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Effect of insecticides in management of tobacco caterpillar of soybean at Kawardha Dist- Kabirdham

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Abstract

With a view to find out the relative bio-efficacy of different insecticides against tobacco leaf eating caterpillar, *Spodoptera litura* (Fab.) infesting soybean under field condition, field trial was carried out at Instructional Farm, Sant Kabir College of Agriculture and Research Station, Kawardha District Kabirdham IGKV, during Kharif season of 2012. Six insecticides were applied as broadcast and foliar spray to manage the infestation of tobacco caterpillar in soybean. The result of applications of six different insecticidal treatments against tobacco leaf eating caterpillar, *S. litura* (Fab.) revealed that the treatment with the efficacy of six insecticides on mean caterpillar population varied in methomyl (poison bait) treatment which minimum 0.64 percent and the maximum was 1.32 per plant which was methomyl (foliar spray) treatment on compared to 2.56 percent mean population in control. The effect of insecticides on means number of healthy pods per plant also varied maximum (87.04) in methomyl (poison bait) while minimum (72.4) in methomyl (foliar spray) were found less effective in controlling the pest as compared to 68.4 pods/plant in control

Keyword: Tobacco caterpillar management, Kawardha CG.

Introduction

India is one of the major oilseeds producing country in the world and these are the second largest agricultural commodity in India after cereals occupying 13-14% of gross cropped area (Sreekanth *et al.*, 2013) ^[14]. In India in the year 2012-13, soybean cultivation reached to 12.03 mha recording production of 12.98 mt with an average of 1079 kg/ha. In Gujarat, the area under soybean was 14,000 hectares and the yield was 714 kg per ha with total production of 10,000 tones (Anon., 2003) ^[3]. Soybean (*Glycine max* (L.) Merrill) is a oil seed crop contains about 40-42 per cent protein (Netam *et al.*, 2013) ^[9]. It is the fifth largest oilseed crop in India next only to castor, safflower, groundnut and rapeseed mustard (Sinha and Netam, 2013) ^[11]. Yield losses in soybean are directly associated with higher larval densities and increased defoliation by tobacco caterpillar (*Spodoptera litura* Fab.)

(Geon Hwi *et al.*, 2006) ^[8]. The intensive use of insecticides for control of this pest has resulted in high levels of resistance to virtually all commercial insecticides in many parts of the world. In recent years, the tobacco caterpillar has become a serious pest on soybean in some parts of India and causes severe outbreak of this pest in soybean (Dhaliwal *et al.*, 2010) ^[6].

Material & Methods

Field experiments on soybean were conducted under rain fed conditions during Kharif season 2012 at Instructional Farm, Sant Kabir College of Agriculture and Research Station, Kawardha District Kabirdham IGKV Chhattisgarh using JS-335 as a test variety.

The experiment was carried out in Randomized Block Design (RBD) with the three replications, during kharif 2012. In soybean crop variety JS-335. Studies on effect of insecticides in

management of tobacco caterpillar of soybean, six insecticides were applied as broadcast and foliar spray. The insecticides were applied when there was appearance of tobacco caterpillar. The numbers of tobacco caterpillar were recorded in one square meter area. In a field, 10 such random square of one meter area was selected to record the population of tobacco caterpillar and the average population per square meter was estimated. The mean pest population was recorded at different interval at before and after spray. The percentage infestation of tobacco caterpillar in different treatment was also recorded.

Studies on effect of insecticides on infestation of tobacco caterpillar of soybean and its influence on mean number of healthy and damaged pods/plant. The mean numbers of healthy and damaged pods were recorded in a field, 10 such random selected plants and count the healthy pods and damage pods each plant in different treatments.

Result & Discussion

The efficacy of six insecticide on mean pest population differed considerably the mean number of Tobacco caterpillar before spray varied from 4.2 – 7.6 but when the insecticides were sprayed or broadcasted, there was drastic reduction in number of mean tobacco caterpillar population. The tobacco caterpillar population considerably less in Methomyl treatment which was broadcasted.

However, the Tobacco caterpillar population was maximum in Methomyl which was applied as foliar spray, as compare to 6.6 Tobacco caterpillars in control, after one day application of insecticides. The same trend was observed in mean Tobacco caterpillar population till 10th day of spray but, there was increase Tobacco caterpillar population 15th day after spray. The Tobacco caterpillar population was minimum (0.8) Methomyl poison bait which was broadcasted while it was maximum (3.6) in Methomyl which was applied as foliar application. The mean Tobacco caterpillar population was minimum (0.64) in Methomyl which was broadcasted, but it was considerably

higher in Methomyl which was applied as foliar spray as compare to maximum mean Tobacco caterpillar population (2.56) in control data presented in table no. 02.

The percentage infestation of Tobacco caterpillar also varied considerably in different treatments it was considerably less in Methomyl as foliar spray, but was maximum (20%) in Indoxacarb as broadcast and Acephate as foliar spray compare to Maximum(30%) in control.

Taggar *et al.* 2011^[12] reveal that the bio-efficacy of seven insecticides *viz.*, quinalphos 25 EC, carbaryl 50 WP, indoxacarb 14.5 SC, acephate 75 SP, endosulfan 35 EC, chlorpyrifos 20 EC and dichlorvos 76 EC was evaluated against tobacco caterpillar, *Spodoptera litura* (Fab.) on soybean crop in three field experiments during kharif 2005. In all the three experiments, indoxacarb 14.5 SC @ 500 ml/ha proved most effective in controlling the pest at 3 and 7 days after spray (4.84 and 2.14 larvae/m², respectively), followed by acephate 75 SP @ 2.0 kg/ha (7.36 and 3.69 larvae/m², respectively). The highest mean grain yield was also recorded in the treatment indoxacarb 14.5 SC (1356 kg/ha), followed by acephate 75 SP (1299 kg/ha). Other insecticidal treatments were almost on par with each other in terms of larval mortality as well as grain yield, but significantly better than untreated control. The avoidable losses due to *S. litura* on soybean crop ranged from 2.66 to 38.51% in all the insecticidal treatments as compared to control. The avoidable losses in indoxacarb 14.5 SC and acephate 75 SP were 38.51 and 32.69%, respectively, indicating their superiority over other treatments in managing the pest.

Babu S *et al.*, 2013^[4], reported that an experiment was conducted for two *kharif* seasons during 2013 and 2014 to find out the field efficacy of newer insecticides against tobacco caterpillar, *Spodoptera litura* (F.) in soybean. In both the years on 3, 7 and 12 DAS (days after spraying), chlorantraniliprole showed significant maximum larval mortality achieving a cumulative value of 79.29–84.77%. Indoxacarb showed a cumulative efficacy of 70.5372.22%. Emamectin benzoate and novaluron + indoxacarb demonstrated more than 50% efficacy and

recorded a cumulative efficacy of 56.72-56.58% and 55.92-58.62% in Emamectin benzoate and novaluron+ indoxacarb, respectively whereas, novaluron showed the cumulative efficacy of 46.23-49.96%. Profenophos and triazophos demonstrated the weakest efficacy against larvae of *S. litura*, not exceeding 40% at individual assessments. The pooled mean data on seed yield, showed an incremental yield of 11.44 q/ha in chlorantraniliprole over untreated control then followed by treatment indoxacarb which recorded an incremental yield of 9.12 q/ha. The highest cost benefit ratio was noticed in chlorantraniliprole (5.54) and indoxacarb 15.8 EC (5.63). The findings are more or less agreements with present studies.

The range of infestation of Tobacco caterpillar in Soybean as influence by insecticides application

indicates that, the range of infestation was minimum (10-15%) in Methomyl (Poison bait) while it was maximum (20-25%) in Methomyl (foliar spray) as compare to 25-30% infestation under check condition

The effect of insecticides on mean number of healthy pods per plant varied greatly. The mean number of healthy pods per plant was maximum (87.04) Methomyl (poison bait) while minimum (72.4) in Methomyl (foliar spray) as compare to 68.4 pods per plant in check. As against to mean number of damaged pods per plant was maximum (6.2) in Methomyl (foliar spray) while mean number of damaged pods per plant was minimum (1.6) in Methomyl (Poison bait) as compare to 8.0 pods per plant in check data presented in table no. 02.

Table 1: Bio-efficacy of different insecticides against *S. litura* infesting soybean under field condition

S. No.	Insecticides	A.I. / dose	Method of application	Mean Pest population at different intervals (DBS/DAS)						Mean population
				DBS-1	DAS-1	DAS-3	DAS-7	DAS-10	DAS-15	
1	Methomyl (Dunet)	40% S.P. 45 gm/ Tank	Foliar application (spray)	7.6	3.6	0.8	0.4	0.2	1.6	1.32
2	Indoxacarb (Dhawa)	14.5% S.C. 20 ml/ Tank	Foliar application (spray)	6.6	1.4	0.4	0.6	0.4	1.2	0.80
3	Acephate	75% S.P. 20gm/tank	Foliar application (spray)	4.2	1.4	0.8	0.6	0.2	1.4	0.88
4	Methomyl (Dunet) Poison Bait	40% S.P. 125 gm + 1 kg. Gur+7kg. wheat straw	Broadcast (Poison bait)	4.4	0.8	0.4	0.6	0.2	1.2	0.64
5	Indoxa carb(Dhawa) Poison Bait	14.5% S.C. 80ml. +2 kg. Gur+15kg. wheat straw	Broadcast (Poison bait)	6.4	1.6	1.0	1.0	0.6	1.0	1.04
6	Acephate Poison Bait	75% S.P. 125 gm+1kg. Gur+7kg. wheat straw	Broadcast (Poison bait)	4.8	1.0	0.4	0.4	0.4	1.2	0.68
7	Check (Control)	--	Water spray	7.4	6.6	2.2	1.6	0.8	1.6	2.56
	C.D.			0.284	0.408	0.253	0.432	0.225	0.320	
	SE(m)			0.091	0.131	0.081	0.139	0.072	0.103	
	C.V.			2.674	9.680	16.401	32.313	31.339	13.540	

* DBS- Day before spraying * DAS- Day after spraying

Table 2: Estimation of losses in yield due to infestation by Tobacco Caterpillar (*Spodoptera litura*) of Soybean

S. No.	Insecticides	% Range of infestation	Mean No. of healthy pods/plant	Mean No. of Damaged pods / plant
1	Methomyl 40% S.P. (Dunet)	20-25%	72.4	6.2

2	Indoxacarb 14.5% S.C. (Dhawa)	15-20%	84.6	3.2
3	Acephate 75% S.P. Poison bait	15-20%	81.4	4.0
4	Methomyl 40% S.P. (Dunet) Poison bait	10-15%	87.4	1.6
5	Indoxacarb 14.5% S.C. (Dhawa) Poison bait	15-20%	78.2	5.0
6	Acephate 75% S.P.	15-20%	85.6	3.2
7	Check	25-30%	68.4	8.0
	C.D.		3.320	0.232
	SE(m)		1.066	0.075
	C.V.		2.316	2.896

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