Efficacy of Newer Insecticides against Sucking Insect Pests of Okra

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Abstract

Field experiments were conducted during Kharif *2010 and 2011 to evaluate the efficacy of six newer insecticides against sucking insect pests on okra cv Arka Anamika. Thiamethoxam spraying recorded the lowest leafhopper population and all the six insecticides were significantly superior to control in both the years. Whitefly population was lowest in spiromesifen treated plots.*

Keywords: leafhopper, whitefly, coccinellid, sucking pest and okra

Introduction

In India, okra, *Abelmoschus esculentus* L. Moench (Malvaceae) is a commonly grown green vegetable cultivated throughout the year and it is ravaged by as many as 44 insect pests. Among the various insect pests, sucking pests like leafhopper, *Amrasca biguttula biguttula* Ishida and whitefly, *Bemisia tabaci* Gennadius pose a major threat, affecting the okra production. The yield loss due to leafhopper desapping in okra amounts to 54 to 66 per cent (Satpathy *et al*., 2004). The whitefly is most notorious among top hundred insect pests having a pandemic distribution and damaging many important crops including vegetables, tubers, fiber crops and ornamentals (Touhidul and Shunxiang, 2007; Abdel- Baky and Al-Deghairi, 2008). Apart from their direct damage by sucking plant sap, it is also known as the vector for deadly yellow vein mosaic virus. Due to its rapid movement from one plant to another, high reproductive potential and its living habitat, management of the pest is very difficult (Fouly *et al*., 2011). Farmers rely on conventional insecticides such as organophosphate; carbamate and synthetic pyrethroid to manage these sucking pests (Patel *et al*., 1997). The repeated use of systemic insecticides has resulted in the development of resistance in the insect pest, and disturbance to the agroecosystem by affecting the non targets (Dittrich *et al*., 1990). Hence, the present study was carried out to evaluate the efficacy of newer molecules with novel mode of action to find out a viable option for sustainable management of sucking insect pest of okra.

Materials and methods

The seeds of okra cv. Arka Anamika were sown by line sowing method during *Kharif* 2010 and 2011 in the experimental farm, Division of Entomology, Indian Agricultural Research Institute, New Delhi. After two weeks of sowing, the seedlings were thinned out and a spacing of 65 cm X 45 cm was maintained and good crop raised with standard agronomic practices. The experiment was laid out in a completely randomized block design and consisted of six insecticidal treatments and a control. All the treatments were replicated thrice. Three insecticidal sprays at fortnightly interval were given during each year and five plants were randomly selected and tagged in each plot for observing the insect population. The insect population counts were recorded from three leaves one at the top, middle and bottom from each plant. The population of leafhopper, whitefly and coccinellid counts were recorded one day prior to spraying and 1, 4, 7, 10 and 13 days after spraying (DAS). The population data were subjected to suitable statistical analysis with the help of SAS 9.2 Programme (Sandra and Ramon, 1987).

Results and discussion

Efficacy against leafhopper

The mean leafhopper population after the first spraying was lowest in the thiamethoxam treated plots during the years 2010 (3.61) and 2011(2.89) (Table 1). The second best treatment in both the years was acetamiprid (4.32 and 4.31

Table 1. Effect of different treatments against leaf hopper and whitefly on okra during *Kharif* 2010 and 2011

Treatment	Leafhopper population/plant/ three leaves*						Whitefly population/plant/ three leaves*					
	I spraying		II spraying		III spraying		I spraying		II spraying		III spraying	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
Thiamethoxam@ 35 g a.i. / ha	3.6 (2.03)^{a}	2.9 (1.84)^{a}	3.0 (1.88)^{a}	3.6 (2.02)^{a}	2.9 (1.84)^{a}	2.7 (1.79)^{c}	6.4 (2.62)^{b}	5.7 (2.49)^{a}	5.5 (2.44)^{ab}	4.9 (2.32)^{a}	4.6 (2.25)^{ab}	4.5 (2.24)^{a,b}
Buprofezin@ 60 g a.i. / ha	4.9 (2.32)^{c}	4.0 (2.12)^{b}	4.4 (2.21)^{bc}	4.3 (2.19)^{b}	4.0 (2.13)^{b}	1.8 (1.50)^{a}	7.5 (2.83)^{c}	8.0 (2.91)^{c}	6.4 (2.63)^{b}	6. 5 (2.56)^{b}	5.5 (2.45)^{b}	5.2 (2.39)^{b}
Pymetrozine@ 120 g a.i. / ha	4.3 (2.18)^{b}	4.5 (2.23)^{c}	5.3 (2.40)^{cd}	4.3 (2.18)^{b}	4.7 (2.28)^{bc}	2.1 (1.62)^{b}	7.7 (2.86)^{c}	7.2 (2.77)^{c}	6.2 (2.59)^{b}	6.0 (2.56)^{b}	5.4 (2.43)^{b}	6.1 (2.56)^{c}
Propargite@ 900 g a.i. / ha	5.5 (2.45)^{d}	5.0 (2.34)^{d}	5.9 (2.52)^{d}	5.4 (2.43)^{c}	5.1 (2.36)^{c}	2.5 (1.74)^{c}	8.6 (3.01)^{d}	7.0 (2.72)^{bc}	7.8 (2.87)^{c}	7.0 (2.73)^{c}	6.9 (2.71)^{c}	6.3 (2.60)^{c}
Spiromesifen@ 150 ga.i. / ha	4.8 (2.30)^{c}	4.6 (2.26)^{cd}	4.9 (2.32)^{c,d}	4.6 (2.24)^{b}	4.3 (2.18)^{b,c}	2.2 (1.63)^{b}	5.2 (2.38)^{a}	5.3 (2.40)^{a}	4.6 (2.25)^{a}	4.4 (2.21)^{a}	4.1 (2.14)^{a}	4.0 (2.12)^{a}
Acetamiprid@ 25 g a.i. / ha	4.3 (2.20)^{b}	4.3 (2.19)^{bc}	3.8 (2.06)^{ab}	4.1 (2.14)^{b}	3.1 (1.88)^{a}	1.9 (1.54)^{ab}	7.2 (2.77)^{c}	5.9 (2.53)^{ab}	4.9 (2.32)^{a}	6.3 (2.61)^{bc}	4.7 (2.27)^{ab}	4.6 (2.23)^{ab}
Control	11.5 (3.46)^{e}	11.5 (3.47)^{e}	13.2 (3.70)^{e}	10.2 (3.27)^{d}	10.7 (3.34)^{d}	9.8 (3.22)^{d}	17.8 (4.27)^{e}	17.4 (4.23)^{d}	18.6 (4.36)^{d}	18.9 (4.41)^{d}	13.4 (3.73)^{d}	16.8 (4.15)^{d}
SEm ±	0.10	0.11	0.12	0.09	0.11	0.13	0.13	0.13	0.15	0.15	0.11	0.15
CV	1.85	2.47	4.81	2.69	4.40	3.37	2.50	4.03	4.77	2.83	4.30	3.37
CD (P<0.05)	0.08	0.10	0.21	0.11	0.18	0.11	0.13	0.21	0.24	0.14	0.20	0.16

Three sprayings were given @ 15 days interval; *Mean of 5 post treatment observations
Figures in parentheses are square root transformed. In a column means followed by same letter are not significant different from each other by DMRT (P =0.05)

in 2010 and 2011 respectively). The present finding corroborates with Misra (2002) who also reported that the superiority of thiamethoxam among seven different insecticides used in the study. The lowest mean population in the second spraying in 2010 and 2011 was also recorded from the thiamethoxam followed by acetamiprid in both the years. During the third spraying of *Kharif* 2010, the lowest mean leafhopper population was again recorded from the thiamethoxam (2.89) followed by acetamiprid (3.05) (Table 1). The next best treatments buprofezin (4.03), spiromesifen (4.25) and pymetrozine (4.71) were on par with each other. But in third spraying of 2011 the lowest mean leafhopper population was recorded from buprofezin followed by acetamiprid, pymetrozine, spiromesifen and thiamethoxam. Hence thiamethoxam had given very good effective control in all the three sprayings. This is in accordance with the findings of Anitha (2007) who found that the thiamethoxam was superior in controlling leafhoppers in okra.

Efficacy against whitefly

Highest whitefly population was recorded in control during both the years while spiromesifen recorded the lowest population in 2010 and 2011. The mean whitefly population varied from 5.15 to 17.77 and 5.28 to 17.41 per three leaves/ plant in 2010 and 2011 respectively (Table 1). During both the years, spiromesifen treatment had recorded the lowest population while the plants in control have recorded the highest population of whitefly. The second best treatments were thiamethoxam (6.37 and 5.72/3 leaves/plant) and acetamiprid (7.20 and 5.91/3 leaves/ plant) in the years 2010 and 2011 respectively followed by buprofezin (7.49 and 7.96) and pymetrozine (7.69 and 7.20). Pymetrozine suppresses the stylet penetration by sucking insect pests especially homopterans hence leading to starvation and death (Kayser *et al*., 1994). The mean whitefly population during the second spraying in 2010 and 2011 was lowest in the spiromesifen (4.59 and 4.40, respectively) while the control has recorded the highest whitefly population in both the years.

After the third spraying in the years 2010 and 2011 spiromesifen recorded the lowest population of 4.08 and 4.00/3 leaves/ plant respectively (Table 1). The present result is in conformity with Wale and Chandele (2010), reported that spiromesifen was superior to acephate and dicofol in reducing the whitefly and mite in tomato. The highest population was recorded from the control (13.41 and 16.76/ 3 leaves/ plant) in 2010 and 2011 respectively. The mean population revealed that the spiromesifen had significantly reduced the whitefly population it was followed by thiamethoxam (4.56 and 4.52/3 leaves/ plant) and acetamiprid (4.68 and 4.49/3 leaves/ plant) in both the years.

The thiamethoxam and acetamiprid resulted in the effective management of leafhopper in okra followed by buprofezin and pymetrozine. Hence these biorationals offers as a good alternative to neonicotinoids. The spiromesifen was very effective in managing the whitefly in okra.

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