

Original Research Article

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Field Efficacy of Selected Insecticides and Neem Products against Shoot and Fruit Borer [*Earias vittella* (Fabricius)] on Okra [*Abelmoschus esculentus* (L.) Moench]

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A B S T R A C T

The present field studies were conducted during kharif 2016 to determine the field efficacy of selected insecticides and neem products against shoot and fruit borer [*Earias vittella* (Fabricius)] on okra [*Abelmoschus esculentus* (L.) Moench] at Central agriculture field, SHUATS (Sam Higgin bottom University of Agriculture, Technology and Sciences), Allahabad, Uttar Pradesh (India). Studies revealed that maximum mean pest population recorded in control and all the treatments were found effective in reducing the infestation of shoot and fruit borer as compared to control, while it was found minimum in insecticides treated plots as compared to neem product treated plots. Among the treatments application of Rynaxypyr 20 SC @ 20 g.a.i. /ha was found superior in recording less infestation of pest on shoot and fruit of okra (2.25%) and (3.80%). Followed by Cypermethrin 10% EC (2.74%) and (4.12%), Flubendamide 480 SC (4.65%) and (5.38%), Spinosad 45% (5.01%) and (5.39%), Cypermethrin + neem oil (6.25%) and (6.76%), Neem oil (8.25%) and (9.19%), NSKE (8.933%) and (9.95) respectively.

Keywords

Okra, *Earias vittella*,
Rynaxypyr,
Insecticides,
Neem products.

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Introduction

Okra (*Abelmoschus esculentus* L.) belongs to family Malvaceae or Mallow, which is locally known as Bhendi and Lady's finger worldwide. It is very popular summer vegetable for home gardening while it is also grown commercially throughout the world especially in Indo-Pakistan sub-continent. It is probably originated in Ethiopian region of Africa (Akbar and Khan 2015). It is quite popular in India because of easy cultivation, dependable yield and adaptability to varying moisture conditions. It is an important vegetable crop due to its nutritional, industrial and medicinal value. One of the important limiting factors in the cultivation of okra is

insect pests. Okra is susceptible to the attack of various insects from seedling to fruiting stage as high as 72 species of insects have been recorded on okra (Srinivasa and Rajendran, 2003) of which, okra shoot and fruit borer *Earias vittella*, okra jassid, cut worm, white fly, aphids etc. causes significant damage to the crop. Among these okra shoot and fruit borer (OSFB), *Earias vittella* is the most serious pest which cause direct damage to tender shoots and fruits. It is reported that about 69% losses in marketable yield due to attack of this insect pest (Rawat and Sahu, 1973; Radake and Undirwade, 1981). The damage due to shoot and fruit borer, *E.*

vittella, accounted for about 25 per cent in Uttar Pradesh (Verma *et al.*, 1984) 45 per cent in Karnataka (Srinivasan and Krishna Kumar, 1983), 21.7 to 29.2 per cent in Andhra Pradesh (Neeraja *et al.*, 2004), 22.56 to 22.6 per cent in Tamil Nadu (Praveen and Dhandapani, 2001) and 25.93 per cent in Madhya Pradesh (Dhamdhare *et al.*, 1984). In Rajasthan the yield loss due to borer was estimated as high as 63.53 per cent (Chaudhary and Dadheech, 1989).

In modern days of agriculture, intensification of the vegetable cultivation has created tremendous pest problems; this has led to high pesticide use, often with no reduction in pests attack, making vegetable production more and more dependent on pesticides. Conventionally farmers are using various types of synthetic chemical insecticides to control okra shoot and fruit borer. But due to the unconscious and unjustified use of synthetic pesticides create several problems in agro-ecosystem such as direct toxicity to beneficial insects, fishes, and man (Goodland *et al.*, 1985). The intensive use of highly toxic and broad spectrum pesticides and their repeated use alone have resulted in the development of resistance in the insect pest, and disturbance to the agroecosystem by affecting the non-targets (Dittrich *et al.*, 1990). Elimination of natural enemies, environmental disharmony, consequently it becomes more difficult to manage key pests and secondary pests. Frequent pickings, high operational cost and indiscriminate use of insecticides resulted in the presence of residues in these vegetables (Arora, 2009) are limiting factors for the chemical control of pests of okra. Due to the presence of pesticide residues in the final commodity, there is a risk of rejection of whole consignments during export. This is manifested in a strong demand for reduced use of pesticides from general public, government and in an increasing number of countries. To overcome these problems, use

of resistant or tolerant variety and use of bio pesticide, botanicals are safe to mammals, safe to natural enemies, which fit well in the IPM concept, is the need of the hour. There is also an increasing demand for healthy food which boosts organic production. So, any non-chemical strategy for managing fruit borer could be a good approach. And chemical pesticides are usually the key tool for combating pests, also it is now urgently need to use safe and effective biodegradable pesticides with less toxic effects on non-target organisms.

Botanical pesticides possess an array of properties including insecticidal activity and insect growth regulatory activity against many insect and mite pests (Rajasekaran and Kumaraswami, 1985; Prakash and Rao, 1989). The neem products with half the dose of conventional insecticides has resulted in more efficient control than insecticides alone (Sinzogan *et al.*, 2006). Neem oil produced nontoxic effects after spray and acted as antifeedent, growth inhibitor and oviposition deterrent against insect's pests of okra and cotton (Ahmed *et al.*, 1995). Low mammalian toxicity, no reported development of resistance, less hazardous to non-target organisms, no pest resurgence problem, no adverse effect on plant growth, negligible application risks, low cost and easy availability are the advantages of plant products over synthetic chemicals.

Indiscriminate use of several insecticides in agricultural field creates problem in the natural ecosystem, environmental pollution, pest resistance and health hazards etc. Due to this, only selective chemicals used in order to avoid indiscriminate use of pesticides. Also a number of previous studies on the sustainable management of insect pests on okra ecosystem through IPM technologies based on the intensive use of bio pesticides and other environmentally safer botanicals

considerable success in mitigating the insect pests damage, reduction in the pesticide usage and restoration of ecological balance (Sardana *et al.*, 2005; Preetha and Nadarajan, 2007; Reddy, 2013) keeping in view, the above, a study entitled “Field efficacy of selected insecticides and neem products against shoot and fruit borer [*Earias vittella* (Fabricius)] major insect pests of okra [*Abelmoschus esculentus* (L.) Moench]” is taken.

Materials and Methods

Studies on the “Field efficacy of selected insecticides and neem products against shoot and fruit borer, (*Earias vittella* Fabricius) on okra [*Abelmoschus esculentus* (L.) Moench]”. In Allahabad region under field condition was carried out at the Central field, SHUATS (Sam Higgin bottom University of Agriculture, Technology and Sciences), Allahabad, Uttar Pradesh, India. Experiment was, Eight treatments consisting of T1-Neemoil 5%, T2-Flubendamide 48 SC, T3-Cypermethrin 25EC, T4-NSKE 5%, T5-Spinosad, T6-Cypermethrin+neemoil, T7-Rynaxypyr 20 SC, T8-control were tested to compare the efficacy of selected insecticides and neem products against shoot and fruit borer [*Earias vittella* (Fabricius)] on okra [*Abelmoschus esculentus* (L.) Moench]. The okra variety BND 777 was sown @ 10 kg.ha⁻¹ by dibbling method with spacing of 45 cm between row to row and 30 cm between plant to plant by placing 2-3 seeds per hill at depth of 4 cm.

Shoot and fruit borer

(Field Efficacy of treatment) the incidence of the borer on the shoot and the fruit was recorded from the five randomly selected plants. Observations were recorded one day before spray and 3rd, 7th, 11th, days after spraying. The extent of the damage, computed by using the formula;

Number of damaged shoots
Percent shoot infestation - ----- X 100
Total number of shoots

Number of damaged fruits
Percent fruit infestation - ----- X 100
Total number of fruits

Results and Discussion

Percent shoot infestation (Assessment of infestation: Number basis)

The data on the percent infestation of shoot borer of Ist and IInd spray pooled mean revealed that all the chemical treatments were significantly superior over control. Among all the treatments lowest percent infestation of shoot and fruit borer was recorded in Rynaxypyr (2.25%) and Cypermethrin (2.74%) are at par with each other, followed by Flubendamide (4.65%) and Spinosad (5.01%) are at par with each other, Cypermethrin + Neemoil (6.25%), followed by Neemoil (8.25%) and NSKE (8.93%) is the least effective among all the treatments and are statistically at par with each other.

Percent fruit infestation (Assessment of infestation: Number basis)

The efficacy of certain chemical insecticides and neem products against percent fruit infestation of shoot and fruit borer are depicted in table. The data on the percent infestation of fruit borer on IInd and IIIrd spray pooled mean revealed that all the chemical treatments were significantly superior over control. Among all the treatments lowest percent infestation of shoot and fruit borer was recorded in Rynaxypyr (3.80%) and Cypermethrin (4.12%) are at par with each other, followed by Flubendamide (5.38%) and Spinosad (5.39%) are at par with each other, Cypermethrin+ Neemoil (6.76%), followed by Neemoil (9.19%) and NSKE (9.95%) is the least effective among all the treatments.

Table.1 Field efficacy of selected insecticides and neem products against shoot and fruit borer [*Earias vitella* (Fabricius)]

Treatments		Concentration/ Dose	I st Spray(% infestation of shoots)					II nd Spray(% infestation of shoots)					Over all mean
			1 DBS	3 DAS	7 DAS	11 DAS	Mean	1 DBS	3 DAS	7 DAS	11DAS	Mean	
T1	Neemoil	3 ml/L	9.67 (18.12)	6.87 (15.19)	7.14 (15.50)	7.69 (16.10)	7.25 (15.631)	11.32 (19.66)	8.33 (16.77)	8.80 (17.26)	8.97 (17.43)	8.714 (17.169)	8.25 (16.69)
T2	Flubendamide 48 SC	4 ml/L	9.23 (17.68)	3.47 (11.77)	3.89 (11.38)	5.96 (14.13)	4.67 (12.489)	8.15 (16.58)	3.37 (10.57)	4.81 (12.67)	5.96 (14.13)	4.651 (12.454)	4.65 (12.46)
T3	Cypermethrin 25EC	2 ml/L	8.39 (16.83)	2.79 (8.73)	2.64 (8.87)	3.46 (10.73)	2.79 (9.627)	6.28 (14.51)	2.11 (8.35)	2.36 (8.84)	3.46 (10.73)	2.714 (9.483)	2.74 (9.53)
T4	NSKE	5 g/L	9.02 (17.48)	7.09 (15.44)	7.69 (16.10)	8.39 (16.83)	7.72 (16.139)	12.20 (20.29)	9.49 (17.94)	9.43 (17.88)	9.55 (18.00)	9.493 (17.945)	8.93 (17.39)
T5	Spinosad	0.5 g/L	9.48 (17.94)	4.31 (11.99)	4.41 (12.12)	5.66 (13.76)	4.83 (12.707)	7.69 (16.10)	4.19 (11.81)	5.32 (13.34)	5.66 (13.76)	5.095 (13.045)	5.01 (12.94)
T6	Cypermethrin+ neem oil	1+1.5 ml/L	9.16 (17.61)	5.10 (13.06)	5.55 (12.81)	6.15 (14.36)	5.506 (13.571)	8.33 (16.77)	4.68 (12.50)	6.89 (15.22)	7.69 (16.10)	6.623 (14.914)	6.25 (14.48)
T7	Rynaxypyr 20 SC	4 ml/L	9.55 (18.00)	2.20 (8.54)	2.02 (8.18)	2.53 (9.15)	2.26 (8.650)	6.21 (14.43)	1.92 (7.97)	2.23 (8.60)	2.58 (9.24)	2.247 (8.621)	2.25 (8.63)
T8	Untreated	-	9.16 (17.61)	10.21 (18.64)	11.03 (19.40)	12.13 (20.38)	11.208 (19.560)	14.89 (22.70)	15.49 (23.17)	16.43 (23.91)	16.76 (24.16)	16.268 (23.787)	14.59 (22.46)
F- test			NS	S	S	S	S	NS	S	S	S	S	S
S. Ed. (±)			0.37	0.52	0.38	0.28	0.17	1.05	0.26	0.34	0.40	0.26	0.39
C. D. (P = 0.05)			1.13	1.40	0.66	0.78	0.52	2.72	0.79	1.03	1.20	0.72	0.75

Figures in parenthesis are arcsine transformed values

(**DBS-Days before spray, DAS-Days after spray, DAS*-Days after sowing)

Table.2 Field efficacy of selected insecticides and neem products against shoot and fruit borer [*Earias vitella* (Fabricius)]

Treatments		Concentration/ Dose	II nd Spray(% infestation of fruits)					III rd Spray(% infestation of fruits)					Over all mean
			1 DBS	3 DAS	7 DAS	11 DAS	Mean	1 DBS	3 DAS	7 DAS	11DAS	Mean	
T1	Neemoil	3 ml/L	10.34 (18.76)	7.59 (15.99)	7.69 (16.10)	7.84 (16.31)	7.731 (16.14)	17.04 (24.38)	11.39 (19.72)	11.66 (19.97)	12.19 (20.43)	11.76 (20.05)	9.19 (17.65)
T2	Flubendamide 48 SC	4 ml/L	9.67 (18.12)	4.76 (12.60)	5.26 (13.26)	5.47 (13.53)	5.181 (13.15)	13.79 (21.80)	5.35 (13.38)	5.55 (13.63)	6.55 (14.83)	5.84 (13.99)	5.38 (13.41)
T3	Cypermethrin 25EC	2 ml/L	8.45 (16.90)	3.84 (11.30)	3.89 (11.38)	3.94 (11.45)	3.896 (11.38)	12.12 (20.37)	4.28 (11.94)	4.41 (12.12)	5.06 (13.00)	4.60 (12.39)	4.12 (11.71)
T4	NSKE	5 g/L	10.71 (19.10)	8.45 (16.89)	8.69 (17.15)	8.82 (17.28)	8.653 (17.10)	18.51 (25.48)	12.5 (20.70)	12.32 (20.55)	12.90 (21.05)	12.56 (20.75)	9.95 (18.38)
T5	Spinosad	0.5 g/L	9.23 (17.68)	4.83 (12.70)	5.17 (13.14)	5.45 (13.50)	5.142 (13.10)	13.95 (21.93)	5.55 (13.63)	5.45 (13.50)	6.32 (14.57)	5.85 (13.99)	5.39 (13.42)
T6	Cypermethrin+ne em oil	1+1.5 ml/L	9.37 (17.83)	5.66 (13.76)	6.64 (14.96)	6.97 (15.31)	6.521 (14.79)	14.63 (22.49)	6.66 (14.96)	6.81 (15.13)	7.77 (16.19)	7.26 (15.63)	6.76 (15.07)
T7	Rynaxypyr 20 SC	4 ml/L	8.21 (16.66)	3.43 (10.76)	3.52 (10.82)	3.70 (11.09)	3.571 (10.89)	11.25 (19.59)	4.16 (11.77)	4.28 (11.94)	4.76 (12.60)	4.39 (12.09)	3.80 (11.25)
T8	Untreated	-	13.11 (21.23)	14.51 (22.39)	14.81 (16.10)	15.04 (22.63)	14.732 (22.57)	22.23 (28.12)	25.86 (30.56)	27.27 (31.48)	27.86 (31.86)	27.01 (31.13)	18.16 (25.22)
F- test			NS	S	S	S	S	NS	S	S	S	S	S
S. Ed. (±)			0.93	0.24	0.34	0.22	0.19	0.27	0.25	0.24	0.29	0.18	0.18
C. D. (P = 0.05)			2.81	0.72	1.02	0.68	0.59	4.62	0.75	0.74	0.89	0.55	0.56

Figures in parenthesis are arcsine transformed values

(**DBS-Days before spray, DAS-Days after spray, DAS*-Days after sowing)

Similar readings were found with Chowdary *et al.*, (2010) showed among the newer insecticide molecules evaluated, Rynaxypyr 20 SC were superior in recording less larval populations, lower fruit damage (7.80 and 10.51 %).

Singh *et al.*, (2015) recorded Cypermethrin 25 EC recorded the lowest percentage of shoot and fruit damage followed by Spinosad 45 SC. some extent corroborate with the present findings.

Nalini and Kumar (2016) reported against shoot and fruit borer, *Earias vittella*. Minimum percent of shoot infestation and percent fruit infestation were observed in cypermethrin with (3.60% and 6.34%).

In shoot and fruit borer, all the three sprays revealed that Rynaxypyr and Cypermethrin were at par with each other and was found to be more effective than other treatments.

From the critical analysis of the present findings it can be concluded that selected insecticides like Rynaxypyr and Cypermethrin, Flubendamide and Spinosad can be suitably incorporated in pest management schedule against *Earias vittella* as an effective tool under chemical control, and combination treatments like Cypermethrin + Neemoil, botanicals like Neemoil and NSKE are also to be incorporated in pest management in order to avoid indiscriminate use of pesticides causing pollution in the environment and not much harmful to beneficial insects and in increasing cost effectiveness. And these synthetic chemicals are better than botanicals in reducing pest population level.

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