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EFFICACY OF NEWER INSECTICIDES AGAINST WHITEFLY (*Bemisia tabaci* Genn.) INFESTING OKRA UNDER FIELD CONDITIONS

R. S. Meena and M. A. Laichattiwar

Department of Entomology and Agricultural Zoology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi-221005, Uttar Pradesh, India E-mail: lmukesh932@gmail.com Corresponding Author: M. A. Laichattiwar

Abstract: *The experiment was conducted to evaluate the efficacy of eight insecticides against whitefly in okra. Two sprays of different insecticides viz., T1 Thiocloprid 10SC @ 0.3 ml/L, T2 Acetamiprid 20SP @ 0.5 ml/L, T3 Spinosad 45SC @ 0.2 ml/L T4 Imidacloprid 17.8SL @ 0.3 ml/L, T5 Thiamethoxam 25WG @ 0.1 g/L, T6 Novaluron 10EC @ 1 ml/L, T7 Cartap hydrachloride @ 1.2 g/L and T8 control. Spray was made at 15 days interval. This study revealed that amongst the treatments tested, the cumulative effect of foliar spray of Thiamethoxam 25 WG and imidacloprid 17.8SL were found best effective treatment and they were at par with each other. Followed by the thiocloprid 10SC and acetamiprid 20SP. The rest of the treatments were also found statistically superior over control.*

Keywords: *Efficacy, Insecticides, Okra and whitefly.*

Introduction: Okra (*Abelmoschus esculentus* L. Monech), commonly known as "Bhendi", is cultivated throughout India. Okra provides an important source of vitamins, calcium, potassium and other minerals, which are often lacking in the diet of developing and under developed countries. Besides various other factors for lower productivity, heavy damage is inflicted by major insect pests *viz.* leafhopper, *Amrasca biguttula biguttula* (Ishida), whitefly, *Bemisia tabaci* (Gennadius) and shoot and fruit borer, *Earias vittella* (Fabricius) Among these, whitefly, *Bemisia tabaci* (Gennadius) is a serious pest, known to be the vector of vein clearing disease [1]. The cultivation of okra in India received a setback due to yellow vein mosaic virus (YVMV) and enation leaf curl virus (ELCV), spread by the vector whitefly. The loss in marketable yield has been estimated at 50-94%, depending up on the stage of crop growth at which the infection occurs. Failure to control these pests in the initial stage causes a yield loss upto 54.04 per cent [2].

On the other hand it is established that use of chemicals form an important part of pest management strategies. There are many upcoming newer molecules having different mode of action and also being comparatively safe to non-target organisms and environment which are equally effective against the pests. Thus in the present investigation an attempt has been made to evaluate the efficacy of some newer insecticides against whitefly in Okra.

Materials and Methods

The present investigation was conducted at the experimental field of BHU Varanasi in the *kharif* season. The experiment was laid out in randomized block design with eight treatments replicated three time. Okra variety 'Kashi Pragati' was raised at a spacing of 60 cm × 45 cm in plots of size 4 x 3 m. Recommended agronomical practices except plant protection were followed for raising the crop. Two sprays were given at fortnightly interval. The treatments included T1 Thiocloprid 10SC @ 0.3 ml/L, T2 Acetamiprid 20SP @ 0.5 ml/L, T3 Spinosad 45SC @ 0.2 ml/L T4 Imidacloprid 17.8SL @ 0.3 ml/L, T5 Thiamethoxam 25WG @ 0.1 g/L, T6 Novaluron 10EC @ 1 ml/L, T7 Cartap hydrachloride @ 1.2 g/L and T8 Untreated check. The observations pertaining to population of whitefly was made on three leaves, each selected randomly on 10 plants from top, middle and bottom canopy. The population was recorded

before as well as 1, 5, 10 and 15 days after each treatment. Observations on whitefly adults were recorded without disturbing the plants to minimize the observational errors. The insect population was counted from three leaves of every randomly selected plant in every plot and population per 10 plants was noted. After that mean of three replications was calculated for each treatment. And the same was done with the untreated plot. Then percentage reduction was calculated by using the following formula.

$$\text{Per cent reduction in population} = \frac{\text{Population in treatment} - \text{Population in control}}{\text{Population in control}} \times 100$$

The data obtained on the pest was subjected to statistical analysis after suitable transformations as per statistical guidelines given [3].

Results and Discussion

First Spray: The population recorded one day before first application revealed that there is no significant variation among different treatments including untreated check. The population of whiteflies ranged between 57.67 and 62.33 per ten plants. Significant reduction in whitefly population was noticed 1, 5, 10 and 15 days after application of insecticides compared to untreated control (table 1).

Table no 1. Efficacy of treatments against whitefly after first spray

Treatments	Dose	Pretreatment population/ 10 plants	Percentage reduction of Population over control				
			1DAT	5DAT	10DAT	15DAT	Mean efficacy
T_1 Thiocloprid 10SC	0.3 ml/L	57.67	51.32(45.75)	93.85(75.64)	79.85(63.32)	40.73(39.65)	66.43(54.59)
T_2 Acetamiprid 20SP	0.5 ml/L	58.33	47.15(43.36)	93.51(75.24)	75.79(60.52)	38.03(38.07)	63.62(52.90)
T_3 Spinosad 45SC	0.2 ml/L	61.67	9.83(18.27)	8.71(17.16)	4.32(11.99)	5.27(13.27)	7.03(15.37)
T_4 Imidacloprid 17.8SL	0.3 ml/L	58.00	66.81(54.82)	97.52(80.93)	91.06(72.60)	54.37(47.50)	77.44(61.64)
T_5Thiamethoxam 25WG	0.1 g/L	62.33	66.32(54.52)	98.15(82.18)	91.36(72.90)	54.81(47.76)	77.66(61.79)
T_6 Novaluron 10EC	1 ml/L	59.33	8.43(16.17)	8.37(16.81)	8.26(16.70)	13.74(21.75)	9.70(18.14)
T_7 Cartap hydrachloride 50 SP	1.2 g/L	57.67	39.99(39.22)	91.26(72.80)	70.57(57.14)	31.24(33.98)	58.26(49.75)
T_8 Untreated check		59.67	0.00	0.00	0.00	0.00	
F test		NS	Sig.	Sig.	Sig.	Sig.	
SEm±			0.50	0.43	0.83	0.60	
CD (P=0.05)			1.52	1.29	2.52	1.83	

Values in parentheses are angular transformed values Sig.: Significant NS: Non Significant DAT: Days after Treatment

The overall efficacy after first spraying against whitefly revealed that thiamethoxam (77.66%) and imidacloprid (77.44%) being at par were the best and the most effective treatments and significantly superior over all other treatments by recording highest per cent reduction of whitefly population over control. These were followed by thiacloprid with 66.43 per cent reduction of whitefly population over control. The next best treatments were acetamiprid (63.62%) and cartap hydrochloride (58.26%) and were significantly superior over control. followed novaluron with 9.70 per cent and spinosad was the least effective treatment with 7.03 per cent reduction of population. However all the treatments were significantly superior over the untreated control in reducing the whitefly population on okra.

Second Spray: The same trend of effectiveness of insecticides was observed during second spray. The mean efficacy of the four observations at one, five, ten and fifteen days after spraying showed that thiamethoxam (74.36%) and imidacloprid (72.04%) were best and most effective treatments and significantly superior over all the other treatments by recording highest per cent reduction of population of whitefly over untreated control. The next best treatment was thiocloprid with 61.48 per cent population reduction and was significantly superior to the remaining treatments. The treatments that followed closely were acetamiprid and cartap hydrochloride, significantly superior over control by recording, 59.50 and 54.76 per cent reduction, respectively, followed by novaluron (8.94%) and spinosad (6.03%) was the least effective amongst all the treatments. However they are significantly superior over control in reducing the whitefly population on okra (table 2).

Table No 2. Efficacy of treatments against whitefly after second spray

Treatments	Dose	Pretreatment population/ 10 plants	Percentage reduction of Population over control				
			1DAT	5DAT	10DAT	15DAT	Mean efficacy
T_1 Thiocloprid 10SC	0.3 ml/L	52.67	49.29(44.59)	84.94(67.16)	73.90(59.27)	37.91(38.00)	61.48(51.63)
T_2 Acetamiprid 20SP	0.5 ml/L	53.33	45.49(42.41)	82.67(65.39)	72.84(58.59)	37.03(37.48)	59.50(50.47)
T_3 Spinosad 45SC	0.2 ml/L	51.33	7.67(16.07)	6.89(15.21)	4.65(12.45)	4.92(12.81)	6.03(14.21)
T_4 Imidacloprid 17.8SL	0.3 ml/L	54.33	61.27(51.51)	94.28(76.16)	83.45(65.99)	49.16(44.51)	72.04(58.07)
T_5 Thiamethoxam	0.1 g/L	51.00	62.74(52.38)	92.22(73.80)	85.67(67.75)	56.81(48.91)	74.36(59.57)

25WG							
T_6 Novaluron 10EC	1 ml/L	52.33	7.84(16.26)	7.22(15.58)	9.29(17.74)	11.44(19.76)	8.94(17.39)
T_7 Cartap hydrachloride 50 SP	1.2 g/L	51.00	36.74(37.31)	86.41(68.36)	68.23(55.69)	27.49(31.62)	54.76(47.73)
T_8 Untreated check		NS	0.00	0.00	0.00	0.00	0.00
F test			Sig.	Sig.	Sig.	Sig.	
SEm±			0.30	0.47	0.39	0.30	

Values in parentheses are angular transformed values Sig.: Significant NS: Non Significant DAT: Days after Treatment

The present findings are in confirmation with the findings [4] who reported that Thiamethoxam 5 SG @ 0.2 g/l was effective on whiteflies compared to untreated control. Similar results were reported [5] who reported the effectiveness of Thiamethoxam 25 WG. The effectiveness of imidacloprid is in line with the findings [6] also reported that imidacloprid @ 0.0053% was found effective against whitefly *B. tabaci* in okra. Moreover, imidacloprid 200 SL @ 100 g a.i./ha had increased yield of okra upto 42% by controlling whitefly [7]. Also reported that spray of imidacloprid @ 0.004 % starting from 20 day after emergence on okra recorded least cumulative average population of whiteflies *i. e.*, 1.13 per leaf [8].

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