General Impact Factor (GIF): 0.875
Scientific Journal Impact Factor: 1.205

e- ISSN: 2394-5532
p- ISSN: 2394-823X

International Journal of Applied And Pure Science and Agriculture

www.ijapsa.com

Effective Management of Gram pod borer *Helicoverpa armigera* (Hubner) with combination of Neem Seed Kernel Extract (NSKE) and Flubendiamide 39.39 SC in Rain fed areas of Chhattisgarh

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Objective: To evaluate correct schedule for effective and economic management of *Helicoverpa armigera* with double spray of NSKE and Flubendiamide 39.39 SC

ABSTRACT

Present investigation was carried out in Rain fed areas of Chhattisgarh on chickpea, Cicer arientum (Linnaeus) by using 5% Neem Seed Kernel Extract (NSKE) suspension with combination of Flubendiamide 39.39 SC compared with Profenophos + Cypermethrin 44 EC, Farmer's practice i. e. Chlorpyriphos + Cypermethrine 55 EC & control plots against the incidence of gram pod borer Helicoverpa armigera (Hubner) at Kurud, Nagari & Sihawa areas of Dhamtari district (Chhattisgarh) during Rabi season, 2012-13. The results indicates that Neem Seed Kernel Extract (5%) alonwith Flubendiamide 39.39 SC @ 50 ml/ha effectively reduce the H. Armigera larval population as compared with control plot when used in regular sprays in vegetative and pod formation stages. H. armigera has been observed to be a major pest in village and requires more attention to get rid of its infestation. The study also concluded that Spraying of Flubendiamide 39.35 SC (Fame) @ 50 ml/ha along with Neem seed kernel extract 5% recorded higher grain yield of chickpea (14.66 q/ha) over Farmer's practice (12.26 q/ha) i.e. Chloropyriphos+Cypermethrin 55 EC @ 1000 ml/ha as a standard check suggesting low cost, eco-friendly, easily acceptable and adoptable technology for management of chickpea pod borer.

Key words: Chickpea (Cicer arietinum), Cypermethrine, Chlorpyriphos, Flubendiamide,Helicoverpa armigera, Neem Seed Kernel Extract, Profenophos.

I. INTRODUCTION

In Chhattisgarh chickpea is generally grown under rain fed or residual soil moisture conditions in rabi season after harvest of rice during October-March. Among the major pulses grown, chickpea ranks first in area and production. The area of chickpea in Dhamtari district is reducing due to some Biotic and abiotic factors. The chickpea has relatively few insect pests but gram pod borer, *Helicoverpa armigera* (Hubner) is the major pest (Lal *et al*. 1985, Naresh and Malik 1986, Lal 1996). Environmental conditions during the late vegetative and reproductive period for chickpea (February to mid-March) are particularly conducive to pod borer development. The pod borers inflicted heavy crop losses from seedling to maturity, but the losses reached at its peak when the pods appeared (Mehto and Singh 1983, Deka *et al*. 1989). Lal (1996) reported that the seed yield losses due to *H. armigera* were 75-90% and in some places the losses were up to 100%. The yield loss in chickpea due to pod borer was reported as 10 to 60 per cent in normal weather conditions, while it was 50 to 100 per cent in favorable weather

conditions, particularly in the state where frequent rain and cloudy weather is prevailing during the crop season (Patel 1979).These losses can be reduced by the application of insecticides (Sinha *et al*. 1983, Singh *et al*. 1987, Rakesh *et al*. 1996, Balasubramanian *et al*. 2001). Chemical insecticides are generally used in pod borer control due to their effectiveness and easy availability. Recently, *H. armigera* is reported to have developed resistance to many commonly used insecticides (Lande 1992). In past, the best insecticide was reported to be the cypermethrin (Gohokar *et al.* 1985, Singh *et al.* 1987, Khan *et al.* 1993, Jadhav and Suryawanshi 1998) and Endosulfan (Chaudary *et al.* 1980, Rizvi *et al.* 1986). Phokela *et al*. (1990) observed a tendency of increased resistance to cypermethrin in the population of *H. armigera.* Moderate to high levels of resistance to cypermethrin and moderate resistance to Endosulfan were recorded in field populations of *H. armiger.* The growing awareness of the hazards of pesticide use has created a worldwide interest in pest control agents of plant origin that are bioactive and yet ecologically safe. Hence, the present experiment was conducted to assess the performance of Neem Seed Kernel Extract (NSKE) along with safer new molecule Flubendiamide 39.35 SC as an effective combination of Oviposition inhibitor and larvicidal effect for the management of *H. armigera* on chickpea.

II. MATERIALS AND METHODS

This experiment was conducted in Rainfed areas of Kurud, Nagri and Sihawa of Chhattisgarh with the combination of Neem Seed Kernel Extract 5% + Flubendiamide 39.35 SC (Fame) @ 50 ml/ha (Two spraying), Profenophos + Cypermethrin 44 EC @ 875 ml/ha, Farmers practice i.e. Chloropyriphos+Cypermethrin 55 EC @ 1000ml/ha and untreated control. Sowing was done between 21st October 2012 to 30th October 2012 depending upon the availability of sufficient moisture in the farmers' fields. Application of Neem seed Kernel Extract and Flubendiamide 39.35 SC considered as treatments of the experiments which were: T_1 = spraying of 5% neem seed kernel extract+ Flubendiamide 39.35 SC @ 50 ml/ha (two sprayings at 14 days interval starting just before flower initiation stage and at Pod formation stage), T_2 = spraying of Profenophos + Cypermethrin 44 EC @ 875 ml/ha, T_3= Chloropyriphos+Cypermethrin 55 EC (Farmer's practice) (two sprayings at 14 days interval) @ 1000 ml/ha T_4 = untreated control. It was laid out in randomized block design with three dispersed replications. Chickpea variety Vaibhav was sown in rows with the spacing of 30 cm. For preparation of Neem Seed Kernel Extract (NSKE 5%), 5 kg of Neem Seed Kernel (well dried) was ground into powder form and soaked overnight in 10 liters of water. Next morning, the solution was stirred with a wooden plank till it became milky white and was, filtered through double layer of muslin cloth. The volume now made up to 100 liters. Thus, the 5% concentrated solution of NSKE was ready to be sprayed in the fields. The land was fertilized with 20-40-20 N: P: K in the form of urea, single super phosphate & muriate of potash respectively. All fertilizers were applied as basal at the final land preparation. The spraying was done by Knapsack hand sprayer as per treatments. At maturity, all the pods were collected from 10 randomly selected plants from middle rows of each plot and examined. The damaged (bored) and total numbers of pods were counted and the percent pod damage was determined. Suitable IPM module consisted of field sanitation, summer ploughing/harrowing, Seed treatment, Installation of Light trap, 20 Pheromone traps ha^{-1}, Bird perches, coriander seed were also sown between chickpea rows to attract natural enemies.

At maturity Observations on infested pod, no. of larvae in 10 randomly selected plants from middle rows of each plot, No. of male moths collection in pheromone traps were recorded and data were analyzed statistically.

III. RESULTS & DISCUSSION

Effect on pod damage and yield loss: A sharp decline in the larval population density of *H. armigera* was noted one day after the application of each spray compared to control. At vegetative stage 5% neem seed extract + Flubendiamide 39.35 SC @ 50 ml/ha significantly reduce larval population (2.36%) followed by Profenophos + Cypermethrin 44 EC(6.23). At Pod formation stage again 5% neem seed extract + Flubendiamide 39.35 SC @ 50 ml/ha significantly reduce larval population (3.3%) followed by Profenophos + Cypermethrin 44 EC(4.5) (Table 1). Significantly the lowest pod damage (4.93%) was observed in the treatment where 5% neem seed extract + Flubendiamide was applied followed by Profenophos + Cypermethrin 44 EC (7.26%). This might be due to its (T1) high pest specificity with fast acting activities that produced quick knock down action to pod borer resulted in the lowest pod damage and also reduces larval count. Due to highest pod borer infestation, some twigs, flowers and pods might completely damaged in untreated control resulted highest pod damage 10.46%.

Grain yield: NSKE 5%+Flubendiamide 39.35 SC established itself as the most effective insecticide with respect to grain yield as well, with grain yield of 14.65 quintals per treatment (Table II). The grain yield per treatment in case of Profenophos + Cypermethrin 44 EC, Farmer's practice (Chloropyriphos + Cypermethrine 55 EC), cypermethrin and control was 13.96, 12.26, and 8.83 quintals respectively.

Table1: Effect of Treatments on Mean population of gram pod borer larvae/ 3 m row legth.

Treatments	Vegetative stage	Pod formation
	Mean No. of larvae	
T_1 NSKE 5%+Flubendiamide 39.39 EC	2.36	3.3
T_2 Profenophos + Cypermethrin 44 EC	6.23	4.5
T_3 Farmer's practice (Chloropyriphos + Cypermethrine 55 EC)	6.86	4.96667
T_4 Untreated Control	9.66	9.33333
SE (m)	1.77	1.5
CD	6.1	5.36

Table: 2 Effect of treatments on pod damage & yield

Treatments	Pod damage (%)	Yield (q/ha)
T_1 NSKE 5%+Flubendiamide 39.39 EC	4.93333	14.66
T_2 Profenophos + Cypermethrin 44 EC	7.26667	13.96
T_3 Farmer's practice (Chloropyriphos + Cypermethrine 55 EC)	7.5	12.26
T_4 Untreated Control	10.4667	8.83333
SE (m)	1.32	1.50
CD	4.58	5.2

IV. CONCLUSION

Spraying 2 times of 5% neem seed extract + Flubendiamide 39.35 SC @ 50 ml/ha at vegetative and pod formation stage in 14 days intervals determined to be the best package in managing pod borer, reducing damage percentage in chickpea and enhance per hectare grain yield.

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Photograph of Experiment