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Research Article

Efficacy testing of indigenous materials and new insecticide molecules against pod borers of fieldbean (*Lablab purpureus*)

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ABSTRACT

A field evaluation of indigenous materials revealed that sprays of GCK (0.5%), GE (1%) and Panchagavya (3%) gave per cent larval reduction to the tune of 57.80 per cent, 58.86 per cent, 55.94 per cent and 59.45 per cent, 56.91 per cent, 58.22 per cent after first and second spray, respectively. GCK (0.5 per cent), recorded per cent pod and seed damage of 19.56 per cent and 28.11 per cent, respectively and recorded yield of 8.30 q/ha. Among the new insecticide molecules, flubendiamide 24 per cent + thiacloprid 24-48 per cent SC recorded highest per cent larval reduction of 79.42 per cent and 79.09 per cent after first and second spray, respectively. It also recorded lowest per cent pod and seed damage of 13.33 per cent and 18.41 per cent, respectively and pod yield of 16.35 q/ha.

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INTRODUCTION

Lablab purpureus L. is an important pulse-cum-vegetable crop in India and cultivated for its tender pods, seeds and also for fodder. Pod borers have been considered to be most important and they appeared regularly causing crop loss to the tune of 80-100 per cent (Katagihallimath and Siddappaji, 1962). As the pods are consumed as vegetables and also as fodder for animals the pest management and especially the pod borer control has to be on organic basis. Unfortunately, so far no efforts have been made in the crop to utilize ecofriendly approaches for the pest management. Hence, the current research has been undertaken to find out cost effective and eco friendly management practices in fieldbean.

MATERIALS AND METHODS

The experiment was laid out in Randomized Block Design (RDB) with 12 treatments replicated thrice in 3 x 2.5 m plot size during 2008-09 at Zonal Agricultural Research Station, Gandhi Krishi Vigyan Kendra, University of Agricultural Sciences, Bengaluru. The fieldbean (HA-3 variety) was raised as per the recommended package of practices except plant protection measures.

The crop received a total of 2 sprays, the first being given after pod initiation (45 DAS) while 2nd spray was imposed at 15 days after first spray. The number of pod borers was counted on 5 randomly selected plants in each plot. The pretreatment count was made a day before each spray while, the post treatment counts were made on 2nd, 5th and 10th day after each spray and per cent larval reduction over pretreatment was calculated on same days. At each harvest, the number of healthy and damaged pods and seeds per 50 pods was recorded in order to determine the per cent pod and seed damage. Per cent pod damage and seed damage were calculated using the below given relations. Further, data were subjected to suitable statistical analysis.

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

$$\text{Per cent seed damage} = \frac{\text{Number of seeds damaged}}{\text{Total no. of locules in 50 pods}} \times 100$$

Preparation of indigenous materials:

Neem seed kernel extract (NSKE) 5 per cent:

Fifty grams of neem seed kernels were 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 NSKE. Teepol solution was added at 0.1 per cent as a spreader.

Garlic chilli kerosene extract (GCK) 0.5 per cent:

5 g each of dried garlic bulb and green chilli fruits were taken and thoroughly ground separately with the help of pestle and mortar. The crushed materials were soaked in kerosene (5 ml each) overnight, separately. Next day the extracts of garlic and chilli were filtered and mixed. Later, the volume was made upto 1000 ml to obtain 0.5 per cent garlic chilli kerosene extract.

Aqueous extract of garlic (GE) 1 per cent:

10 g of dried garlic bulbs were taken, crushed and soaked in 100 ml of water overnight. The contents were squeezed using muslin cloth. The volume was then made upto one litre by adding water to obtain 1 per cent extract.

Panchagavya:

Cow dung (7 kg) and Ghee (1litre) were collected, mixed thoroughly and kept for 2 days. Similarly, cow urine and water, 10 litre each were taken, mixed thoroughly and kept for 6 days. Later, above two mixtures were mixed and kept for 15 days. After 15 days, cow milk (3 litre), cow curd (2 litre), coconut water (3 litre), jaggery (3 kg) and ripened banana (a dozen) were added and kept for 6 days. After six days, Panchagavya used for spray at 3 per cent concentration.

RESULTS AND DISCUSSION

The findings of the present study have been presented in the following sub heads :

Larval reduction:

Among the indigenous materials, garlic extract (GE) recorded the highest per cent larval reduction after second (64.54%) and fifth (62.16%) day after first spray followed by Panchagavya (60.57% and 57.68%) but failed to differ statistically with other indigenous materials. Ten days after first spray, GCK (52.46%) was found effective and stood at par with others. Among the new insecticide molecules, flubendiamide 24 per cent + thiacloprid 24-48 per cent SC recorded the highest per cent larval reduction after second (76.29%), fifth (79.78%) and tenth (81.15%) day after first spray followed by emamectin benzoate and Indoxacarb (Table 1).

Among the indigenous materials, GCK recorded the highest per cent larval reduction after second (58.81%), fifth (62.60%) and tenth (56.95%) day after second spray followed by Panchagavya (57.46%, 60.72% and 56.50%). Similar trend was followed as first spray among the new insecticide molecules. Flubendiamide 24 per cent + thiacloprid 24-48 per cent SC recorded the highest per cent larval reduction after second (72.02%), fifth (78.31%) and tenth (87.93%) DAS followed by emamectin benzoate and Indoxacarb (Table-1). Similar results were obtained by Rekha (2005) in field bean under Dharwad condition. Ravi Kumar (2004) also reported higher effectiveness of GCK + cow urine and GCK against *Helicoverpa armigera* in chilli.

Pod damage:

In the 1st picking, among the indigenous materials, the least per cent pod damage was observed in GCK (23.14%) followed by NSKE (24.10%), Panchagavya (24.40%) and GE

Table 1: Efficacy of indigenous materials and new insecticide molecules on larval mortality

Treatments	Per cent larval reduction over pretreatment after first spray				Per cent larval reduction over pretreatment after second spray			
	2 DAS	5 DAS	10 DAS	Mean	2 DAS	5 DAS	10 DAS	Mean
T_1-NSKE 5%	58.61^{d}	43.04^{f}	24.73^{f}	42.14	56.32^{f}	58.85^{g}	56.63^{e}	57.26
T_2-GCK (0.5%)	63.44^{d}	57.50^{e}	52.46^{de}	57.80	58.81^{e}	62.60^{e}	56.95^{de}	59.45
T_3-GE (1%)	64.54^{d}	62.16d^{e}	49.89^{e}	58.86	55.81^{g}	58.94^{g}	56.00^{f}	56.91
T_4-Panchagavya (3%)	60.57^{d}	57.68d^{e}	49.58^{de}	55.94	57.46^{f}	60.72^{f}	56.50^{ef}	58.22
T_5-Spinosad 45SC (0.2ml/l)	70.80^{c}	73.95^{b}	74.71^{b}	73.48	66.65^{d}	70.53^{d}	75.43^{c}	70.87
T_6-Emamectin benzoate 5SG (0.2g/l)	72.28^{ab}	73.72^{ab}	75.77^{ab}	73.59	69.78^{b}	73.26^{b}	79.04^{b}	74.02
T_7-Flubendiamide 480SC (1ml/l)	67.68^{c}	66.33^{c}	61.17^{c}	65.05	69.79^{b}	73.13^{b}	78.25^{b}	73.72
T_8-Indoxacarb 14.5SC (0.3ml/l)	71.58^{bc}	74.68^{ab}	75.42^{b}	73.89	67.87^{c}	72.01^{c}	78.82^{b}	72.90
T_9-Fenvalerate 20EC (0.5ml/l)	65.45^{d}	66.19^{cd}	64.80^{c}	65.48	66.81^{d}	71.28^{d}	74.89^{c}	70.99
T_{10}-Endosulfan 35EC (2ml/l)	62.07^{d}	59.28^{e}	59.33^{cd}	60.22	55.94^{g}	59.58^{g}	58.39^{d}	57.97
T_{11}- Flubendiamide 24% + thiacloprid 24-48%SC (2ml/l)	76.29^{a}	79.78^{a}	81.15^{a}	79.09	72.02^{a}	78.31^{a}	87.93^{a}	79.42
T_{12}-Untreated control	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.D. (P=0.05)	0.07	0.11	0.10		0.02	0.02	0.02	

Note: DAS-Days after spray; Values were ?x+0.5 transformed before analysis
Values followed by same letter do not differ significantly by DMRT (p=0.05)

Table 2 : Influence of indigenous materials and new insecticide molecules on pod damage, seed damage and pod yield

Treatments	Per cent pod damage					Per cent seed damage					Pod yield (q/ha)
	I Picking	II Picking	III Picking	IV Picking	Mean	I Picking	II Picking	III Picking	IV Picking	Mean	
T1-NSKE 5%	24.10 (29.40)^{ef}	28.00 (31.95)^{f}	18.27 (25.30)^{g}	14.00 (21.97)^{f}	21.09	28.69 (32.38)^{g}	46.71 (43.11)^{f}	22.52 (28.33)^{f}	19.42 (26.15)^{e}	29.33	6.88
T2-GCK (0.5%)	23.14 (28.75)^{e}	26.40 (30.91)^{e}	16.50 (23.96)^{e}	12.21 (20.45)^{e}	19.56	27.57 (31.67)^{f}	44.65 (41.93)^{e}	21.11 (27.35)^{e}	19.10 (25.91)^{e}	28.11	8.30
T3-GE (1%)	24.94 (29.96)^{f}	27.11 (31.37)^{e}	18.11 (25.19)^{fg}	13.75 (21.76)^{f}	20.98	29.01 (32.58)^{g}	45.77 (42.57)^{ef}	22.63 (28.40)^{f}	20.01 (26.57)^{e}	29.35	6.19
T4-Panchagavya (3%)	24.40 (29.60)^{f}	27.91 (31.89)^{f}	17.76 (24.92)^{f}	12.51 (20.71)^{e}	20.64	28.11 (32.01)^{f}	44.24 (41.69)^{e}	21.51 (27.63)^{e}	19.02 (25.85)^{e}	28.22	6.66
T5-Spinosad 45SC (0.2ml/l)	19.55 (26.24)^{c}	23.30 (28.86)^{c}	12.98 (21.12)^{c}	9.03 (17.49)^{c}	16.21	23.71 (29.14)^{d}	40.41 (39.47)^{d}	18.03 (25.12)^{c}	14.38 (22.28)^{c}	24.13	13.69
T6-Emamectin benzoate 5SG (0.2g/l)	18.18 (25.24)^{b}	22.00 (27.97)^{b}	12.15 (20.39)^{b}	8.04 (16.47)^{b}	15.09	20.08 (26.62)^{b}	35.90 (36.81)^{b}	15.89 (23.70)^{b}	12.94 (21.08)^{b}	21.20	14.94
T7-Flubendiamide 480SC (1ml/l)	18.61 (25.55)^{b}	22.93 (28.61)^{c}	12.48 (20.68)^{b}	8.19 (16.63)^{b}	15.55	21.95 (27.93)^{c}	38.02 (38.07)^{c}	16.16 (24.07)^{b}	13.67 (21.70)^{bc}	22.45	14.26
T8-Indoxacarb 14.5SC (0.3ml/l)	18.37 (25.38)^{b}	22.67 (28.45)^{c}	12.96 (21.09)^{c}	9.25 (17.70)^{c}	15.81	21.95 (27.94)^{c}	36.11 (36.93)^{b}	16.63 (24.71)^{d}	14.89 (22.70)^{cd}	22.40	14.57
T9-Fenvalerate 20EC (0.5ml/l)	21.53 (27.64)^{d}	24.90 (28.93)^{c}	14.42 (22.31)^{d}	10.13 (18.56)^{d}	17.75	24.64 (29.76)^{e}	42.02 (40.41)^{d}	18.93 (25.79)^{e}	16.10 (23.65)^{d}	25.42	11.73
T10-Endosulfan 35EC (2ml/l)	24.07 (29.38)^{ef}	24.72 (29.81)^{d}	17.92 (25.04)^{fg}	14.17 (22.11)^{f}	20.22	28.08 (32.00)^{f}	47.01 (43.28)^{f}	23.05 (28.69)^{f}	19.91 (26.50)^{e}	29.51	7.15
T11 Flubendiamide 24% + thiacloprid 24-48%SC (2ml/l)	16.68 (24.10)^{a}	20.13 (26.65)^{a}	9.78 (18.22)^{a}	5.93 (14.10)^{a}	13.13	17.04 (24.38)^{a}	32.35 (34.66)^{a}	13.55 (21.59)^{a}	10.72 (19.11)^{a}	18.41	16.35
T12-Untreated control	36.07 (36.91)^{g}	44.30 (41.72)^{g}	55.52 (48.16)^{h}	60.89 (51.29)^{g}	49.19	37.63 (37.84)^{h}	49.34 (44.46)^{g}	38.51 (38.36)^{g}	61.98 (51.94)^{f}	46.86	3.17
CD (P=0.05)	0.64	0.47	0.30	0.65		0.37	1.06	0.42	0.96		

Note: DAS-Days after spray; Values were ?x+0.5 transformed before analysis
Values followed by same letter do not differ significantly by DMRT (p=0.05)

(24.94%) which were statistically at par with each other. Flubendiamide 24 per cent + thiacloprid 24-48 per cent was significantly superior (16.68 % pod damage) over endosulfan (24.07 %) but failed to differ statistically from emamectin benzoate (18.18%), indoxacarb (18.37%) and flubendiamide (18.61%) which in turn were statistically at par with each other (Table 2).

The trend continued during rest of the three pickings. During second picking, the per cent pod damage varied from 26.40 to 28.00 in indigenous materials as compared to 20.13 to 24.90 per cent damage observed in insecticidal treatments. During the subsequent pickings, the per cent pod damage was on declining trend *i.e.* 16.50 to 18.27 per cent (indigenous materials) and 9.58 to 17.92 per cent (new insecticide molecules) during III picking and 12.21 to 14.00 per cent (indigenous materials) and 5.93 to 14.17 per cent (new insecticide molecules) during IV picking. However, in the untreated plots the damage continued to increase from 36.07 per cent to 60.89 per cent damage during different pickings (Table 2).

Seed damage:

In the 1st picking, among the indigenous materials, the least per cent seed damage was observed in GCK (27.57%) followed by panchagavya (28.11%), NSKE (28.69%) and GE (29.01%). GCK (27.57%) and Panchagavya (28.11%) stood on par with each other. The newer insecticide molecule, flubendiamide 24 per cent + thiacloprid 24-48 per cent was significantly superior (17.04% seed damage) over endosulfan (28.08% seed damage) but failed to differ statistically from emamectin benzoate (20.08%), indoxacarb (21.95%), flubendiamide (21.95%), spinosad (23.71%) and fenvalerate (24.64%) (Table 2).

The trend continued during rest of the three pickings. During second picking, the seed damage varied from 44.24 to

46.71 per cent in indigenous materials as compared to 32.35 to 47.01 per cent damage observed in insecticidal treatments. During the subsequent pickings, the per cent seed damage was on declining trend *i.e.* 21.11 to 22.63 per cent (indigenous materials) and 13.55 to 23.05 per cent (new insecticide molecules) during III picking and 19.02 to 20.01 per cent (indigenous materials) and 10.72 to 19.91 per cent (new insecticide molecules) during IV picking. However, in the untreated plots the seed damage continued to increase from 37.63 to 61.98 per cent during different pickings (Table 2).

Pod yield:

Among the new insecticidal molecules, the total yield was maximum (16.35 q/ha) in flubendiamide 24 per cent + thiacloprid 24-48 per cent followed by emamectin benzoate (14.94 q/ha), indoxacarb (14.57 q/ha), flubendiamide (14.26 q/ha), spinosad (13.69 q/ha), fenvalerate (11.73 q/ha) and endosulfan (7.15 q/ha). Among the indigenous materials, the total pod yield varied from 6.19 q/ha in GE to 8.30 q/ha in GCK. Pod yield of 3.17q/ha was obtained from untreated check (Table 2). Similar results were obtained by Rekha (2005) who recorded higher field bean yield with emamectin benzoate followed by spinosad.

The present findings are in agreement with Mallapur (2002) and Ravi Kumar (2004). Rekha (2005) also reported the lower pod and seed damage and higher pod yield in treatments of GCK + cow urine, GCK alone and emamectin benzoate followed by spinosad. Meena *et al*. (2006) recorded higher grain yield in pigeonpea using emamectin benzoate 5 WSG @ 11 g a.i. /ha sprayed twice at 15 days interval.

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