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Efficacy and economics of some neem based products against tobacco caterpillar, *Spodoptera litura* F. on soybean in Madhya Pradesh, India

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ABSTRACT

A field experiment was conducted at Zonal Agricultural Station (JNKVV), Powarkheda during kharif 2004 and 2005. Six neem based products and quinalphos (0.04 %) were evaluated to assess the efficacy and economics in managing the *Spodoptera litura* in soybean. Quinalphos (0.04%) application was proved to be most effective, it reduces 73.28 per cent larval population, with the highest seed yield (1183.13 kg/ha) and incremental cost benefit ration [(ICBR) (7.40)]. Among the neem based products, application of Neem Seed Kernel Extract (NSKE) 5%+ Neem Leaf Extract (NLE) 10% reduces the maximum larval population (51.59%) and gave the seed yield (987.66 kg/ha). However the ICBR showed that the application of NSKE 5% (2.44) proved economically most viable amongst the neem based treatments, followed by NLE 5% (2.20).

Key words : Soybean, *Spodoptera litura*, Neem, ICBR

INTRODUCTION

Soybean is an important *kharif* crop of Madhya Pradesh. The crop is attacked by large number of insect pests, which are one of the major constraints in soybean production in the state. *Spodoptera litura* F., commonly known as Tobacco caterpillar has been reported on soybean in M.P., U.P., Delhi, Maharastra, Karnataka, Orissa, and H.P. (Singh *et al.,* 1989). The pest appeared in serious form on soybean crop during *kharif*, 2003-04; causing severe yield losses in Hoshangabad, Harda and Chindwara district of Madhya Pradesh. Several liquid and dust formulations have been recommended for control of the pest. To avoid the serious residual, resistance problems and ecological consequences due to chemical, the plant products derived from *Neem* were tested against the *Spodoptera litura* on soybean.

METERIALS AND METHODS

Experiments were conducted during two kharif seasons (2004 & 2005) at Zonal Agricultural Research Station, Powarkheda (M.P.). The experiment was laid out in randomized Block Design with three replications. There were eight treatments (Table no.1), which were applied twice at fifteen days interval. The plot size was maintained to be 5 X 2.4 m comprised of six rows at a row distance of 30 cm. Prior to first treatment application, mechanical removal of egg masses/ early instars larvae was carried out uniformly in all the plots. Observation on larval population on per meter row length from 3 random spots was recorded one day before and 3, 5, 7, and 15 day after treatment from each plot, while the per cent pod damage and grain yield was recorded at harvest. Data so obtained were transformed by $\sqrt{(X+1)}$ of larval population, while the percent pod damage were transferred by Arc sin transformation prior to statistical analysis. Results obtained were given and discussed in result and discussion section.

RESULTS AND DISCUSSION

The pooled data of two years (Table 1) revealed that the pretreatment larval population in different treatments had non-significant differences, and ranged from 15. 61 to 28.22 larvae per meter row length. While the Post treatment mean larval population per meter row length ranged from 2.18 to 8.16 in various treatments and differed significantly. Larval population was found to be significantly lowest in quinalphos (0.04%) application (2.18). Neem based treatments, although, proved to be significantly inferior then the quinalphos but was superior and had significantly low larval population (3.95 to 6.01) as compared to the control (8.16). Among Neem based treatments, the application of Neem Seed Kernel Extract (NSKE) 5% + Neem Leaf Extract (NLE) 10% (3.95) was the most effective, followed by NSKE 5% + NLE 5% (4.13), and were significantly at par with each other, while the later was at par with NSKE 5% (5.50).

Maximum larval reduction of 73.28 per cent was achieved in case of quinalphos (0.04%) treatment. In various Neem based treatments the larval population reduction varied from 29.17 to 51.59 per cent as compared to control. The NSKE 5% + NLE 10% reduced the larval population by 51.59 per cent, followed by NSKE 5% +

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Table 1: Efficacy and Economics of '*Neem*' based insecticides against *Spodoptera litura* on soybean.

(Mean of 2004 & 2005)

S. No.	Treatments	Larval Population (Mean/m)			Pod damage (%)	Yield (kg/ha)	ICBR (Rs.)
		Pre-Treatment	Post-Treatment (mean)*	Reduction (%)			
T_1	Untreated	15.61 (3.55)	8.16 (3.00)	0.00	22.20 (28.06)	596.71	0.00
T_2	NSKE 5%	19.39 (3.87)	5.50 (2.52)	32.60	12.13 (20.34)	884.78	2.44
T_3	NLE 5%	18.56 (3.84)	6.01 (2.63)	26.35	14.02 (21.95)	792.18	2.20
T_4	NLE 10%	19.67 (3.95)	5.75 (2.59)	29.53	14.78 (22.53)	833.33	1.82
T_5	T_2+T_3	16.28 (3.61)	4.13 (2.26)	49.39	10.48 (18.80)	853.91	0.77
T_6	T_2+T_4	21.67 (4.07)	3.95 (2.18)	51.59	9.35 (17.72)	987.66	1.33
T_7	Multineem 0.5%	28.22 (4.53)	5.78 (2.60)	29.17	15.12 (22.85)	555.56	-1.33
T_8	Quinalphos (0.04%)	24.67 (4.31)	2.18 (1.77)	73.28	5.67 (13.37)	1183.13	7.40
S Em ±		0.46	0.10	-	1.16	62.97	-
CD (p=0.05)		1.31	0.29	-	3.32	180.73	-

Figure in parenthesis are ?(x+1) transformed data for Pre and Post treatment larval population, while Arc sin transformed data in case pod damage (%). *- Mean of 4 observations i.e., 3, 5, 7 & 15 days after treatment

NLE 5% (49.39%) and NSKE 5% (32.60%).

Behera and Satapathy (1996) also reported that Neem seed kernel extract was the most effective causing 100 per cent mortality, up to 10 days of treatment, of 4th instar larvae of *Spodoptera litura.* Similarly Raman *et al*. (2000) reported that NSKE was the most effective treatment in reducing the larval/ egg population of *S. litura,* resulted in less damage and increase yield of pod in groundnut. However, Kumar and Krishnayya (1999) observed that use of Neem oil 1.0 per cent treatment reduces 30.7 per cent larval population of *S. litura* in groundnut. Pod damage varied from 5.67 to 22.20 per cent in different treatments. Significantly lowest pod damage (5.67%) was observed in quinalphos (0.04%). Amongst the neem based treatments, the NSKE 5% + NLE 10% (9.35%), NSKE 5% + NLE 5% (10.48%), and NSKE 5% (12.13%) were superior treatment and were at pat with each other. Significantly the maximum pod damage was observed in control (22.20%).

Significantly the highest grain yield (kg/ha) was produced in quinalphos (0.04%) treatment (1183.13). NSKE 5% + NLE 10% (987.66), NSKE 5% (884.78), and NSKE 5% + NLE 5% (853.91) were next better performing treatments and were at par with each other. Later two were also at par with the following NLE 10% (833.33) and NLE 5% (792.18). Manjanaik *et al.* (2002) also reported that the quinalphos produced the lowest rate of defoliation by *S. litura* and highest shelling quality of groundnut. Quinalphos (0.04%) spray recorded the highest incremental cost benefit ratio (ICBR) of 7.40. The neem based treatments gave ICBR in between 2.44 to (-) 1.33. The NSKE 5% gave the maximum ICBR ratio (2.44), followed by the NLE 5% (2.20) and NLE 10% (1.82). Yadav *et al.* (2001) reported that in kharif soybean application of quinalphos gave net return of Rs. 6090 per hectare.

REFERENCES

Behera, U. K. and Satapathy, C. R. (1996). Screening indigenous plants for insecticidal properties against *Spodoptera litura* Fb. *Insect Environment,* **2 (2) :** 43-44.

Kumar, D. A. and Krishnayya, P.V. (1999). Effect of diflubenzuron in combination with selected insecticides on major lepidopteran pests of groundnut, *Arachis hypogaea* Linn. *Journal of Applied Zoological Reaserches,* **10 (1) :** 1-5.

Manjanaik, C., Jyothilakshmi, S., Chandrappa, H., Somasundra, K. M. and Herle, P.S. (2002). Efficacy of insecticides and plant products (neem oil) against *Spodoptera litura* (Noctuidae: Lepidoptera) on groundnut in costal zone. *Environment and Ecology*, **20 (1) :** 105-108.

Raman, G.V., Raddy, V.R.K., Rao, M. S., Srimannarayana, G. and Venkateswarlu, B. (2000). Effect of annona and neem formulations on rabi groundnut crop against *Spodoptera litura* Fab. *Pesticide Research Journal*, **12 (2) :** 174-177.

Singh, O.P., Verma, S.N. and Nema, K.K. (1989). Insect pests of Soybean in India. International Book Distributors, DehraDun, 91-97.

Yadav, M.K., Matkar, S.M., Sharma, A. N., Billore, M., Kapoor, K.N. and Patidar, G.L. (2001). Efficacy and economics of some new insecticides against defoliators and stem borers of soybean [*Glycine max* (L.) Merrill]. *Crop Research*, **21 (1) :** 88-92.

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