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Original Research Article

Effect of Chemicals on Tomato Fruit Borer [*Helicoverpa armigera* (Hubner.)] at Trans Yamuna of Allahabad

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A B S T R A C T

Field experiment was conducted to study The effect of Chemicals on tomato fruit borer [*Helicoverpa armigera*(Hubner)] at Transyamuna of Allahabad *Kharif* season of 2014-2015 The experiment was conducted in the research field of Sam Higginbottom Institute of Agriculture Technology and Science, Deemed-to-be-University Allahabad. Total two sprays were applied to protect the crop from *Helicoverpa armigera* with three replications. Flubendiamide12.52 % Profenophas13.55 % Cypermethrin12.68 % spinosad12.44 % Indoxcard12.58 % Imidachloprid12.12% Monocrotophas12.69 % were evaluated against *Helicoverpa armigera* infesting Tomato. The observations on infestation of *Helicoverpa armigera* 24 hours before (Pre-treatment) and 3, 7 and 14 days after treatment (Post-treatment) at each spraying were recorded for computing the percent of infestation. The data were subjected to statistical analysis after appropriate transformation for interpretation. The treatment with recommended insecticide flubendiamide 0.01 % was of the most effective treatment followed with and spinosad 0.009 %, indoxacarb 0.0075 %, cypermethrin 0.01 %,The treatments with dimethoate 0.05%, and Profenophas 0.05% Conc. also performed well against this pest. Imidacloprid 0.03%were found less effective against *Helicoverpa armigera*. Flubendiamide 0.01% (1:2.4) followed byspinosad 0.009% (1:2.4.), Indoxacarb 0.0075% (1:2.3), cypermethrin 0.01% (1:1.7), dimethoate 0.05% (1:1.7), Profenophas 0.05% (1:1.5),Imidacloprid 0.03% (1:1.2). Among the treatments the highest cost benefit ratio (C:B) of (1:2.4.) was obtained with of Flubendiamide.

Keywords

Insecticides, Cost benefit ratio, Efficacy, *Helicoverpa armigera*, *Lycopersicon esculentum Mill*

Introduction

Tomato, *Lycopersicon esculentum* (Miller) new name *Solanum lycopersicon*, is one of the most popular and nutritive vegetable crops grown all over the world. Tomato belongs to family Solanaceae and is native of Peru and México. It is a warm season crop. It is grown as an off-season vegetable in the hills of India and farmers fetch good income after sending their produce in the plains from June to September. The fruit can be eaten raw or cooked. Tomato in large quantities is used to produce soup, juice, ketchup, puree, paste and powder. Tomato is also rich in medicinal value. It is reported to have antiseptic properties against intestinal infection. It is said to be useful against cancer of the mouth,

sore mouth and blood purifier *etc*. Tomato is a good source of vitamins A, C and E and minerals. Tomato juice retains vitamin C. It is one of best vegetable which keeps our stomach and intestine in good order.

Tomato, *Lycopersicon esculentum* (Mill.) is an important vegetable crop grown around the world occupying the daily food regime of a majority of people (Hussain and Bilal, 2007). Tomato is the world, ranking second in importance next to potato.

The highest productivity of tomato is incurred by Spain having 66.81 t/ha while India has only 19.5 t/ha. Tomato growing either out doors or indoors, mainly in China, India, U.S.A., Italy, Turkey, Mexico, Russian Fed and Japan .The first reference to the tomato appears in the writings of the 16th Century herbalists, but they are brief and only identify it as newly introduced into Europe. Evidences about the first cultivation of tomato has been complained and evaluated by

In India tomato crop is mainly grown in the states of Maharastra, Andra Pradesh, Odissa, West Bengal, Karnataka, Jharkhand, Gujarat, Tamil Nadu, Uttar Pradesh and Rajasthan Total area under the tomato crop in India is about 864 thousand hectare with production of 16826.4 thousand metric tonnes (Anonymous, 2011).

The recent production of tomato in India 2398697.4700 tonnes in July 2013 to June 2014 the data are given below (Anonymous, 2013). Therefore, non–traditional approaches have been evaluated for the management of *H. armigera* in tomato like exploitation of plant resistant (Sivaprakasam, 1996; and Khanam *et al*., 2003) and use of plant-products and microbial insecticides Karabhantanal and Awaknavar (2006).

Materials and Methods

The experiment was undertaken to study the "Effect of Chemicals on tomato fruit borer [*Helicoverpa armigera* (Hubner)] at trans yamuna of Allahabad. The materials and methods employed to carry out these studies are described below.

Experimental site

The present investigation was conducted at the Agricultural Research Farm of "Sam Higginbottom Institute of Agriculture, Technology and Sciences" Allahabad, Uttar Pradesh during Kharif season 2014. The research farm is situated on the right side of Allahabad Rewa road at 20 degree and 15^0 North, 60^0 03 east longitude city and is about 129.2 cm above sea level. The site selected was uniform, cultivable with typical sandy loam soil having good drainage

Material

Seed of tomato variety Pusarubi Fertilizers (FYM, Urea, DAP) Farm equipment, Tractor measuring tape Rope, flubendiamide 0.01% Profenophas 0.05% Cypermethrin 0.01% spinosad 0.009% Indoxacarb 0.0075% Imidachloprid 0.03%, dimethoate 0.05% Measuring cylinder, plastic buckets, labels, tags, ploythene bags, weighing balance, mixer, khurpi, pipette, *etc*. were used for conducting the studies.

Preparation of insecticidal spray solution

The insecticidal spray solution of desired concentrations as per treatment will be freshly prepared every time at the site of experimentation just before the start of spraying operations the quantity of spray material required for average of crop will gradually increased as the crop advanced in age.

The spay solution of a desired concentration will prepare by adopting the following formula:

$$V = \frac{C \times A}{\%\ a.i.}$$

Where

V = Volume / Weight of Commercial insecticide ml.
C = Concentration required.
A = Volume of Solution to be prepared
% a.i. = Percentage of active ingredient in commercial product.

Results and Discussion

The present investigation was undertaken to observe the, "Effect of Chemicals on tomato fruit borer [*Helicoverpa armigera* (Hubner.)] at trans yamuna of Allahabad" Crop during the *kharif* season of 2014-15. The field experiment was conducted on research farm of the Department of Entomology, Sam Higginbottom Institute of Agriculture, Technology and Sciences (Deemed-to-be-University), Allahabad.

The data on the mean of (3, 7 & 14 DAS) percent infestation that all the treatments were significantly superior over control. Among all the treatments lowest infestation percent of fruit borer was recorded in flubendiamide (7.15%). Which was statistically par with spinosad (8.07%), indoxacarb (8.68%), cypermethrin (9.47%), dimethoate (9.96%), profenophas (10.42%), and imidacloprid (11.01%).

Table.1 To find out efficacy of certain insecticide against fruit borer in tomato (Mean of 1st and 2nd Spray)

	Treatments	1st spray	% Infestation 2nd spray	Overall Mean
T_0	**Untreated**	23.59	41.35	32.47
		(28.75) *	**(40.00) ***	**(34.54)***
T_1	**Flubendiamide**	9.49	7.82	8.69
	39.35% Sc	**(18.97) ***	**(16.65) ***	**(17.09)***
T_2	**Profenophas**	12.83	10.42	11.62
	50%EC	**(20.74) ***	**(18.66) ***	**(19.91)***
T_3	**Cypermethrin**	12.34	9.47	10.90
	25%EC	**(19.59) ***	**(17.56) ***	**(19.24)***
T_4	**Spinosad**	11.05	8.40	9.73
	45% SC	**(19.40) ***	**(16.61) ***	**(18.13)***
T_5	**Indoxacarb**	11.72	9.02	10.37
	14.5 %SL	**(19.98) ***	**(17.27) ***	**(18.75)***
T_6	**Imidachloprid**	13.58	11.01	12.29
	17.8 Sl	**(21.61) ***	**(19.21) ***	**(20.50)***
T7	**Dimethoate**	12.63	9.96	11.29
	36% SL	**(20.76)***	**(18.23)***	**(19.61)***
	F- test	S	S	S
	S. Ed. (±)	0.627	2.130	4.14
	C. D. (P=0.05)	1.842	4.568	11.994

The present field study was carried out at Central Research Farm, SHIATS, Naini, Allahabad. The results of first spray revealed that flubendiamide was the most effective insecticide in controlling the tomato fruit borer among all the insecticide tested at 3, 7and 14 days after application followed by spinosad, indoxacarb, cypermethrin, dimethoate, and profenophas. The least effective treatment was imidacloprid. Maximum control was observed when flubendiamide while minimum control was achieved by imidacloprid spraying during second spray Highly significant differences were found among the percent infestation in various treatments. Maximum net returns of Rs 1:2.4 Benefit cost ratio was recorded in flubndiamide39.35 SC % 0.01% than spinosad 45% SC 0.009% which recorded benefit ratio 1:2.1 as.

The experiment was conducted at the central research farm, Sam Higginbottom Institute of science and Technology, Allahabad during kharif season 2014-15. The experiment was laid out in Randomized Block Design with 8 treatments replicated thrice along with control. The chemical treatments were used in the research.

Application of treatments for the management of the fruit borer was initiated as a soon as infestation reached ETL (5%) in the experimental plots. Subsequent application was under taken at an interval of 15 days. The observations on fruits infestation were recorded at 3, 7 and 14 days after each spray.

The observations on infestation of h*elicoverpa armigera* on Tomato revealed the lowest percent infestation in flubendiamide, followed by spinosad, and indoxacarb. Imidacloprid was the least effective treatment.

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