Research Paper :

Evaluation of new insecticide molecules, botanicals and biopesticides against maize stem borer, *Chilo partellus* (Swinhoe) Crambidae: Lepidoptera

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SUMMARY

Field experiment was conducted at College of Agriculture, Navile, Shimoga, during *Kharif* 2007. There were six insecticidal treatments, one botanical and a biopesticide along with control, each of which replicated thrice in 6 x 3 meter plots. The insecticides were applied 40 days after sowing to strike the activity of insect pest on the crop. The results revealed that all the insecticides tested were effective in suppressing the stem borer. Indoxacarb 0.0145, lambda cyhalothrin 0.005 and cypermethrin 0.01 per cent spray showed higher efficacy in suppressing the stem borer. All other chemicals showed moderate to least effectiveness but they were significantly superior to untreated control.

Key words : Insecticide, Biopesticides, Maize stem borer

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Maize or corn (*Zea mays* Linn.) is one of the important cereal crops of the world, cultivated for food, fodder and for raw material in many industries. In many parts of the world, it is an important food crop providing daily bread for the rural population.

Stem borer, *Chilo partellus* (Swinhoe) is one of the major pests of maize and causes considerable yield loss. Heavy infestation may result in total loss of the crop leading to resowing during *Kharif* season. Chemical insecticides and biopesticides represent a major class of insecticides, which have been widely recognised and exploited for suppression of the pest. The variable results obtained with different *Bt* formulations suggest that insecticidal activities appeared different against a given target pest species (Brownbridge, 2001).

MATERIALS AND METHODS

To evaluate the efficacy of insecticides to control maize stem borer, an experiment was laid out at College of Agriculture, Navile, Shimoga, during *Kharif* 2007. There were six insecticidal treatments, one botanical and a biopesticide along with control, each of which replicated thrice in 6 x 3 meter plots. The insecticides were applied 40 days after sowing to strike the activity of insect pest on the crop. Efficacy of the treatments was judged based on per cent mortality of the stem borer after first, third and fifth day after application and pre- treatment counts of the pest were made by randomly selecting 10 plants in each plot a day prior to spraying. Finally, the data obtained were subjected for arc sin transformation and then statistically analyzed.

The treatment details for the management of maize stem borer were as follows:

Sr. No.	Treatments	Concentrations (%)	Trade name
1.	Bt-toxin(Dipel 8L)	0.008	Dipel
2.	Imidacloprid(17.8 SL)	0.0056	Confidar
3.	Cypermethrin 10EC	0.01	Cyperkill
4.	Lambda-cyhalothrin 5 EC	0.005	Karate
5.	Indoxacarb 14.5 SC	0.0145	Avaunt
6.	Endosulfan 35 EC	0.007	Thiodan
7.	Azadirachtin (1%)	0.20	Econeem
8.	Untreated control		

RESULTS AND DISCUSSION

Pre treatment count of stem borer per ten plants ranged from 11.66 to 21.30. The stem borer population reduced among all the treatments on different days of observation (Table 1). A day after imposition of treatment, indoxacarb 14.5 SC showed the highest

Table 1 : Efficacy of insecticides against maize stem borer *Chilo partellus*

Sr. No.	Treatments	Concentrations (%)	Pre count (mean no.of stem borer/10 plant)	Per cent mortality of maize stem borer		
				1DAA	3DAA	5DAA
1.	Bt-toxin (Dipel 8L)	0.008	19	54.87(47.78)	67.57 (55.65)	63.28 (52.78)
2.	Imidacloprid (17.8SL)	0.0056	17.33	34.95 (36.20)	31.81 (34.27)	25.29 (30.05)
3.	Cypermethrin 10EC	0.01	13.33	55.15 (47.95)	50.16 (45.08)	45.38 (42.33)
4.	Lambda-cyhalothrin 5 EC	0.005	18.50	60.70 (51.21)	69.86 (56.91)	73.58 (60.23)
5.	Indoxacarb 14.5 SC	0.0.145	19.00	91.31 (73.45)	82.54 (66.14)	77.45 (61.79)
6.	Endosulfan 35 EC	0.007	21.30	52.77 (46.59)	51.66 (45.66)	48.61 (44.28)
7.	Azadirachtin (1%)	0.20	11.66	44.96 (42.01)	54.77 (47.77)	64.20 (53.39)
8.	Untreated control		16.48	16.48 (23.10)	8.76 (16.99)	14.12 (21.53)
	S.E. $\pm$		NS	2.73	3.33	3.55
	C.D.(P=0.05)		-	8.27	10.09	10.77
	CV%		-	10.25	12.50	13.42

DAA- Days after application. NS-Non significant

Figures in parentheses are arc sin transformed values.

Treatment means showing similar alphabets in the columns.

mortality (91.30) per cent followed by lambda-cyhalothrin 5EC which showed 60.70 per cent mortality. However, cypermethrin 10EC, endosulfan 35 EC and Bt-toxin (Dipel 8L) were at par with each other showing the mortality of 55.15, 52.77and 54.87 per cent, respectively. Whereas the lowest per cent mortality was noticed in imdacloprid 17.80 SL and Azadiractin(1%) showing 34.95 and 44.96 per cent mortality (Table 1).

On third day after application, the highest mortality was observed in indoxacarb, Whereas the per cent mortality in pest population was slightly increased in lambda cyhalothrin, Dipel-8L and azadiractin(1%) spray when compared to the previous observation with mortality per cent of 69.86, 67.57 and 54.77, respectively. However, cypermethrin and endosulfan were at par showing the moderate mortality of 50.16 and 51.66 per cent. The lowest mortality was noticed in imdacloprid spray showing 31.81 per cent mortality.

The same trend of the highest mortality in stem borer population was noticed on fifth day after application incase of indoxacarb (77.45%) but it was low compared to third day. Whereas, Dipel-8L and lambda-cyhalothrin 5EC were at par bringing the highest mortality of 63.28 and 73.58 per cent, respectively. However, standard check endosulfan 35EC was superior over control.

The present findings on azadiractin (1%) spray are in agreement with Pareek and Batta (1993) who evaluated 12 plant products namely, neem oil, neem seed kernel, ghikanvar, garlic clove, oak, datura, lantana, papaya, tulsi seed, mint, henna and ipomea against *Chilo partellus* under laboratory conditions. Neem oil (1.0%) was most effective with highest mortality after 12, 24 and 48 hrs of treatment. Similarly, Bhanukiran and Panwar (2002) reported the effect of neem products, azadirectin and neemazal on the development of *Chilo partellus*. Neem products when added to artificial diet of *C. partellus* in the laboratory which adversely affected larval and pupal weights, prolonged developmental period from larva to adult, longevity of moths, reduced egg laying capacity of females and resulted in high egg mortality, whereas, the effect of neem products on sex ratio was not pronounced. Similarly, Agarwal *et al.* (1977) reported that Endosulfan 0.05 per cent, Phosphomidon 0.025 per cent and Ekadin 0.05 per cent were effective. But in the present investigation, imdachloprid 17.8 SL (0.03 per cent) spray tried against maize stem borer, was ineffective.

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