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EFFECT OF DIFFERENT DOSES OF NEWER INSECTICIDES AGAINST SUCKING PESTS OF OKRA

S. R. PATIL[1], G. K. LANDE[2], NIKITA S. AWASTHI[3]* AND U. P. BARKHADE[1]
[1]Department of Agricultural Entomology,
Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola - 444 104, Maharashtra, INDIA
[2]Department of Agricultural Entomology, Tamil Nadu Agriculture University,
Coimbatore - 641 003, Tamil Nadu, INDIA
e-mail: nikita.agri19@gmail.com

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***Corresponding author**

ABSTRACT

Field experiment was conducted to evaluate and validate the efficacy of some new insecticides against sucking insect pest's viz., leafhopper, aphid and whitefly in okra. Three sprays of different insecticides viz., Thiamethoxam 25 WG, Lambda cyhalothrin 5 EC and Triazophos 40 EC, at three different concentrations of Thiamethoxam 25 WG, Lambda cyhalothrin 5 EC and Triazophos 40 ECwere made at 15 days interval. This study revealed that, amongst the treatments tested, the cumulative effect of foliar spray of Thiamethoxam 25 WG @ 0.006% was found the most effective against aphids, followed by Lambda cyhalothrin 5 EC @ 0.004%. While, Thiamethoxam 25 WG @ 0.006% was effective against leafhoppers population followed by Thiamethoxam 25 WG @ 0.008%. Also, in case of whitefly the effective treatment recorded was Thiamethoxam 25 WG @ 0.006%. The recommended doses of insecticides were found more effective than other doses.

INTRODUCTION

Pesticides, as a key component for the management of crop pests, a number of chemical insecticides are mostly sprayed on the vegetable crops. But continuous, injudicious and indiscriminate use of insecticides by farmers resulted in resistance development, resurgence of pests and destruction of natural enemies and pollution in environment.Most of the farmers are now experiencing that the recommended doses of largely used insecticides could not give the expected control of sucking pests. For overcoming these pest problems, farmers undertake 4-6 sprays of insecticides injudiciously against sucking pests, out of which 30 to 40% sprays compose of nicotinoid insecticides, followed by insecticides from organophosphates and synthetic pyrethroid groups.

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.In India, okra occupies an area of about 3, 70,000 ha with production of 3550 million tones and productivity of 95.94 q/ha (Anonymous, 2004).In India, okra is commercially grown in the states of Gujrat, Maharashtra, Andra Pradesh, West Bengal, Bihar, Orissa, Jharkhand, Uttar Pradesh, Tamil Nadu, Karnataka, Harayana, Punjab and Assam. In Maharashtra, okra occupies a prominent position among vegetables covering an area of 19,000 ha with an annual production of 224 thousand metric tons (Anonymous, 2011). The fruits are harvested when immature and eaten as a vegetable. The roots and stems of okra are used for cleaning the cane juice from which gur or jaggery is prepared. The crop is also used in paper industry as well as for the fiber extraction. One of the limiting factors in cultivation of okra is the damage caused by various insect pests. Among 72 species of insects infesting the crop, the sucking pest viz., Aphids (*Aphis gossypii* Glover), leafhopper (*Amrasca biguttula biguttula* Ishida) and whitefly (*Bemisia tabaci* Gennadius) are the most important which cause significant yield reduction. Aphids and leafhopper are important pests in the early stage of the crop which desap the plants, making them weak which results in reduced flowering and poor fruit setultimately reduction in yield. 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 (Chaudhary and Dadeech, 1989). Krishnaiah (1980) reported about 40-56 per cent losses in okra due to leafhopper.In order to overcome these problems and keeping in view, the importance of okra crop, the present studies were undertaken to validate and test the efficacy of different doses of newer insecticides against sucking pest of okra.

MATERIALS AND METHODS

The present investigation was conducted at the experimental field of Department of Entomology, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during *Kharif*2012.Akola (Maharashtra) is located at latitude 20.7º North and longitude 77.07º East with an altitude of 282 m above mean sea level. Akola has a tropical climate with hot dry summer. The experiment was laid out in randomized block design with ten treatments replicated three times. Okra variety 'Akola bahar' was raised at spacing of 60 cm × 45 cm in plots of size 4.8 x 2.7 m. Recommended agronomical practices exceptplant protection were followed for raising the crop. Three sprays were given at fortnightly interval. The treatments included Thiamethoxam 25 WG @ 0.006%, 0.008% and 0.009%, Lambda cyhalothrin 5 EC @ 0.004%, 0.005% and 0.006%, Triazophos 40 EC @ 0.025%, 0.031 and 0.04% and untreated control.The observations on population of sucking insect pests (aphid, leafhopper, whitefly) were made on three leaves,each selected randomly on 5 plants from top, middle and bottom canopy.The sucking insect pest's population was recorded before as well as3, 7 and 10 days after each. Observations on whitefly adults were recorded without disturbing the plants to minimize the observational errors. Population of sucking pest was recorded from each net plot and population was worked out per leaf. Okra green fruits were collected at each picking and weighed separately from each net plot area. At the end of last picking, total yield from each net plot was calculated and computed on hectare basis (q/ha).The data obtained on the pests and fruit yield was subjected to statistical analysis after suitable transformations as per statistical guidelines given by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Efficacy of different doses of insecticides against sucking pests of okra

Aphid (*Aphis gossypii* Glover)

The pooled data (Table 1) indicates that the aphid population in different treatments 1 day before spraying of insecticides did not differ significantly. Significant reduction in aphid population was noticed at 3, 7 and 10 days after application of insecticides compared to untreated control. Average population of aphids/leaf after three sprays in all treated plots was (2.14 to 3.01) and significantly superior over untreated control (8.69). The average aphids population count was lowest in the treatment Thiamethoxam 25 WG @ 0.006% (2.14 aphids/leaf) followed by the treatments, Lambda cyhalothrin 5 EC @ 0.004% (2.40 aphids/leaf), Thiamethoxam 25 WG @ 0.008% (2.46 aphids/leaf), Thiamethoxam 25 WG @ 0.009% (2.66 aphids/leaf), Lambda cyhalothrin 5 EC @ 0.005% (2.67 aphids/leaf), Triazophos 40 EC @ 0.025% (2.78 aphids/leaf), Triazophos 40 EC @ 0.031% (2.90 aphids/leaf), Lambda cyhalothrin 5 EC @ 0.006% (2.95 aphids/leaf) and Triazophos 40 EC @ 0.04 % (3.01 aphids/leaf) all at par with each other. Maximum average aphids/leaf population was recorded in untreated control (8.69 aphids /leaf). The treatment with Thiamethoxam 25 WG @ 0.006 % was found the most effective against aphids. Our results are supported by the findings of Ghoshal *et al.* (2013) who found that Thiamethoxam

Table 1: Effect of different doses of some newer insects on sucking pest population of Okra

S.n.	Treatments	%Conc.	Number of Aphids/ leaf					Number of Leafhoppers/ leaf					Number of Whitefly/ leaf				
			1 DBT*	3 DAT**	7 DAT**	10 DAT**	Mean	1 DBT*	3 DAT**	7 DAT**	10DAT**	Mean	1 DBT*	3 DAT**	7 DAT**	10DAT**	Mean
1	Thiamethoxam 25 WG	0.006	7.23(2.69)	1.59(1.26)	1.55(1.25)	3.26(1.81)	2.14(1.46)	13.69(3.70)	0.89(1.18)	1.55(1.24)	7.29(2.70)	3.23(1.80)	2.42(1.55)	0.64(1.07)	0.35(0.92)	0.45(0.97)	0.48(0.99)
2	Thiamethoxam 25 WG	0.008	7.13 (2.67)	1.34 (1.16)	1.98 (1.41)	4.06 (2.01)	2.46(1.57)	15.51(3.94)	0.79(1.14)	1.58(1.26)	9.47(3.08)	3.94(1.98)	2.60(1.61)	0.43(0.96)	0.71(1.10)	0.75(1.12)	0.63(1.06)
3	Thiamethoxam 25 WG	0.009	7.95 (2.82)	1.07 (1.04)	2.25 (1.50)	4.64 (2.15)	2.66(1.63)	15.70(3.96)	0.69(1.09)	1.61(1.27)	9.96(3.16)	4.09(2.02)	2.69(1.64)	0.45(0.98)	0.69(1.09)	1.26(1.32)	0.80(1.14)
4	Lambda-cyhalothrin 5EC	0.004	8.10 (2.85)	1.83 (1.35)	1.82 (1.35)	3.55 (1.88)	2.40(1.55)	14.88(3.86)	2.05(1.60)	1.96(1.40)	8.45(2.91)	4.15(2.04)	3.04(1.74)	0.66(1.08)	0.42(0.96)	0.72(1.10)	0.60(1.05)
5	Lambda-cyhalothrin 5EC	0.005	8.24 (2.87)	1.33 (1.15)	2.37 (1.54)	4.30 (2.07)	2.67(1.63)	16.73(4.09)	1.72(1.49)	1.79(1.34)	9.81(3.13)	4.44(2.11)	2.81(1.68)	0.52(1.01)	0.54(1.02)	0.78(1.13)	0.61(1.06)
6	Lambda-cyhalothrin 5EC	0.006	9.72 (3.12)	1.22 (1.10)	2.95 (1.72)	4.68 (2.16)	2.95(1.72)	16.91(4.11)	1.68(1.48)	1.84(1.36)	10.60(3.26)	4.71(2.17)	2.86(1.69)	0.37(0.93)	0.67(1.08)	1.18(1.30)	0.74(1.11)
7	Triazophos 40 EC	0.025	7.36 (2.71)	1.88 (1.37)	2.30 (1.52)	4.17 (2.04)	2.78(1.67)	16.29(4.04)	2.41(1.71)	2.29(1.51)	8.86(2.98)	4.52(2.13)	2.98(1.73)	0.55(1.02)	0.50(1.00)	1.02(1.23)	0.69(1.09)
8	Triazophos 40 EC	0.031	8.31 (2.88)	1.39 (1.18)	2.85 (1.69)	4.45 (2.11)	2.90(1.70)	17.21(4.15)	2.32(1.68)	2.27(1.51)	10.52(3.24)	5.04(2.24)	2.68(1.64)	0.54(1.02)	0.74(1.11)	1.17(1.29)	0.82(1.15)
9	Triazophos 40 EC	0.04	8.76 (2.96)	1.31 (1.15)	3.03 (1.74)	4.69 (2.17)	3.01(1.74)	17.26(4.15)	1.82(1.52)	2.12(1.46)	11.97(3.46)	5.30(2.30)	2.95(1.72)	0.47(0.98)	0.73(1.11)	1.32(1.35)	0.84(1.16)
10	Untreated Control	-	9.55 (3.09)	7.29 (2.70)	9.03 (3.00)	9.74 (3.12)	8.69(2.95)	14.86(3.85)	7.97(2.91)	9.28(3.05)	17.22(4.15)	11.49(3.39)	2.97(1.72)	4.33(2.20)	4.55(2.25)	4.84(2.31)	4.57(2.25)
	F test		N.S.	Sig	Sig	Sig	-	N.S.	Sig	Sig	Sig	-	N.S.	Sig	Sig	Sig	-
	SE (m) ±		0.69	0.20	0.29	0.39	0.29	1.20	0.18	0.11	0.53	0.27	0.17	0.08	0.09	0.14	0.10
	CD at 5%		-	0.59	0.87	1.15	0.87	-	0.53	0.32	1.60	0.81	—	0.23	0.26	0.41	0.30

**Figures in parentheses are $\sqrt{x + 0.5}$ transfomed values; DBT – Days before treatment; DAT – Days after treatment

Table 2: Effect of different doses of some newer insects on green fruit yield of Okra

Tr.No.	Treatments	Conc. (%)	Fruit yield kg /plot*
1	Thiamethoxam 25 WG	0.006	4.280(66.05)
2	Thiamethoxam 25 WG	0.008	4.270(65.89)
3	Thiamethoxam 25 WG	0.009	4.265(65.81)
4	Lambda-cyhalothrin 5EC	0.004	3.805(58.71)
5	Lambda-cyhalothrin 5EC	0.005	3.800(58.64)
6	Lambda-cyhalothrin 5EC	0.006	3.795(58.56)
7	Triazophos 40 EC	0.025	3.280(50.62)
8	Triazophos 40 EC	0.031	3.270(50.46)
9	Triazophos 40 EC	0.04	3.262(50.34)
10	Control	-	2.190(33.79)
	F testSE (m)±CD at 5%		Sig.0.200.60

*values in parentheses q/ha of okra green fruit yield.

25 WG was effective against aphid in okra. Gavkare *et al.* (2013) found that, on the basis of LC50 value, Thiamethoxam was the most toxic insecticide against green peach aphid *Myzus persicae*. Our results are in collaboration with the results of Rudramuni *et al.* (2011) who reported Triazophos and Lambda cyhalothrin as effective insecticides for the control of cotton aphid.

Leafhopper (*Amrasca biguttula biguttula* Ishida)

The results represented in table 1. reveals that the leafhopper population in different treatments 1 day before spraying of insecticides did not differ significantly. Significant reduction in leafhopper population was noticed at 3, 7 and 10 days after application of insecticides compared to untreated control. Average population of leafhoppers/leaf after three sprays in all treated plots was (3.23 to 5.30) significantly lower and superior than untreated control plot (11.49). The leafhoppers population count was lowest in the treatment Thiamethoxam 25 WG @ 0.006% (3.23 leaf hoppers/leaf) and it was statistically followed by the treatment Thiamethoxam 25 WG @ 0.008% which recorded 3.94 leafhoppers/leaf. Other treatments with Lambda cyhalothrin 5 EC and Triazophos 40 EC were also found effective in reducing the leafhopper population significantly over control and were at par with each other. Untreated control was recorded highest number of leafhoppers/leaf population (11.49). Sinha and Sharma (2007) reported that the foliar spray of Thiamethoxam 25 WG @ 20 g a.i./ha at 30 days of sowing was found effective in managing leafhopper (*Amrasca biguttula biguttula*) population on okra. Also the foliar spray of Thiamethoxam 25 WG @ 25 g a.i./ha was effective at 50 days after sowing followed by lambda-cyhalothrin 5 EC @ 50 g a.i./ha against leafhoppers. Similarly, Bharpoda *et al.* (2014) found that Thiamethoxam 25 WG @ 0.0125% was significantly superior insecticide in reducing the populationof leafhopper in cotton.

Whitefly (*Bemisia tabaci* Gennadius)

The whitefly population in different treatments 1 day before spraying of insecticides did not differ significantly. Significant reduction in whitefly population was noticed 3, 7 and 10 days after application of insecticides compared to untreated control. Average population of whiteflies/leaf after three sprays in all treated plots (0.48 to 0.84) was significantly lower than untreated plot (4.57). The average whitefly population count was the lowest in the treatment Thiamethoxam 25 WG @ 0.006% which recorded the minimum 0.48 whiteflies/leaf. The next effective treatments were Lambda cyhalothrin 5 EC @ 0.004%, Lambda cyhalothrin 5 EC @ 0.005%, Thiamethoxam 25 WG @ 0.008%, Triazophos 40 EC @ 0.025%, Lambda cyhalothrin 5 EC @ 0.006%, Thiamethoxam 25 WG @ 0.009%, Triazophos 40 EC @ 0.031% and Triazophos 40 EC @ 0.04% which recorded 0.60, 0.61, 0.63, 0.69, 0.74, 0.80, 0.82 and 0.84 whiteflies/leaf, respectively. The highest whiteflies/leaf population recorded in untreated control (4.57) (Table 1). The cumulative average results regarding the (T1) Thiamethoxam 25 WG @ 0.006% were at par with all the other treatments and superior over (T10) untreated control against whitefly population on okra. Our findings are in confirmation with the findings of Rohini *et al.* (2012) who reported that Thiamethoxam 5 SG @ 0.2 g/l was effective on whiteflies compared to untreated control. Similar results were reported by Mohansundaram and Sharma (2011) who reported the effectiveness of Thiamethoxam 25 WG. The results are supported by the results of Khan (2011) who found Triazophos 40 EC and Lambda cyhalothrin 2.5 EC effective against whitefly and leafhoppers.

Effect of different doses of insecticides on green fruit yield

The data on fruit yield represented in table 2.showsthat all treatments gave significantly higher green fruits yield of okra over untreated control (33.79 q/ha). However, highest yield of okra fruits (66.05 q/ha) was obtained from Thiamethoxam 25 WG @ 0.006% followed by the treatments Thiamethoxam 25 WG @ 0.008% and Thiamethoxam 25 WG @ 0.009% which were at par with each other. The next best treatment was Lambda cyhalothrin 5 EC @ 0.004% followed by the treatments Lambda cyhalothrin 5 EC @ 0.005% and Lambda cyhalothrin 5 EC @ 0.006% which were at par with each other. The next better treatment was Triazophos 40 EC @ 0.025% and at par with the treatments Triazophos 40 EC @ 0.031% and Triazophos 40 EC @ 0.04% (50.34 q/ha). The lowest yield was recorded in the untreated control (33.79 q/ ha).Similar results were found by Anitha and Nandihalli (2009) who evaluated the efficacy of Thiamethoxam 25 WG (0.2 g/ lit.) when applied as foliar sprays and registered highest fruit yield. Similarly, Venkataravanappa *et al.* (2012) reported that Thiamethoxam 25 WG gave highest fruit yield of okra.

REFERENCES

Anitha, K. R. and Nandihalli, B. S. 2009. Bioefficacy of newer insecticides against leafhopper and aphid in okra. *Karnataka J. Agricultural Sciences*. **22(3):** 714-715.

Anonymous 2004. FAO Stat. Citation.

Anonymous 2011. Indian Horticulture Database - 2011

Bharpoda, T. M., Patel, N. B.,Thumar, R. K., Bhatt, N. A.,Ghetiya, L. V., Patel, H. C. and Borad, P. K. 2014. Evaluation of insecticides against sucking insect pests infesting bt cotton BG- II. *The Bioscan*. **9(3):** 977-980.

Chaudhary, H. R. and Dadeech 1989. Incidence of insect attacking okra and the available losses caused by them. *Ann. Arid Zone*. **28(3):** 305-307.

Gavkare, O., Kumar, S., Sharma, N. and Sharma, P. L. 2013. Evaluation of some novel insecticides against *myzus persicae* (Sulzer). *The Bioscan*. **8(3):** 1119-1121.

Ghosal, A., Chatterjee, M. L. and Bhattacharyya, A. 2013. Bio-Efficacyof neonicotinoids against *Aphis gossypii* Glover of okra. *J. Crop. and Weed.* **9(2):** 181-184.

Gomez, K. A. and Gomez, A. A. 1984. Statistical procedures for agricultural research, 2nd edition, Awileyinterscience publication, *J.Wiley and Sons,* New York. pp. 302-307.

Khan, S. M. 2011. Varietal performance and chemical control used as tactics against sucking insect pests of cotton. *Sarhad J. Agriculture.* **27(2):** 255-261.

Krishnaiah, K. 1980. Methodology for assessing crop losses due to pests of vegetable. Assessment of crop losses due to pests and diseases. *In* Proc. *of Workshop held from Sept, 19-30, 1977 at U.A.S., Bangalore.* pp. 259-267.

Mohanasundaram, A. and Sharma, R. K. 2011. Effect of newer pesticide schedules on the population of suckingpests and predators on okra. *Pesticide Research J.* **23(1):** 55-63.

Rohini, A., Prasad, N. V. V. S. D. and Chalam, M. S. V. 2012. Management of major suckingpests in cotton by insecticides. *Annals of Plant Protection Sciences.* **20(1):** 102-106.

Rudramuni, T., Srinivas Reddy, K. M. and Ashok Kumar, C. T. 2011. Bio-efficacy of new insecticidal molecules against insect-pests of cotton. *J. Farm Sciences.* **1(1):** 49-58.

Sinha, S. R. and Sharma, R. K. 2007. Efficacy of neonicotinoids against okra insect pests. *Pesticide Research J.* **19(1):** 42-44.

Venkataravanappa, V., Krishnareddy, M., Lakshinimarayanreddy, C. N and Salil Jalali, 2012. Managament of okra YVM disease through neem product and insecticides. *Annals of Plant Protection Science.* **19(2):** 487-488.