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Bio-efficacy of Bio-Rational Insecticides against Blister Beetle on Black Gram

Vijay Kumar[1*] and Gagandeep Singh[2]
[1]Maharana Pratap University of Agriculture and Technology, Udaipur (Rajasthan), India.
[2]Agriculture University, Kota (Rajasthan), India.

(Corresponding author: Vijay Kumar)*
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Abstract: Blister beetle, *Mylabris pustulata* is a polyphagous pest attacking flowers of black gram. An experiment on the bio-efficacy of bio-rational insecticides against insect pests infesting black gram was conducted at Agronomy farm, Rajasthan College of Agriculture, Udaipur during *Kharif*, 2018. The experiment was laid out in a randomized block design with three replications. The beetle feeds on flowers and flower buds, the economical yield parts of the plant and devours them. Flower shedding and reduced pod setting result in heavy loss in the grain yield of the crop. Among different treatments, indoxacarb 14.5 SC a.i./ha caused significant maximum reduction in the population of blister beetle and can be used effectively for the management of blister beetle.

Keywords: Blister beetle, bio-rational insecticides, bio-efficacy, incidence, management, black gram.

INTRODUCTION

Black gram reported to be originated in India. It is a self-pollinated deep rooted drought hardy crop, source of food, fodder and green manure. It has good digestibility, flavor and high protein content. Black gram is used in different food items all over the world. Its green fodder is very nutritive and specially fed to milch cattle (Jeswani and Baldev 1990). Blackgram seeds are highly nutritious containing higher amount of protein (24-26 %) and are reported to be rich in potassium, phosphorus and calcium with good amount of sodium. It is also reported to be rich in vitamin A, B1, B3 besides nutritionally rich proteins, important mineral and vitamins. Depending on the nature and period of occurrence, insect and fungus can cause losses of grain yield of black gram. The worldwide yield of black gram is very low because mostly indigenous land contests are cultivated and also because the crop is often grown on a poor fertile land with insufficient water.

Among biotic factor; insect pests are a major factor responsible for causing heavy losses in the yield of black gram and thus limit its production in the region. As many as 200 insect pests have been reported to infest black gram from sowing to the harvest (Talekar, 1990). The blister beetle, *Mylabris pustulata* is the important insect species that cause damage to pulses including black gram. Blister beetle is a voracious flower feeder, directly affecting the grain yield. *M. pustulata*, considered as a minor pest in past has recently assumed the state of a major pest. In short duration and determinate cultivars with compact floral clusters of black gram, damage by blister beetle tends to be manifold. The beetle feeds on flowers and flower buds, the economical yield parts of the plant and devours them. Flower shedding and reduced pod setting result in heavy loss in the grain yield of the crop.

This beetle is highly polyphagous and it feeds on the flowers of several plants in the families of Convolvulaceae, Cucurbitaceae, Leguminosae, Malvaceae etc. The adults sometimes feed on flowers and leaves of plants of such diverse families as Amaranthaceae, Asteraceae, Fabaceae, and Solanaceae. The adult is the destructive stage and feed on the petals of flowers. These long-bodied beetles feed on leaves and flowers. Some biorational insecticides originated from microbes *viz.*, emamectin benzoate, spinosad, and insect growth regulator Novaluron are also reported to be effective against lepidopteran and coleopteran insect pests in pulse crops (Shinde, 2016). In the present investigation bio-rational management of blister beetle infesting black gram was studied.

MATERIALS AND METHODS

The experimental field was prepared during 1st week of July by ploughing using the disc plough followed by cross harrowing and planking. The row-to-row distance and plant to plants spacing were maintained at 15 and 45 cm^2, respectively. The bio-efficacy of bio-rational insecticides against blister beetle infesting black gram was conducted under natural infestation condition at Agronomy farm, Rajasthan College of Agriculture, Udaipur during *Kharif*, 2018. In experiment was laid out in a randomized block design with three replications in uniformly sized plots measuring 5 × 4.5 m with three replications. The seven treatments comprising of different bio-rational insecticides were applied in each replication when the pest population reaches economic threshold level (ETL). The insecticide application was repeated at 15 days interval. Two applications were done during the crop growth period. The treatments were Emamectin benzoate 5 SG @ 12 g, Spinosad 45 SC @ 50 g, Novaluron 10 EC @ 75 g, NSKE 5%, Indoxacarb 14.5 SC @ 75 g, Neem oil @ 2% and control.

The observations on the population of blister beetle were recorded from five randomly selected and tagged plants in each replication. The observations recorded before spraying and 3, 7 and 10 days after each spray. The population data thus recorded was converted into per cent reduction by using the correction factor given by Henderson and Tilton (1955) as under:

$$\text{Percent reduction in population} = 100\left[1-\frac{T_a \times C_b}{T_b \times C_a}\right]$$

Where,

T_a= Number of insects after treatment in treated plot

T_b = Number of insects before treatment in treated plot

C_a=Number of insects in untreated check after treatment

C_b= Number of insects in untreated check before treatment

The blister beetle infestation was expressed as a mean percentage infestation.

$$\text{Mean infestation (\%)} = \frac{\text{No. of infected pods}}{\text{No. of total pods}} \times 100$$

RESULTS AND DISCUSSION

The data recorded on the per cent reduction in blister beetle population in black gram during *Kharif* 2018 and presented in Table 1 revealed that all the treatments were found significantly superior over control in terms of reduction in the mean population of blister beetle at 3, 7 and 10 days after second spraying during *Kharif* 2018. The application of emamectin benzoate 5 SG @ 12 g a.i./ha was found most effective in reducing the blister beetle mean population with 65.19 per cent mean reduction in population of blister beetle. The above treatment was followed by spinosad 45 SC @ 50 g a.i/ha which recorded 56.00 per cent mean reduction in blister beetle mean population at 3 days after spraying during *Kharif* 2018, respectively. The above two treatments were at statistically par to each other. The spray of indoxacarb 14.5 SC a.i./ha, neem oil 2% and NSKE 5% recorded 50.35, 44.07, 38.42 and 32.85 per cent mean population reduction. Novaluron 10 EC @ 75 g a.i./ha which recorded 32.85 per cent was found least effective among all the treatments against blister beetle at 3 days after second spraying during *Kharif* 2018.

Table 1: Bio-efficacy of bio-rational insecticides against blister beetle on black gram during *Kharif*, 2018.

Sr. No.	Treatment	Dose (a.i./ha)	Reduction (%) in blister beetle population (days after sprays)			
			II Spray			
			PTP	3 DAS	7 DAS	10 DAS
1.	NSKE 5%	5%	4.33	38.31	47.25	41.50
			(2.20)	(38.42)	(53.92)	(43.91)
2.	Neem oil 2%	2%	5.33	41.60	49.77	46.49
			(2.41)	(44.07)	(58.28)	(52.61)
3.	Indoxacarb 14.5SC	75g	4.33	45.20	56.87	50.51
			(2.20)	(50.35)	(70.14)	(59.55)
4.	Spinosad 45SC	50g	5.33	48.45	60.35	53.82
			(2.41)	(56.00)	(75.53)	(65.14)
5.	Novaluron 10EC	75g	5.00	34.97	56.55	47.89
			(2.34)	(32.85)	(69.61)	(55.04)
6.	Emamectin benzoate 5SG	12g	4.00	53.84	57.67	52.30
			(2.09)	(65.19)	(73.00)	(62.60)
7.	Control		5.33			
			(2.41)	-	-	-
	S.Em.±		0.13	2.48	2.39	2.79
	C.D at 5%		0.39	7.82	7.53	8.79

* PTP- Pre treatment population, *DAS- Days after spray, * Figures in the parenthesis are retransformed per cent values

At seven days after spraying, application of spinosad 45 SC @ 50 g a.i/ha was found most effective in reducing the blister beetle mean population with 75.53 per cent mean reduction in population of blister beetle. The above treatment was followed by emamectin benzoate 5 SG @ 12 g a.i./ha which recorded 73.00 per cent mean reduction in blister beetle mean population at 7 days after spraying during *Kharif* 2018, respectively. The above two treatments were statistically at par to each other. The spray of indoxacarb 14.5 SC a.i./ha, novaluron 10 EC @ 75 g a.i./ha, neem oil 2% and NSKE 5% recorded 70.14, 69.61, 58.28 and 53.92 per cent mean reduction, respectively during *Kharif* 2018. Similarly, at tenth days after spraying application of spinosad 45 SC @ 50 g a.i/ha was found most effective in reducing the blister beetle mean population with 65.14 per cent mean reduction in population of blister beetle. The above treatment was followed by emamectin benzoate 5 SG @ 12 g a.i./ha which recorded 62.60 per cent mean reduction in blister beetle mean population at 10 days after spraying during *Kharif* 2018, respectively. The above two treatments were at statistically at par to each other. The spray of indoxacarb 14.5 SC a.i./ha, novaluron 10 EC @ 75 g a.i./ha, neem oil 2% and NSKE 5% recorded 59.55, 55.04, 52.61 and 43.91 per cent mean reduction, respectively during *Kharif* 2018.

The result of the experiment on bioefficacy against insect pest infesting blackgram and reveals that among different treatments tested**,** single spray of spinosad 45 SC @ 50 g a.i/ha recorded maximum reduction of 56.00, 75.53 and 65.14 per cent in mean population at 3, 7 and 10 days after spray, respectively which was significantly superior over other treatments in reducing blister beetle populations during *Kharif* 2018 and was followed by spray of emamectin benzoate 5 SG @ 12 g a.i./ha recorded reduction of 65.19, 73.00 and 62.60 per cent in mean population at 3, 7 and 10 days after spray, respectively. Emamectin benzoate 5 SG was found at par with Indoxacarb 14.5 SC @ 75 g a.i./ha with reduction of 50.35, 70.14 and 59.55 per cent in mean population at 3, 7 and 10 days after spray, respectively. These findings are in agreement with that of Shabana *et al*. (2018) who studied the efficacy of indoxacrb against blister beetle infesting soybean and reported that indoxacrb significantly minimized blister beetle population on soybean. Rao *et al.* (2007) showed that the indoxacarb 14.5SC @ 1 ml/ l was the most effective against *M. vitrata* in pigeon pea. Sonune *et al.* (2010) observed that the indoxacarb 0.008% was the most effective in against *M. vitrata* in black gram. Nebapure and Sagar (2019) revealed that chlorantraniliprole 18.5SC @ 30g a.i./ ha followed by indoxacarb 15.8 EC @ 73g a.i./ ha at 15 days interval were effective against *M. vitrata* on pigeonpea. Ahmed *et al.* (2020) found emamectin benzoate @ 1.0 g/ l as the most effective against *M. vitrata*. Haripriya *et al.* (2021) revealed that spinosad 45SC @ 75 ml/ ha followed by emamectin benzoate 5SG @ 200 ml/ ha were effective against *M. vitrata* on lablab and green gram. Thus, indoxacarb 14.5 SC a.i./ha can be recommended against *M. vitrata*.

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