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EVALUATION OF FLUBENDIAMIDE 20 % WG (TAKUMI 20 % WG) AGAINST LEGUME POD BORER, *MARUCA VITRATA* (FABRICIUS) IN BLACKGRAM UNDER FIELD CONDITIONS

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ABSTRACT

A field experiment was conducted for two consecutive seasons to evaluate the efficacy of flubendiamide 20 % WG (Takumi 20 % WG) against pod borers at Regional Agricultural Research Station, Lam, Guntur, Andhra Pradesh, India. Among the two doses evaluated, flubendiamide 20 % WG @ 60 g a.i./ha was proved better in curtailing both leaf eating caterpillar, Spodoptera litura and spotted pod borer, Maruca vitrata both in terms of larval population and pod damage coupled with higher seed yield. Further, It was found safer against natural enemies such as coccinellids too. Hence, flubendiamide 20 % WG @ 60 g a.i./ha can be used against lepidopteran pests in blackgram.

Keywords: Maruca, Legume pod borer, flubendiamide, blackgram

Introduction

India is an important pulse growing country contributing 28 per cent to the global pulse basket from an area of about 37 percent (Masood Ali and Shivkumar, 2000). Urdbean, commonly known as blackgram, *Vigna mungo* (L.) Hepper, is an important short duration pulse crop grown throughout the year in Andhra Pradesh under different agroclimatic conditions, such as kharif (rainy), rabi (winter) and summer crop both in uplands as well as in rice fallows. Though, urdbean is being grown throughout the year in varied agro-climatic conditions, the productivity was low, because of various biotic and abiotic stresses.

Blackgram is ravaged by an array of insect pests from sowing to harvest in the field as well as in storage. Among them, the legume pod borer (LPB) which is also known as spotted pod borer, *Maruca vitrata* (Fabricius) (Crambidae: Lepidoptera) has been observed as a key pest of blackgram in Andhra Pradesh. It is an important pest effecting the grain legumes in tropics and subtropics and it is reported to feed on 39 host plants (Atachi and Djihou, 1994). Control of legume pod borer has traditionally relied upon chemical insecticides only due to its concealing nature (Sharma, 1998). Foliar application of the conventional insecticides and broad spectrum insecticides such as organophosphates, carbamates and synthetic pyrethroids against pod borers at frequent intervals during the growing season leads to increase cost of cultivation which inturn reducing the net profits for the pulse growing farmers. Hence, the newer insecticides with relatively low quantities compared to standard insecticides which had long residual properties should be evaluated for effective management of legume pod borer. Keeping in view, the present study was taken-up to evaluate the efficacy of a newer insecticide, flubendiamide 20 % WG (Takumi 20 % WG) at different doses against spotted pod borer in blackgram under field conditions.

Flubendiamide activates the ryanodine sensitive calcium release channels (ryanodine receptors) on the intracellular calcium homeostasis, which induces body contraction followed by a rapid cessation of feeding. Flubendiamide is classified in group 28 (RyR modulator) in the IRAC (Insecticide Resistance Action Committee) classification and fits well into strategies of Insect Resistant Management (Nishimatsu *et al*., 2005).

Materials and Methods

A field experiment was conducted at regional agricultural research station, Lam, Guntur during Rabi seasons of 2010-11 and 2011-12 to evaluate the bio-efficacy of flubendiamide 20 % WG in blackgram against legume pod borer. The trial was laid in Randomized Block Design with five replications and four treatments including untreated control during both seasons. The crop was sown in first fortnight of November during both the years in 20 sq m plots maintaining a spacing of 30 cm and 10 cm between rows and plants respectively. The crop was grown under rainfed conditions by adopting all the agronomic practices as per recommendations of ANGRAU, Hyderabad. The crop was protected from sucking pests such as thrips and whiteflies at initial stages through blanket sprays in all the experimental plots uniformly with selective insecticides such as imidacloprid and thiamethoxam. The test insecticides *viz.*, flubendiamide 20% WG at 50 and 60 g a.i./ha along with one standard check, i.e., Quinalphos 25% EC @ 375 g a.i/ha were applied twice after flowering in blackgram. The first spray was given after observing initial incidence of spotted pod borer and second spray was given after 15 days using knap-sack sprayer with 500 liters of spray fluid per hectare. Pre treatment count was taken at one day before spraying and post treatment counts were recorded at 3, 7 and 10 days after each application from five randomly selected plants per plot for both larval count and pod damage. The incidence of natural enemies were also recorded from 5 randomly selected plants per plot. The yield was recorded from each net plot excluding border rows and computed to yield in quintal/ha. The mean data of two sprays of both the years was pooled and subjected to statistical analysis after using suitable transformations.

Results and discussion:

Larval count

The mean larval incidence of the spotted pod borer at one day before spraying was ranged from 2.0 to 2.8 larvae/plant during 2010-11 without any significant differences among the experimental plots indicating the uniform incidence of larvae among all the experimental plots (Table 1). The larval population was slightly low during 2011-12 when compared to 2010-11 and it was uniform in all the experimental plots at one day before spraying (Table.2).

The larval count at 10 days after second spray was nil with flubendiamide 20 % WG at 60 g a.i./ha. However, it was failed to differ significantly with flubendiamide 20 % WG at 50 g a.i./ha but significantly superior over the standard check, quinalphos 25 % EC and untreated control during both the seasons (Table 1 & 2).

Pod damage

The percent pod damage at 10 days after second spray was slightly higher during 2010-11 (4.20 to 25.00 %) compared to 2011-12 (3.0 to 20.6 %) among the different treatments. The pod damage was lowest with flubendiamide 20 % WG at 60 g a.i./ha, but it was found at par with flubendiamide 20 % WG at 50 g a.i./ha. However, these two treatments were found significantly superior in reducing the pod damage due to maruca pod borer over the standard check, quinalphos 25 % EC and untreated control during both the seasons (Table 1 & 2).

Natural enemies

The natural enemies such as ladybird beetles, *Coccinella* Spp. and *Scymnus* Spp. were observed in all the experimental plots during the experimental period. The mean population of natural enemies ranged from 1.0 to 2.4 nos/plant and 1.4 to 1.6 nos/plant during 2010-11 and 2011-12, respectively. Statistically, there were no significant differences among the treatments with respect to the population of natural enemies during both the seasons. But, the population of natural enemies was numerically low in standard check, quinolphos 25 % EC during both the seasons. However, statistically there were no significant differences among the treatments regarding the incidence of natural enemies which indicating that Flubendiamide had no adverse affects on the population natural enemies (Table 1& 2).

Yield

The seed yield was highest from the experimental plots treated with flubendiamide 20 % WG at 60 g a.i./ha during both the seasons which was significantly superior over rest of the treatments. The next best treatment was flubendiamide 20 % WG at 50 g a.i./ha and it was found superior over standard check and untreated control. However, all the treatments were found significantly superior over the untreated control which recorded lowest seed yield.

DISCUSSION

Flubendiamide 20 % WG at two different doses was found effective against spotted pod borer as evidenced with lower incidence of larvae and pod damage as compared to the standard check and untreated control. The bioefficacy of Flubendiamide was reported earlier by some researchers in different crops. Mallikarjuna *et al*. (2009) recorded the highest larval reduction of pod borers with flubendiamide 480 SC and thiacloprid 48 SC followed by emamectin benzoate 55 G and indoxacarb 14.5 SC in dolichos bean. Ashok Kumar and Shivaraju (2009) reported that flubendiamide 480 SC @ 48 g a.i/ha and Thiodicarb 75 WP @ 562.5g a.i/ha were highly effective followed by Indoxacarb 14.5 SC @ 75g a.i/ha in controlling the pod borers in blackgram. Deshmukh *et al*. (2010) reported significant reduction in pod damage due to gram pod borer with flubendiamide 480 SC (0.007%) in chickpea. MahaLakshmi *et al*. (2012) reported that flubendiamide @ 0.2 ml/lt, thiodicarb @ 1.5 g/l and emamectin benzoate @ 0.4 g/l were effective against spotted pod borer in blackgram.

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Table 1. Effect of Flubendiamide 20 % WG against pod borers, natural enemies and grain yield in blackgram during rabi, 2010-11:

Treatments	Dose /ha (g a.i.)	Maruca larval population (Nos /plant)*		Per cent pod damage due to Maruca at 10 days after 2nd spray**	Coccinellid Grubs at 20 Days after 2nd spray*	Grain Yield (Kg/ha)
		1 day before 1st spray	10 days after 2nd spray			
Takumi 20%WG	50	2.00 (1.71)	0.60 (1.24)	5.20 (13.14)	2.00 (1.74)	1151.60
Takumi 20%WG	60	2.20 (1.79)	0.00 (1.00)	4.20 (11.77)	1.80 (1.69)	1283.20
Quinalphos 25%EC	375	2.80 (1.95)	1.20 (1.48)	14.20 (22.02)	1.00 (1.41)	1016.20
Control	---	2.00 (1.71)	5.00 (2.44)	25.00 (29.96)	2.40 (1.86)	828.00
SEm±		NS	0.08	0.72	0.05	34.01
CD (5%)			0.25	2.21	0.16	104.79
CV %			10.50	8.35	8.10	7.11

*Figure in the parenthesis are SQRT X + 1 transformed values

**Figures in the parenthesis are arc sine transformed values

Table 2. Effect of Flubendiamide 20 % WG against pod borers, natural enemies and grain yield in blackgram during rabi, 2011-12:

Treatments	Dose /ha (g a.i.)	Maruca larval population (Nos /plant)*		Per cent pod damage due to Maruca at 10 days after 2nd spray**	Coccinellid Grubs at 10 Days after 2nd spray*	Grain Yield (Kg/ha)
		1 day before 1st spray	10 days after 2nd spray			
Takumi 20%WG	50	1.20 (1.54)	0.20 (1.08)	4.60 (12.30)	1.60 (1.60)	1089.20
Takumi 20%WG	60	2.20 (1.79)	0.00 (1.00)	3.00 (9.86)	1.40 (1.54)	1228.00
Quinalphos 25%EC	375	1.60 (1.60)	1.60 (1.60)	11.60 (19.81)	1.40 (1.54)	985.00
Control	---	1.40 (1.54)	5.00 (2.44)	20.60 (26.95)	1.60 (1.60)	827.00
SEm±		NS	0.07	0.72	0.07	42.54
CD (5%)			0.21	2.22	0.23	131.06
CV %			10.17	9.35	10.6	9.21

*Figure in the parenthesis are SQRT X + 1 transformed values

**Figures in the parenthesis are arc sine transformed values