International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 5 Sep-Oct 2022, pp: 486-489 www.ijprajournal.com ISSN: 2456-4494

Efficacy of different biopesticides against sucking pests infesting okra (Abelmoschus esculentus L. Moench)

Akshay M. Kekan, Dr. S. S. Gurav, Dr. P. B. Sanap, Anand M Panchare
Department of Agril. Entomology, College of Agriculture Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth Dapoli. Dist. Ratnagiri, Maharashtra, India.
Assistant professor, Department of Agri. Entomology, College of Horticulture, Mulde. Sindhudurg, Maharashtra, India.
Vegetable specialist, Vegetable Improvement Scheme, Central Experiment Station, Wakavali. Ratnagiri, Maharashtra, India.
Department of Agril. Entomology, College of Agriculture Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth Dapoli. Dist. Ratnagiri, Maharashtra, India.

Submitted: 16-09-2022 Accepted: 26-09-2022

ABSTRACT: In order to examine the efficacy of different biopesticides against sucking pests of okra, a field study was taken at Central Experimental Station Wakawali, during kharif, 2019-2020. Three important pests were found infesting okra including leaf hopper, aphid and whitefly. The results revealed that Azadirachtin 1% EC @ 0.003 per cent was the best treatment which was recorded minimum (3.07) mean leaf hopper population per three leaves and followed by treatment Lecanicillium lecanii @ 5gm/lit recorded (3.48). For aphidLecanicillium lecanii @ 5gm/lit was the best treatment which was recorded minimum (6.28) mean aphid population per three leaves and was followed by treatment Azadirachtin 1% EC @ 0.003 per cent recorded (6.65).The treatment Lecanicillium lecanii @ 5gm/lit was the best treatment which was recorded minimum (2.58) mean whitefly population per three leaves and was followed by treatment Azadirachtin 1% EC @ 0.003 per cent (2.72) and Beauveria bassiana @ 5g/lit (3.17).

I. INTRODUCTION

Okra (Abelmoschus esculentus L. Moench) belonging to family Malvaceae is an important vegetable in India and cultivated for its immature fruits. The 25^0C to 35^oC is the optimum range of temperature for successful cultivation of okra. Soil with good moisture holding capacity, well drained and pH should be 5.8 to 7.0 is ideal for its successful cultivation. It has good nutritional value. Per 100 g of edible portion of okracontaincalories35.0,Moisture89.6gm,Carbohydrates6.4gm,Protein1.9gm, Fat 0.2 gm, Fibre 1.2 gm, Minerals 0.7 gm, Phosphorus 56.0 mg, Sodium 6.9 m g , Sulphur 30.0 mg, Calcium 66.0 mg, Iron 1.5 mg, Potassium 103 mg, Magnesium 53 mg, Copper 0.19 mg, Riboflavin 0.01 mg, Thiamine 0.07 mg, Nicotinic acid 0.06 mg, Vitamin C 13.10 mg, Oxalic acid 8.0 mg (Gopalan et al., 2007). Okra has vital role in curing of health problems as it possesses many antidiabetic, antipyretic, diuretic & antispasmodic properties etc. (Roy et al., 2014). India ranks second in terms of vegetable production in the world with the production of about 169.1million tonnes with an area of 10.1 million hectares, while it occupies the first position in okra production which is about 67% of the total world's production (Anonymous, 2015-16a).

In India, the total area under okra is 5.09 lakh hectares with an annual production of 60.94 lakh tons with productivity of 11.97 tons' ha^{-1} (Anonymous, 2017-18b) Although okra is a rich source of nutrients but in addition to this, it also serves as the house of pest and diseases. As high as 72 species of insects has been recorded on okra (Srinivasa and Rajendra, 2003) of which among the sucking pest complex, leaf hopper Amrasca biguttula biguttula (Ishida) is a major concern and cause havoc damage. Leafhopper alone had caused 59.79 per cent losses in okra fruit yield (Atwal & Singh, 1990).

The sucking pests suck the cell sap from the ventral surface of the leaves and in addition inject the toxic saliva into the plant tissues leading to yellowing and curling of leaves (Singh et al, 2013). In general, overall damage due to insect pests amounts to 48.97 per cent loss in pod yield (Kanwar and Ameta,2007). The present day pest management emphasizes on holistic approach that cares for plant, pest, beneficial organisms as well as environment. Keeping this in view, the present investigation was undertaken to evaluate the efficacy of different biopesticides against sucking pests infesting okra.

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 5 Sep-Oct 2022, pp: 486-489 www.ijprajournal.com ISSN: 2456-4494

II. MATERIAL AND METHODS

Field trail was conducted during kharif season 2019-2020 at Vegetable Improvement Scheme, Central Experiment Station, Wakavali. Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli. The experiment was laid out in Randomized Block Design (RBD) with three replications. Each replication consists of eight treatments. Viz., T^1 Beauveria bassiana @ 5gm/lit of water, T^2Metarhizium anisopliae @5gm/lit of water, T^3Lecanicillium lecanii @ 5gm/lit of water, T^4Pongamia pinnata 2% EC @2 ml/lit of water, T^5 Azadirachtin 1% EC @ 3ml/lit of water, T^6 Soapnut Liquid Extract 5% @ 5ml/lit of water, T^7 Chilli Garlic Extract 5% @ 5ml/li of water and T^8 untreated control, replicated thrice in 2.25 x 3.0 $m^2$with a spacing of 45 × 30 cm. The okra (cv. Varsha uphar) was raised as per recommended package of practices.The first spray was given when crop is 40 days old and second spray were given after 15 days of first spray. The observations were recorded on five randomly selected and tagged plants in each treatment, a day before application of pesticides as pretreatment observations and post treatment observations at 3^{rd},7^{th}, 10^{th} and 14^{th} days after each spray for leaf hopper, aphid and whitefly.

III. RESULT AND DISCUSSION

The result of effectiveness of different biopesticidal treatments against sucking pests of okra showed that all the treatments were significantly superior over control in terms of reductions of pest populations.

Leaf hopper (Amarasca biguttula biguttula)

The results regarding overall mean of two sprays against leaf hoppers infesting okra revealed that the treatment Azadirachtin 1% EC @ 0.003 per cent was the best treatment which was recorded minimum (3.07) mean leaf hopper population per three leaves and was at par with treatment Lecanicillium lecanii @ 5gm/lit recorded (3.48). The treatment Pongamia pinnata 2% EC @ 2ml/lit recorded (4.23) mean leaf hopper population and was at par with treatments Beauveria bassiana @ 5g/lit (4.33), Metarhizium anisopliae @ 5g/lit (4.67) and chilli garlic extract @ 5 per cent (4.67). The treatment Soap nut liquid extract @ 5 per cent recorded (5.64) leaf hopper mean population per three leaves. All the above treatments were found to be superior over untreated control which recorded highest mean leaf hopper population (8.81) per three leaves.

The present investigations are inconformity with Mann et al. (2001) revealed that neemazal (1%) and rakshakgold (1%) both these insecticides persisted for 6-12 days and found to suppress B. tabaci below economic threshold level.Also Danielet al. (2014) reported that use of Neemazal T/S was effective against aphids and leafhoppers in greenhouse sweet pepper and tomato production in Switzerland.

Aphid (Aphis gossypiiGlover)

The results regarding overall mean of two sprays against aphids infesting okra revealed that the treatment Lecanicillium lecanii @ 5gm/lit was the best treatment which was recorded minimum (6.28) mean aphid population per three leaves and was at par with treatment Azadirachtin 1% EC @ 0.003 per cent recorded (6.65) The treatment Beauveria bassiana @ 5g/lit recorded 7.85 mean aphid population and was at par with treatments Pongamia pinnata 2% EC @ 0.1 per cent (7.77), chilli garlic extract @ 5 per cent (7.98), soapnut liquid extract @ 5 per cent (8.08) and Metarhizium anisopliae @ 5g/lit (8.41). All the above treatments were found to be superior over untreated control which recorded highest mean aphid population 11.83/three leaves.

The present investigations are more or less similar with Bade et al., (2017)were revealed that use of V. lecanii @ 2.5 kg/ha alone was found effective in controlling population of aphids on okra with minimum mortality of lady bird beetles as compared to other insecticides. Khalil et al. (2007) repotorted that Verticillium lecanii (Zimm.) against the aphid on cucumber in the glasshouse and Control of M. persicae was rapid and reached 100% in 25 days.

Whitefly(Bemisia tabaci Genn.)

The data on mean population of whitefly per three leaves after two sprays revealed that the treatment Lecanicillium lecanii @ 5gm/lit was the best treatment which was recorded minimum (2.58) mean whitefly population per three leaves and was at par with Azadirachtin 1%EC @ 0.003 per cent (2.72)andBeauveria bassiana @ 5g/lit (3.17). The treatments Metarhizium anisopliae @ 5g/lit recorded (3.46) mean whiteflies population per three leaves and was at par with treatments chilli garlic extract @ 5 per cent (3.69) and Pongamia pinnata 2% EC @ 2ml/lit (3.75). The treatment soapnut liquid extract @ 5 per cent recorded (4.48) mean population of whiteflies per three leaves. All the above treatments were found to be superior over untreated control which recorded highest pest

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 5 Sep-Oct 2022, pp: 486-489 www.ijprajournal.com ISSN: 2456-4494

population (6.29) per three leaves).

The present investigations are inconformity with Halder J,et al. (2021) found that among the EPF tested, whitefly (1.33/leaf) population was recorded inplots treated with L. lecanii during the two consecutive years.Also Naik and Shekharappa (2009) found that oil based formulation of V. lecanii was best and recorded mean number of 2.70 whiteflies/3 leaves followed by oil based formulation of B. bassiana (3.15) after second spray.

Table 1: Efficacy different biopesticides against sucking pests of okra after two sprays during kharif 2019-2020

Treatments	Leafhopper population (3 leaves/plant)		aphid population (3 leaves/plant)		Whitefly population (3 leaves/plant)	
	Pre count	Post count	Pre count	Post count	Pre count	Post count
Beauveria bassiana	5.18 (2.48)	4.33 (2.29)	12.93 (3.73)	7.85 (2.90)	5.18 (2.48)	3.17 (2.00)
Metarhizium anisopliae	5.53 (2.55)	4.67 (2.37)	13.11 (3.76)	8.41 (3.00)	5.53 (2.55)	3.46 (2.08)
Lecanicilium lecanii	5.33 (2.51)	3.48 (2.08)	12.38 (3.66)	6.28 (2.56)	5.33 (2.51)	2.58 (1.82)
Pongamia pinnata 2% EC	5.42 (2.53)	4.23 (2.27)	11.95 (3.60)	7.77 (2.91)	5.42 (2.53)	3.75 (2.15)
Azadirachtin 1% EC	5.29 (2.51)	3.07 (1.97)	12.53 (3.68)	6.65 (2.65)	5.29 (2.51)	2.72 (1.86)
Soapnut liquid extract	5.44 (2.54)	5.64 (2.57)	11.78 (3.57)	8.08 (2.98)	5.44 (2.54)	4.48 (2.33)
Chilli garlic extract	4.91 (2.43)	4.67 (2.37)	12.51 (3.67)	7.98 (2.94)	4.91 (2.43)	3.69 (2.15)
Untreated control	5.38 (2.52)	8.81 (3.10)	12.58 (3.68)	11.83 (3.56)	5.38 (2.52)	6.29 (2.69)
SE (m±)	0.06	0.07	0.10	0.05	0.06	0.06
CD at 0.5%	0.22	0.20	0.16	0.14	0.21	0.19

*Figures in parenthesis are $\sqrt{X+1}$ transformed values

REFERENCES

[1]. Anonymous (2015-16a). Indian Horticulture Database, National Horticulture Board, Ministry of Agriculture, Government of India.

[2]. Anonymous (2017-18b). Source: Ministry of Agriculture and Farmers Welfare, Govt. of India.

[3]. Atwal AS, Singh B. (1990). Pest population and assessment of crop losses. ICAR Publication, Indian council of Agricultural Research, New Delhi. 1990, 265.

[4]. Bade, B.A., Nimbalkar, N.A., Kharbade, S.B., Patil, A. S., (2017) Seasonal incidence and bioefficacy of newer insecticides and biopesticide against aphids on okra and their effect on natural enemies. Int. Journal of Pure Applied Bioscience (2017); **5**(3): 1035-1043.

[5]. Daniel, C., Koller, M. and Wyss, E. (2014). Neem-Azal T/S to control leafhoppers and aphids in greenhouse sweet pepper and tomato. Acta Horticulturae, **10**(41): 157-162.

[6]. Gopalan C, Rama Sastri BV, Balasubramanian S. (2007). Nutritive Value of Indian Foods 2nd edition, National Institute of Nutrition (NIN), ICMR, 2007, 47-58.

[7]. Halder. J, Divekar P and Rani (2021). Compatibility of entomopathogenic fungi and botanicals against sucking pests of okra: an ecofriendly approach.Egyptian Journal of Biological Pest Control 2021(31):30

[8]. Kanwar, N. and Ameta, O. P. (2007) Assessment of losses caused by insect

pests of okra. Journal of Pestology, **31** (5): 45-47.

[9]. Khalil, S. K., Bartos, J. and Landa, Z. (2007). Effectiveness of Verticillium lecanii to reduce populations of aphid under glasshouse and field conditions. Agric. Ecosyst. Environ., (12): 151– 156.

[10]. Mann G. S., Dhaliwal G. S., Dhawan A. K. (2001). Field efficacy of neem based insecticides against whitefly and their impact on insect pest complex of cotton. Pesticide Research Journal, **13**(1): 79 – 85.

[11]. Naik, R. H.; Shekharappa. (2009a). Field evaluation of different entomopathogenic fungal formulations against sucking pests of okra. Karnataka Journal of Agricultural Science, 2009; **22**(3) : 575-578.

[12]. Roy, A; Shrivastav S.L; Santi Mandal. (2014) Functional properties of okra Abelmoschus esculentus L. (Moench): traditional claims and scientific evidences. Plant Science Today (2014); **1**(3):121-130.

[13]. Srinivasa R, Rajendran R. (2003) Joint action potential of neem with other plant extracts against the leaf hopper Amrasca devastance (Distant) on okra. Journal of Pest Management and Economic Zoology, 2003; **10**:131-136.

[14]. Singh, Y., Jha, A., Verma, S., Mishra, V. K. and Singh, S. S., (2013) Population dynamics of sucking insect pests and its natural enemies on okra agroecosystem in Chitrakoot region. African Journal of Agricultural Resources, **28**: 3814-3819.