 \text{ X } \text{Quantity of N to be given through organic manure}}{\text{Per cent N content in the organic manure}}$$

Five plants were randomly selected from net plot area of each plot and tagged for recording the incidence of shoot and fruit borer, *L. orbonalis* as well as the incidence of natural enemies. The harvested fruits of each plot were carefully observed after each picking to ascertain fruit infestation and percentage fruit infested was worked out. The data on per cent fruit damage was statistically analyzed after suitable transformation.Observation on natural enemies was recorded by counting the number of adults from selected plants. The observations were recorded at weekly interval starting from the transplanting of the crop. The natural enemies observed during the season were coccinelids and green lace wing.

RESULTS AND DISCUSSION

Shoot infestation

The data on shoot infestation due to shoot and fruit borer in brinjal (Table 1) revealed that significantly the lower shoot infestation (1.41%) was recorded in the treatment, where maximum nitrogen requirement (75%) was supplied through neem cake combined with remaining 25 per cent through chemical fertilizers. However, it was at par with the treatments where 75 per cent of the nitrogen was provided with poultry manure combined with remaining 25 per cent through chemical fertilizers (2.03%). The maximum shoot infestation of 13.73 per cent was recorded where only the chemical fertilizers were applied.

Fruit infestation

The data on fruit infestation in brinjal on number basis (Table 1) showed that the significantly lower fruit infestation (1.41%) was recorded in the treatment where maximum nitrogen requirement (75%) was supplied through neem cake combined with remaining 25 per cent through chemical fertilizers. However, it was at par with the treatments where 75 per cent of the nitrogen was provided with poultry manure combined with remaining 25 per cent through chemical fertilizers (2.02%). Significantly the maximum infestation of 13.19 per cent was recorded where only the chemical fertilizers were applied.

The fruit infestation in brinjal on weight basis (Table 1) revealed that significantly the lower fruit infestation (6.73%) due to shoot and fruit borer, *L. orbonalis* was observed in the treatment where maximum nitrogen requirement (75%) was supplied through neem cake combined with remaining 25 per cent through chemical fertilizers and it was at par with the treatments where 75 per cent of the nitrogen was provided with poultry manure (7.59%) and vermicompost (8.11%) combined with remaining 25 per cent through chemical fertilizers. The maximum infestation of 20.53 per cent was recorded where only the chemical fertilizers were applied. It can be concluded that the nitrogen supplied through neem cake had shown effective results on fruit and shoot infestation due to fruit and shoot borer on both number and weight basis in brinjal.

The present results are supported the results of Singh (2003) who reported that neem products alone or combination with conventional insecticides were effective against brinjal fruit and shoot borer. Earlier, effectiveness of neem cake against the shoot and fruit borer in brinjal was also reported by Venkatesh*et al.* (2004) and Kavitharaghavan*et al*. (2006). Hence, the results of the earlier workers are in accordance with the present findings.

Natural enemies

The data presented in the Table 2revealed that, significantly maximum population of natural enemies (5.52 natural enemies/ 3 leaves/ plant) was recorded in the treatment where only farm yard manure (FYM) was provided to meet the nutritional requirement of the crop. However, it was at par with the treatment where 50 per cent of the nitrogen requirement of the crop was provided through vermicompost combined with chemical fertilizers and 25 per cent of the nitrogen requirement of the crop provided through neem cake combined with inorganic fertilizers (5.32 and 5.12 natural enemies/ 3 leaves/ plant, respectively).Similar results were reported by Chakraborti (2001) in mustard, Venkateswarlu*et al*. (2003) in groundnut and Naik*et al*. (2009) in *Bt* cotton.

CONCLUSION

From the present study, it can be concluded that the nitrogen supplied through neem cake found effective in reducing shoot infestation as well as fruit infestation on both number and weight basis due to fruit and shoot borer in brinjal. Application of FYM as nutritional requirement in brinjal increasing the natural enemies population. ,

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Table1:Effect of organic manures on shoot infestation, fruit infestation on number basis and on weight basis due to brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee.

Sr. No.	Treatment	Per Cent Shoot Infestation	Per Cent Fruit Infestation	
			On Number Basis	On Weight Basis
		Pooled	Pooled	Pooled
1	25% VC + 75% RDF	16.98 (8.53)	16.95 (8.50)	21.93 (13.95)
2	50% VC + 50% RDF	12.75 (4.87)	12.67 (4.81)	18.36 (9.92)
3	75% VC + 25% RDF	9.08 (2.49)	9.14 (2.52)	16.55 (8.11)
4	25% NC + 75% RDF	13.63 (5.56)	13.39 (5.36)	19.61 (11.26)
5	50% NC + 50% RDF	10.90 (3.58)	10.75 (3.48)	17.73 (9.28)
6	75% NC + 25% RDF	6.81 (1.41)	6.81 (1.41)	15.04 (6.73)
7	25% PM + 75% RDF	16.30 (7.88)	16.22 (7.80)	20.77 (12.57)
8	50% PM + 50% RDF	9.64 (2.81)	9.76 (2.88)	17.40 (8.94)
9	75% PM + 25% RDF	8.20 (2.03)	8.18 (2.02)	15.99 (7.59)
10	FYM alone (100%)	11.26 (3.81)	11.20 (3.77)	18.01 (9.55)
11	Recommended dose of fertilizer (RDF)	21.75 (13.73)	21.29 (13.19)	26.94 (20.53)
12	Control (No fertilizer/manure)	19.37 (11.00)	19.31 (10.94)	24.53 (17.24)
	S. Em ±	0.69	0.71	0.74
	C. D. at 5%	1.96	2.01	2.11
	CV%	12.92	13.32	9.32

Where, ***VC= Vermicompost*** ***NC= Neem Cake*** ***PM =Poultry Manure***
FYM= Farm Yard Manure ***RDF= Recommended Dose of Fertilizer***

Note: Figures in the parentheses are retransformed values, while outside are angular transformed values.

Table 2: Effect of organic manures on population of natural enemies in brinjal

Sr. No.	Treatment	Number of Natural Enemies/ Plant		
		2011	2012	Pooled
1	25% VC + 75% RDF	1.79 (3.22)	1.86 (3.47)	1.83 (3.34)
2	50% VC + 50% RDF	2.28 (5.18)	2.34 (5.46)	2.31 (5.32)
3	75% VC + 25% RDF	1.99 (3.96)	2.06 (4.24)	2.03 (4.10)
4	25% NC + 75% RDF	2.23 (4.97)	2.30 (5.27)	2.26 (5.12)
5	50% NC + 50% RDF	1.88 (3.55)	1.95 (3.82)	1.92 (3.68)
6	75% NC + 25% RDF	1.79 (3.22)	1.86 (3.47)	1.83 (3.34)
7	25% PM + 75% RDF	2.10 (4.41)	2.16 (4.67)	2.13 (4.54)
8	50% PM + 50% RDF	2.07 (4.28)	2.14 (4.58)	2.11 (4.43)
9	75% PM + 25% RDF	1.71 (2.94)	1.79 (3.22)	1.75 (3.07)
10	FYM alone (100%)	2.32 (5.40)	2.38 (5.65)	2.35 (5.52)
11	Recommended dose of fertilizer (RDF)	1.62 (2.64)	1.71 (2.94)	1.67 (2.78)
12	Control (No fertilizer/manure)	1.52 (2.30)	1.47 (2.16)	1.49 (2.23)
	S. Em ±	0.11	0.09	0.07
	C. D. at 5%	0.31	0.27	0.20
	CV%	9.48	7.96	8.73

Where,

VC= Vermicompost ***NC= Neem Cake***

PM =Poultry Manure ***FYM= Farm Yard Manure***

RDF= Recommended Dose of Fertilizer

Note: Figures in the parentheses are retransformed values, while outside are Square root transformed values.

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