Evaluation of biopesticides against field infestation of bruchid, *Callasobruchus theobromae* L. on fieldbean, *Dolichos lablab*

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ABSTRACT

A field trial was conducted to evaluate the efficacy of biopesticides and neem products to control the field infestation of bruchids in *Dolichos lablab*. The fieldbean (cultivar HA_3) seeds were sown in Randomized complete block design with eight treatments viz., Two *Bt* formulations (Halt& Dipel), *Pseudomonas* sp., Neem oil, Neem seed kernel extract, Malathion and Spinosad with four replications. The 1st spray was given at the time of 60 percent formation of buds and flowers and the subsequent spray was given with an interval of 15days. The study revealed that spraying of NSKE (5%) resulted in good control of pulse beetle under field conditions. The mean per cent pod damage was significantly different between the treatments. NSKE (5%) recorded the lowest pod damage (4.64 %) when compared to Malathion (5.96%) and Spinosad (6.30%). However, they were significantly different from the others except Dipel (4.88%). Untreated control recorded highest pod damage (10.95%) followed by *Pseudomonas* sp. (8.88%). Significantly high yield was obtained in case of NSKE (12.19 q/ha) followed by Dipel (9.95 q/ha). However, lowest yield was in untreated control (7.55 q/ha).

Key words : Bruchids, NSKE, *Pseudomonas, Bacillus thuringiensis.*

INTRODUCTION

Fieldbean, a pulse crop that belongs to the family of Fabaceae, is native to India and is mainly cultivated as an inter crop with cereals. In India, *Dolichos lablab* is being cultivated in the states of Karnataka, Andhra Pradesh, Tamil Nadu, Kerala and Maharashtra. In Karnataka, the total area under this crop was 0.77 lakh hectares with an annual production of 0.17 lakh tonnes with a productivity of 183 kg per ha (Anonymous, 2008). It is prone to greater damage by insect pests and microorganisms when compared to many cereals. In field condition, about 27 insect species have been recorded to infest the crop in India. Among insect pests, bruchids are known to infest both in field and storage which cause losses qualitatively and quantitatively. Among these insect pests, bruchids assume greater importance as they damage the final produce in the field as well as in store. Being serious pests of stored pulses, the bruchids first breed in field and this primary infestation is carried over into storage. In recent years, many workers reported that field infestation is increasing just before harvest (Raina, 1971; Ravindra, 1998). Keeping this in mind, the present study was undertaken.

MATERIALS AND METHODS

The field trial was conducted to know the most effective biopesticide and neem product to suppress the field infestation by bruchids in Zonal Agricultural Research Station, UAS, GKVK, Bengaluru. The fieldbean cultivar, HA-3 seeds were used in the experiment with a Randomized Complete Block Design with eight treatments [T1-*Bacillus thuringiensis* (Halt @1 kg/ha), T2 - *Bacillus thuringiensis* (Dipel @1 kg/ha), T3 - *Pseudomonas* (1 kg/ha), T4- Neem Seed Kernal Extract (5%), T5- Neem oil @ 2ml/l, T6 - Malathion @ 3 ml/l, T7 - Spinosad @ 0.2ml/l and T8 - Untreated check]. All the agronomic practices were followed as per the package of practice except plant protection measures (Raina, 1971).

Preparations

Fifty gram of neem seed kernel was taken and crushed into fine powder and then soaked overnight in little quantity of water. Later the mixture was squeezed through the muslin cloth and the volume was made upto one litre so as to obtain 5 per cent neem seed kernal extract. Soap solution was added at 0.1 per cent as a spreader. Other treatments were prepared in appropriate concentrations as mentioned above.

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Spraying

The 1st spray was given at the time of 60 per cent formation of buds and flowers and the subsequent sprays were given at interval of 15 days. From each plot, 5 plants were selected randomly and pods were harvested separately. Observations were recorded on pod damage by the pulse beetle.

$$\text{Per cent pod damage} = \frac{\text{Number of pods damaged}}{\text{Total number of pods in sample}} \times 100$$

RESULTS AND DISCUSSION

The experiment was conducted along with standard check Malathion @ 3ml/l. NSKE @ 5 per cent recorded the lowest pod damage and highest pod yield which was significantly superior to all other treatments where as pod damage was on par with Dipel @ 1 kg per ha and both were significantly superior to all other treatments. Dipel @ 1kg/ha has showed as second best with 9.95q/ha yield. However, this differed significantly with all other treatments. Among the biopesticides, highest pod damage was observed in *Pseudomonas* treated plots which is significantly inferior to all other treatments and was on par with neem oil @ 2ml/l. Standardized cost effective and commercially viable mass production technologies of 32 candidate biocontrol agents/biopesticides including *Pseudomonas* has been available in India (Wahab, 2009)

Table 1. Effect of different biopesticides and neem products against field infestation of bruchid, *Callosobruchus theobromae* on fieldbean.

Treatment details	Pod damage	Yield (q/ha)
Bacillus thuringiensis (Halt @1 kg/ha)	6.16(14.30)^{cd}	8.25(16.68)^{cd}
Bacillus thuringiensis (Dipel @1 kg/ha)	4.88(12.03)^{e}	9.95(18.38)^{b}
Pseudomonas (1 kg/ha)	8.88(17.08)^{b}	7.62(16.02)^{d}
Neem Seed Kernal Extract 5%	4.64(12.20)^{e}	12.19(20.43)^{a}
Neem oil @ 2ml/l	7.59(15.94)^{bc}	8.97(17.43)^{c}
Malathion @ 3 ml/l	5.96(14.11)^{d}	9.63(18.15)^{b}
Spinosad @ 0.2ml/l	6.30(14.51)^{cd}	7.97(16.39)^{d}
Untreated check	10.95(19.24)^{a}	7.55(15.93)^{d}
SEm ±	1.244	0.265
CD@ 5%	3.660	0.780

and it is worthwhile to use this in stored product pest management. The highest pod damage and least pod yield was observed in untreated control followed by *Pseudomonas* @ 1kg/ha and Spinosad @ 0.2ml/l which were on par with each other in terms of yield respectively. NSKE is effective against pod borers (Abdul, 1980) which registered lowest pod infestation and recorded highest yield. Ramteke *et al.* (2002) also mentioned in the order of efficacy, neem seed kernel extract 5 per cent and neem oil (300 ppm) were found to suppress pod borer on chickpea The neem oil did not exhibit any impact on pod damage and production. It is proposed that due to its wide range of activity, non-phytotoxicity, and longterm persistence of insecticide, the neem oil along with neem seed kernel extract can be exploited as a insecticide against storage pest for the preservation of legume seeds. However, further research should be directed to elucidate the mixing proportion of neem oil and to ascertain the appropriate concentration for higher efficacy and safety.

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