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EVALUATION OF BIO-EFFICACY OF NEWER MOLECULES OF INSECTICIDES AGAINST THRIPS, *Megalurothrips usitatus* IN YARD LONG BEAN, VIGNA UNGUICULATA SUBSP. SESQUIPEDALIS

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ABSTRACT
The present studies were conducted to test the efficacy of different insecticides viz., Acetamiprid, Imidacloprid, Chlorfenapyr, Diafenthiuron, Spiromesifen, Fenazaquin, Azadirachtin and Acephate against thrips under natural field condition during 2018-2019 at Agricultural and Horticultural Research Station, Bhavikere, UAHS, Shivamogga, Karnataka. Yard long bean, Vigna unguiculata subsp. Sesquipedalis is infested with many sucking pest viz., aphids, jassids, bugs, thrips and mites. Among the different sucking pests reported on yard long bean, thrips are the major pest at the time of flowering, causing severe yield loss under field condition. Observations on the population counts of thrips were recorded one 1 DBS and 1, 3, 5 and 7 DAS on five randomly selected plants on three leaves from the top, middle and bottom in each plot. Among the insecticides tested, the highest per cent reduction of thrips was recorded in the treatments Imidacloprid (83.91 %) followed by, Acetamiprid (81.20 %), Acephate (73.44 %) and Diafenthiuron (69.18 %). However, the least per cent reduction of thrips population was observed in Azadirachtin (51.93 %) treated plot when compared to untreated control (Pooled). Thus, it is concluded that all the studied insecticides proved effective against the thrips but, the toxicity studies of the pesticides were observed from maximum to minimum in the following order, Imidacloprid > Acetamaprid > Acephate > Diafenthiuron > Spiromecifen > Fenazaquin > Chlorfenapyr > Azadirachtin.

INTRODUCTION

Yard long bean, Vigna unguiculata sub spp. sesquipedalis is a delicious fresh vegetable belonging to the family Fabaceae. It is also known by other names like asparagus bean, string bean, snake bean, long podded cowpea, snake bean and body bean (Purseglove, 1997). The yard long bean was originated probably in Middle West Africa or Southern China. In India, Kerala contributes a significant share, accounting for nearly 90 per cent in terms of both area and production followed by Karnataka and Tamil Nadu. The area of yard long beans in India is about 18,560 - 20,160 ha (Saurabh *et al*., 2018). It is a highly nutritious vegetable containing a right amount of digestible protein both in pods (23.5 - 26.3%) and in leaves. It can also be used as fodder, vegetable, green legume, as well as green manure crop (Ano and Ubochi, 2008).

There has been a gradual increase in the area under yard long bean while the production has been fluctuating due to various diseases, insect pest damage and abiotic factors (Balanchard, 1992 and Gomaa, 2001). Presently, the farmer faces pest management problems during the cultivation. The essential constraints for lowering yield and poor quality of yard long bean is the incidence of insect pests (Rashid, 1993).

The major insect pests which severely damage yard long bean during all growth stages are the bean aphid, Aphis craccivora, leaf hopper,Emposca terminalis Distanct thrips, Megalurothrips usitatus and red spider mites, Tetranychus urticae. Among these, flower thrips was the major one at the time of flowering, and it has been reported as a cosmopolitan species causing direct and indirect (as vectors) damage to the cultivated crops (Grubben, 1993). The yield loss in yard long bean due to thrips is reported to be about 10-15 per cent (Hossain and Awrangzeb, 1992).

Cultivation of resistant varieties is the ultimate control of this pest. Although heritable resistance has been reported on yard long bean (Holley *et al*., 1983; Herriot *et al*., 1986 and Christ, 1991), the pest is still primarily managed by use of systemic insecticides. However, frequent application of these insecticides over some time has led to the development of resistance in yard long bean, resulting in the emergence of pesticides resistant strain.

Regarding the management of flower thrips, many workers had done a lot of works based on chemical control. Earlier workers reported that application of insecticides was a most effective method of flower thrips control and found that imidacloprid and acetamiprid were effectively managed the flower thrips in cowpea (Ngakou *et al*., 2008 and Sani and Umar, 2017). But, reports on the incidence of insect pests and their management techniques for the yard long beans in its major growing areas of India are limited. Review of literature revealed that in our state, no work had been conducted on the insect pests of the yard long bean. The present study was, therefore, undertaken to know the incidence and management of flower thrips by using different insecticides in yard long bean.

MATERIALS AND METHODS

A field experiment was conducted to evaluate the efficacy of newer molecules of insecticides *viz*., acetamiprid 20 SP, imidacloprid 17.5 SL, chlorfenapyr 10 EC, diafenthiuron 50 EC, spiromesifen 22.9 SC, fenazaquin 10 EC, azadirachtin 10000 ppm and acephate 75 SP against thrips under natural field condition during 2018-2019 at Agricultural and Horticultural Research Station (AHRS), Bhavikere, UAHS, Shivamogga, Karnataka. Arka Mangala variety of yard long bean was sown with a spacing of 120 cm x 30 cm in a gross plot size of 660 m^2 area. The crop was raised as per standard package of practices except for plant protection measures against sucking pests. The field experiment was laid out in randomized block design (RCBD) with nine treatments and three replications comprising of different molecules of insecticides along with untreated control (Table 1).

Scouting methods for detection of thrips

Scouting methods (Robert *et al*., 2002) was followed to detect the thrips population. The nymphs and adults of thrips were counted from three leaves, *i.e*., one each from the top, middle, and bottom canopy of five randomly selected plants. The total number of thrips from each plant was estimated, and the population was expressed in terms of a mean number of trips per leaf.

Recording observation

Two sprays of insecticides were given at 15 days interval during the study period. The first spray was initiated when the crop was uniformly infected with a single pest. The data on the population of thrips were recorded at one day before spraying and 1, 3, 5 and 7 days after each spraying.

Per cent reduction over control was also worked out using the following formula.

$$\text{Percent reduction over control} = \frac{\text{Pest population in control} - \text{Pest popilation intreatment}}{\text{Pest population in control}} X100$$

Statistical analysis

For statistical analysis of data SPSS software and WASP software were used, and for average data, square root transformation, for percentage data arc sine transformation were used.

RESULTS AND DISCUSSION

Efficacy of selected insecticides against thrips

First spray

There was no significant difference among the treatments concerning the number of thrips per leaf before the imposition of remedies. The mean population varied from 3.36 to 4.07 per leaf, respectively (Table 2)

At 1 DAS population of thrips ranged from 1.55 to 2.96 per leaf. The lowest number of 1.55 thrips per leaf was observed in the treatment imidacloprid followed by acetamiprid of 1.68

Table1: Details of the insecticides tested against thrips in yard long bean

Treatments	Chemicals	Dosage (ml or gm per lit)	Trade name
T1	Acetamiprid 20 SP	0.3 g/l	Pride
T2	Imidacloprid 17.8 SL	0.5 ml/l	Confider
T3	Chlorfenapyr 10 EC	1.0 ml/l	Interprid
T4	Diafenthiuron 50 WP	1.0 g/l	Peagasus
T5	Spiromesifen 22.9 SC	0.50 ml/l	Oberon
T6	Fenazaquin 10 EC	2.0 ml/l	Magister
T7	Azadirachtin 10000 ppm	2.0 ml/l	Neembicidine
T8	Acephate 75 SP	1.5 gm/l	Acetaf
T9	Untreated control	-	-

Table 2 : Efficacy of different insecticides against thrips, Thrips fabae during Kharif 2018-19 (first spray)

Sl. No.	Treatments	Dosage (g or ml per ltr.)	Mean no. of thrips per leaf						Per cent reduction over control
			1DBS	1DAS	3DAS	5DAS	7DAS	Mean	
1	Acetamiprid 20 SP	0.3g/ ltr	3.36 (1.83)	1.68 $(1.29)^{ef}$	1.13 $(1.06)^{d}$	0.73 $(0.85)^{e}$	0.4 $(0.63)^{e}$	0.98	78.02
2	Imidacloprid 17.8 SL	0.5ml/ltr	3.48 (1.86)	1.55 $(1.24)^{f}$	1.02 $(1.00)^{d}$	0.62 $(0.78)^{e}$	0.3 $(0.54)^{e}$	0.87	81.59
3	Chlorfenapyr 10 EC	1.5ml/ltr	3.76 (1.93)	2.85 $(1.68)^{abc}$	2.34 $(1.53)^{b}$	1.98 $(1.40)^{b}$	1.77 $(1.30)^{b}$	2.23	50.22
4	Diafenthiuron 50 WP	1.5g/ltr	3.4 (1.84)	2.01 $(1.40)^{def}$	1.63 $(1.27)^{c}$	1.1 $(1.05)^{d}$	1.85 $(1.36)^{d}$	1.64	63.22
5	Spiromesifen 22.9 SC	0.5ml/ltr	4.07 (2.04)	2.39 $(1.54)^{bcde}$	1.97 $(1.40)^{bc}$	1.55 $(1.24)^{bc}$	1.34 $(1.15)^{bc}$	1.8	59.64
6	Fenazaquin 10 EC	2.0ml/ltr	3.91 (1.98)	2.5 $(1. 58)^{bcd}$	2.03 $(1.42)^{bc}$	1.68 $(1.29)^{bc}$	1.46 $(1.20)^{bc}$	1.91	57.17
7	Azadirachtin 10,000 ppm	2.0ml/ltr	4.01 (2.01)	2.96 $(1.71)^{ab}$	2.45 $(1.56)^{b}$	2.08 $(1.44)^{b}$	1.87 $(1.35)^{b}$	2.34	47.53
8	Acephate 75 SP	1.5g/ltr	3.85 (1.96)	2.12 $(1.44)^{cdef}$	1.73 $(1.31)^{c}$	1.25 $(1.11)^{cd}$	1.03 $(1.01)^{cd}$	1.53	65.69
9	Control	-	3.46 (1.86)	3.55 $(1.88)^{a}$	4.32 $(2.07)^{a}$	4.87 $(2.20)^{a}$	5.1 $(2.25)^{a}$	4.46	-
	SEM±	-	NS	0.49	0.34	0.37	0.4	-	-
	CD (P=0.05)	-	NS	1.49	1.03	1.11	1.2	-	-
	CV (%)	-	8.4	9.81	7.38	8.86	10.47	-	-

Figures in parentheses are "x + 0.5 transformed values; Means in the columns followed by the same alphabet do not differ significantly by DMRT (P = 0.05); DBS-Day before spray; DAS-Days after spray;

Table 3: Efficacy of different insecticides against thrips, Thrips fabae during Kharif 2018-19 (second spray)

Sl. No.	Treatments	Dosage (g/ml per ltr.)	Mean no. of thrips per leaf						Per cent reduction over control
			1DBS	1DAS	3DAS	5DAS	7DAS	Mean	
1	Acetamiprid 20 SP	0.3g/ ltr	2.67 (1.63)^{d}	1.57 (1.25)^{de}	1.12 (1.02)^{d}	0.78 (0.98)^{ef}	0.42 (0.64)^{fg}	0.97	83.47
2	Imidacloprid 17.8 SL	0.5ml/ltr	2.4 (1.54)^{d}	1.38 (1.17)^{e}	0.97 (0.98)^{d}	0.6 (0.77)^{f}	0.27 (0.52)^{g}	0.8	86.37
3	Chlorfenapyr 10 EC	1.5ml/ltr	3.72 (1.92)^{bc}	2.92 (1.70)^{bc}	2.65 (1.62)^{b}	1.98 (1.40)^{bc}	1.84 (1.35)^{bc}	2.35	59.96
4	Diafenthiuron 50 WP	1.5g/ltr	2.98 (1.72)^{bcd}	2.07 (1.43)^{cde}	1.71 (1.30)^{cd}	1.4 (1.18)^{de}	0.98 (0.98)^{e}	1.54	73.76
5	Spiromesifen 22.9 SC	0.5ml/ltr	3.32 (1.82)^{bc}	2.44 (1.49)^{bcd}	2.16 (1.49)^{bc}	1.89 (1.37)^{cd}	1.38 (1.17)^{d}	1.96	66.6
6	Fenazaquin 10 EC	2.0ml/ltr	3.54 (1.88)^{bc}	2.62 (1.61)^{bcd}	2.3 (1.51)^{bc}	1.99 (1.41)^{bc}	1.67 (1.29)^{cd}	2.14	63.54
7	Azadirachtin 10,000 ppm	2.0ml/ltr	3.8 (1.94)^{b}	3.27 (1.80)^{b}	2.9 (1.70)^{b}	2.45 (1.56)^{b}	1.92 (1.38)^{b}	2.63	55.19
8	Acephate 75 SP	1.5g/ltr	2.87 (1.68)^{cd}	1.76 (1.32)^{de}	1.38 (1.17)^{cd}	1.06 (1.02)^{de}	0.64 (0.80)^{ef}	1.21	79.38
9	Control	-	5.38 (2.31)^{a}	5.42 (2.32)^{a}	5.79 (2.40)^{a}	5.98 (2.44)^{a}	6.27 (2.50)^{a}	5.87	-
	SEM $\pm$	-	0.48	0.47	0.48	0.4	0.32	-	-
	CD (P=0.05)	-	1.45	1.41	1.45	1.22	0..97	-	-
	CV (%)	-	7.97	9.54	10.64	9.86	9.18	-	-

Figures in parentheses are "x + 0.5 transformed values; Means in the columns followed by the same alphabet do not differ significantly by DMRT (P = 0.05); DBS-Day before spray; DAS-Days after spray;

thrips per leaf which was on par with imidacloprid. Whereas acephate and diafenthiuron recorded 2.12 and 2.01 thrips per leaf, respectively. In untreated control thrips population increased from 3.46 to 3.55 per leaf at one day after spraying. The mean number of thrips recorded at 3 DAS indicated that imidacloprid and acetamiprid are on par with each other and significantly reduce the thrips population of 1.02 and 1.13 per leaf, respectively. Azadirachtin recorded highest trips population of 2.45 per leaf compared to other treatment included in the study. At 5 DAS showed the thrips population ranged from 0.62 to 2.08 per leaf. The lowest number of 0.62 thrips per leaf was observed in plots treated with imidacloprid 17.8 SL and emerged as the significantly superior treatment.

The data recorded on 7 DAS revealed that thrips population varied from 0.30 to 1.87 per leaf across treatments. The treatment imidacloprid recording significantly less number of thrips population of 0.30 per leaf. However, it was statistically on par with acetamiprid was 0.40 per leaf, and it was followed by acephate of 1.03 thrips per leaf. Azadiractin was recorded highest thrips population of 1.87 per leaf.

Imidacloprid was found to be superior with 81.59 per cent reduction over untreated control which was followed by acetamiprid of 78.02 per cent and acephate of 65.69 per cent. Azadirachtin was recorded least effective treatment with 47.53 per cent reduction of thrips over untreated control (Table 2).

Second spray

When the thrips population on different treatments started to retained up in different treatment, the second spray was taken up at 15 days after the first spray. The data about the efficacy of insecticides after the second spray is presented in table 3.

At 1 DAS population of thrips ranged from 1.38 to 3.27 per leaf. Imidacloprid has retained superiority in the reduction of thrips population from 2.40 to 1.38 per leaf followed by acetamiprid 1.57 thrips per leaf which was on with imidacloprid. Whereas, acephate, diafenthiuron recorded 1.76 and 2.07 thrips per leaf, respectively. In untreated control thrips population increased from 5.38 to 5.42 per leaf at one day after spraying.

The mean number of thrips recorded at 3 DAS indicated that imidacloprid and acetamiprid are on par with each other and significantly reduce the thrips population of 0.97 and 1.12 per leaf, respectively. Azadirachtin recorded highest thrips population of 2.90 per leaf compared to other treatment included in the study. At 5 DAS showed the thrips population ranged from 0.60 to 2.45 per leaf. The lowest number of 2.45 thrips per leaf was observed in plots treated with imidacloprid. However, it was on par with acetamiprid recorded thrips population of 0.78 per leaf, respectively (Table 3). At 7 DAS varied from 0.27 to 1.92 per leaf and 6.27 in the untreated control. The imidacloprid was found to be superior over the rest of the treatments.The treatment with azadirachtin was least effective in controlling the thrips population of 1.92 per leaf.

Imidacloprid was recorded maximum per cent reduction over untreated control of 86.37 per cent, and it was superior over other treatments, followed by acetamiprid and acephate with 83.47 and 79.38 per cent reduction over untreated control respectively. Azadirachtin has recorded the lowest per cent reduction of 55.19 per cent (Table 3).

The result of the present study indicated that the thrip is one of the severe pests of a bean crop. Its damage is more severe at the stages of bud, flower and fruit formation (Khan, 2003).

Kalyan *et al*. (2012) and Amit yadav and Raghuraman (2014) who reported that use of imidacloprid and acetamaprid showed maximum efficacy against sucking pests in Cotton and Brinjal.

These results were in line with Muhammad *et al*. (2000) who reported that imidacloprid was found to be effective against the populations of the thrips in mung bean. Imidacloprid was the most effective chemical and resulted in a minimum population and maximum control of thrips in the mung bean, followed by acetamiprid and acephate (Jamshaid *et al*., 2013). The present study was in line with the findings of Hossain M. A. (2015) and Mithu Antu and Korat (2016) showed very encouraging results of spraying of imidachloprid and acetamaprid on cowpea and green gram in reducing flower infestation of thrips population.

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REFERENCES

Amit yadav and Raghuraman, M. 2014. Bioefficacy of certain newer insecticides against fruit and shoot borer, Leucinodes orbonalis (guen.), white fly, Bemisia tabaci (genn.), and jassid, Amrasca devastans distant in brinjal. *The Bioscan*. **6:** 85-89.

Ano, A. O. and Ubochi, C. I. 2008. Nutrient composition of climbing and prostrate vegetable cowpea accessions. *African J. Biotech*. **7(20):** 3795-3798.

Balanchard, D. 1992. A colour atlas of tomato diseases. Wolfe Pub. Ltd., Brook House, London, p. 298.

Christ, B. J. 1991. Chemical control system of Frankliniella occidentalis in greenhouse eggplant. *J. Asia- pacific Entomol*. **3(1):** 1-9.

Gomaa, A. M. I. 2001. Pathological studies on early blight of tomato. M.Sc. Thesis., Fac. Agric., Cairo Univ.

Grubben, G. J. H. 1993. Vigna unguiculata (L) Walp. cv. group Sesquipedalis. In: Siemonsma, J.S. & Kasem Piluek (Editors). Plant Resources of South-East Asia No 8. Vegetables. Pudoc Scientific Publishers, Wageningen, The Netherlands, pp.274-278 .

Herriot, A. B., Haynes, Jrol. and Shoemaker, P. B. 1986. The heritability of resistance to early blight in diploid potatoes (Solanum tuberosum subsp. phureja and stenotonum). *Am. Potato J.* **63:** 229-232.

Holley, J. D., Hall, R. and Hofstra, G. 1983. Identification of ratereducing resistance to early blight in potato. *Can. J. Plant Pathol*. **5:** 111-114.

Hossain, A. and Awrangzeb, S. N. H. 1992. Vegetable production polices plan and future directions. Proceding on Vegetable production and marketing. AVRDC, BARI, BARC and USAID. pp.21-30 .

Hossain, M, A. 2015. Efficacy of some insecticides against insect pests of cowpea. *Bangladesh J. Agril. Res*. **40(4):** 657-667.

Jamshaid, I., Muhammad, N. and Muhammad, W. H. 2013. Comparative efficacy of some insecticides against sucking insect pests on mungbean, Vigna radiata (l.) Wilczek. *Gomal University J.Research*. **29(1):** 32-37.

Kalyan, R. K., Saini, D. P., Urmila., Jambhulkar, P. P. and Abhishek, P. 2012. Comparative bioefficacy of some new molecules against jassids and whitefly in cotton. *The Bioscan*. **7(4):** 641-643.

Khan, H. U. 2003. Effect of different sowing dates on population of insect pests of garden peas (Pisum sativum L.). *Balochistan J. Agri. Sci*. **4 (2):** 34-38

Mithu Antu and Korat, D. M. 2016. Phytotonic effects of neonicotinoid insecticides in cowpea and green gram. *The Bioscan*. **11(1):** 241-246.

Muhammad. A, Tanveer, A. and Hamid, B. M. 2002. Relative toxicity of different insecticides against whitefly, Bemisia tabaci (Genn.) and black thrips, Caliothrips indicus on nm-92 mung bean, Vigna radiata (l.). *Pak. J. Agri. Sci.* **39(3):** 20-25.

Ngakoua, A., Tamo, M., Parhc, A. I., Nwagad, A., Ntonifore, A. A., Korieb, S. and Nebanee, C. L. N. 2008. Management of cowpea flower thrips, Megalurothrips sjostedti (Thysanoptera, Thripidae), in Cameroon. *Crop Protection*. **27:** 481-488.

Purseglove, J. W., 1977. Tropical crops (Dicotyledons) London. Longman Group Ltd.PP. 273-276.

Rashid, M. M. 1993. Begun Paribarer Shabji. Shabji Biggan (in Bangla). Firsted. Bangla Academy, Dhaka, Bangladesh. pp.384-389 .

Robert, G. H., Kelvin, T., Sewake, J. and Armstrong, W. 2002. Scouting Methods for Detection of Thrips (Thysanoptera: Thripidae) on Dendrobium Orchids in Hawaii. *Environmental Entomology*. **31 (3):** 523–532.

Sani and Umar, K. M. 2017. Biology and management of legume flower thrips (Megalurothrips sjostedti) (Thysanoptera: thripidae), a major insect pest of cowpea: A Review. Scholars Research Library. **5 (7):** 14-17.

Saurabh, T., Devi, S. and Deepanshu. 2018. Evaluation trial in yard long bean (Vigna unguiculata ssp. Sesquipedalis (l.) Verdic.) in Allahabad agro-climatic condition. *Global J Bio Science and Biotechnology*. **7(3):** 447-450.