



SEASONAL INCIDENCE OF MAJOR SUCKING INSECT PEST OF CHILLI

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ABSTRACT

A field experiment on the incidence of insect pest of chilli was conducted at the Instructional Farm, R.C.A., Udaipur during *kharif*, 2012 (July to November). Thrips (*Scirtothrips dorsalis* Hood), aphids (*Aphis gossypii* Glover), whitefly (*Bemisia tabaci* Genn.), jassids (*Amrasca biguttula biguttula* Ishida.), and fruit borer (*Helicoverpa armigera* Hubner) were recorded on chilli. The incidence of aphid initiated during 31st SMW and continued up to the 46th SMW; thereafter, disappeared during 47th SMW. The infestation of whiteflies, thrips, jassids and fruit borer initiated during 29th, 30th, 32nd and 33rd SMW, respectively. The pest populations reached the peak at different periods during the season, thrips (15.30/plant) were the maximum in 40th SMW; aphids (11.93/plant) in 35th SMW; whitefly (7.30/plant) in 38th SMW; jassids (12.67/plant) and fruit borer (30.6%) during 41st SMW. The aphid showed significant and positive correlation with mean atmospheric temperature and mean relative humidity. Whitefly exhibited significant positive correlation with mean relative humidity. The thrips exhibited significant negative correlation with mean relative humidity.

Key words: Chilli, Sucking insect pests, Incidence

INTRODUCTION

Chilli (*Capsicum annum* L.) is an important vegetable and condiment crop that belongs to the family Solanaceae. It is cultivated under tropical and subtropical climates both for green and ripe dry fruits. The medicinal value of chilli is much realised because of its vitamin 'C' and capsaicin (C₁₈H₂₇O₃N). It is widely used throughout the tropics as a major ingredients of curry powder in the culinary preparations.

India is the largest consumer and exporter of chilli in the world with a production of 1492 MT from an area of 775 thousand hectares and productivity was 1.9 MT per hectares during 2014 (Anonymous, 2014). The major chilli growing states are Andhra Pradesh, Maharashtra, Karnataka, Tamilnadu and Rajasthan. In Rajasthan, it is cultivated in an area of 12.21 thousand hectare with the production of 17.71 MT (Anonymous, 2013); the major chilli growing districts of Rajasthan include Jodhpur, Sawai Madhopur, Bhilwara, Tonk, Ajmer, Udaipur, Jaipur, Jalore, Pali and Bharatpur.

Various factors responsible for low yield of chilli include adverse climate, poor quality seeds, diseases, insect and mite pests. Among all known factors, insects and mites are of prime importance, which significantly affects both the quality and production of chilli.

Major insect pests of chilli in southern Rajasthan are thrips (*Scirtothrips dorsalis* Hood.), aphids (*Aphis gossypii* Glover), whiteflies (*Bemisia tabaci* Genn.), jassids (*Amrasca biguttula biguttula* Ishida) and the fruit borer (*Helicoverpa armigera* Hub.) which are reported to cause economic damage. The yield losses range from 50-90 per cent due insect pests of chilli (Nelson and Natrajan, 1994). The losses due to chilli thrips range from 50-90 per cent (Bagale, 1998). Due to variation in the agro climatic conditions of different regions insects show varying trends in their incidence in nature and extent of damage to the crop. Hence a region oriented study of the insect pest is necessary as it would help in combating the problems. Keeping in view, all these facts the present study on Seasonal incidence of major insect pest of chilli was conducted.

MATERIALS AND METHODS

The seasonal incidence of insect pests was studied under natural condition in three plots each measuring 5 × 5 sq. meter; thus, the incidence was studied in a total area of 75 sq. meters. The seedlings of chilli variety "Pusa Jwala" were transplanted in the field on July 2, 2012 at 60 cm and 30 cm row to row and plant to plant spacing, respectively.

Ten plants per plot were selected randomly, tagged and observations were recorded on these tagged plants

after 15 days of transplanting at weekly intervals. Population of insect pests *viz.*, thrips (*Scirtothrips dorsalis* Hood), whiteflies (*Bemisia tabaci* Gennadius), jassid (*Amrasca biguttula biguttula* Ishida), aphids (*Aphis gossypii* Glover) and fruit infestation (*Helicoverpa armigera* Hubner) were recorded at weekly intervals. Appropriate sampling techniques were adopted depending on the type of insect pest. The population of different insect pests was recorded during morning hours between 6.30 AM to 8.00 AM.

The population of thrips, aphids, whiteflies and jassids was recorded on three leaves *viz.*, top, middle and lower leaf on 10 plants selected randomly. (Heathcote, 1972 & Satpathy, 1973). The population of jassids as suggested by Rawat and Sahu (1973) was recorded on three leaves, one each from the basal, middle and upper portion was selected from each of the 10 tagged plants in three plots. The population was estimated by gently holding the leaf between the halves of a Petri plate and then counting adults and the nymphs within the Petri plate. The nymphal stages were counted with the help of magnifying glass (lens). The population of fruit borer was counted on ten randomly selected plants in each plot. The damage caused by fruit borers was estimated by the method described by Pradhan and Menon (1945). The mean infestation was worked out on the basis of number of damaged fruits out of the total number of fruits.

$$\text{Mean infestation (\%)} = \frac{\text{No. of infested fruits}}{\text{No. of total fruits}} \times 100$$

Statistical Analysis

Population data of different insect pests was subjected to statistical analysis to find out the coefficient of correlation with average temperature, relative humidity and rainfall which was obtained from the Meteorological Observatory, Rajasthan College of Agriculture, Udaipur. Following formula was used for calculating correlation coefficient:-

$$r_{xy} = \frac{\sum XY - \frac{\sum X \sum Y}{n}}{\sqrt{\left[\sum X^2 - \frac{(\sum X)^2}{n} \right] \left[\sum Y^2 - \frac{(\sum Y)^2}{n} \right]}}$$

Where,

r_{xy} = Simple correlation coefficient

X = Variable i.e. abiotic component

(Average temperature, relative humidity and total rainfall)

Y = Variable i.e. mean number of insect pests

n = Number of paired observations

The correlation coefficient (r) values were subjected to the test of significance using t-test:

$$t = \frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2}$$

The calculated t-value obtained was compared with tabulated t-value at 5% level of significance.

RESULT AND DISCUSSION

The infestation of thrips initiated in the IV week of July 30th and remained up to IV week of November (47th SMN). The population increased gradually and touched its peak with a mean of 15.30 thrips per plant; thereafter, the population declined gradually and reached up to 8.33 thrips per plant in IV week of November (47th SMW). The population exhibited a negative correlation with mean temperature, mean relative humidity and average rainfall. The results obtained in the present investigation are thus in close agreement with the earlier work of Desai (1994), who observed the higher incidence of thrips during November, which might be due to local weather conditions that prevailed during the study period. The findings confirmed the results obtained by Patel (1992), who reported negative correlation between thrips population, rainfall and temperature, similar results were also obtained by Paniker (2000) who observed the activity of thrips on chilli from first week of September that continued up to second week of January. The pest showed negative correlation with minimum temperature, vapour pressure and relative humidity. The present findings are also supported by Bhede *et al.* (2008), who reported the highest incidence of thrips in the 40th meteorological week and the population had negative correlation with evening humidity and rainfall and positive correlation with bright sunshine.

Aphids appeared from the last week of July and attained a peak population (11.93 aphids/plant) during last week of August (35th meteorological week) and remained active on the crop up to III week of November (46th SMW). The population exhibited a positive correlation with mean temperature and mean relative humidity, while negative with average rainfall. The present findings are similar to those of earlier workers like Butani (1970), who reported the appearance of aphid from July to till harvest. The period of activity lasted from late August to October. Sumana (1995) revealed that the population and reproduction potential of *Aphis gossypii* on chillies were highest during preflowering/flowering stage when the crop was 2-14 weeks old. Venzon *et al.* (2006) reported that the sucking and Lepidopterous pests were major pests of chilli and the infestation occurred on crop throughout the crop season.

Table 1. Effect of abiotic factors on the insect pests infesting chilli during *kharif*, 2012

SMW	Date and month of observation	Abiotic factor			Insect pests population/ Plant				Mean fruit infestation (%)
		Mean Temp.(°C)	Mean R.H.(%)	Total rainfall (mm)	Thrips	Aphids	Whitefly	Jassids	
29	16 - 22 July	27.70	65.40	0.00	0.00	0.00	1.33	0.00	0.00
30	23 - 29 July	27.30	67.20	4.00	1.33	0.00	2.23	0.00	0.00
31	30 July - 5 Aug	25.60	70.40	10.60	3.10	2.97	3.20	0.00	0.00
32	6 - 12 Aug	26.20	79.60	65.90	7.30	3.90	3.30	0.96	0.00
33	13 - 19 Aug	24.30	78.00	57.40	4.10	8.10	5.53	1.53	17.80
34	20 - 26 Aug	26.00	75.50	16.40	6.33	11.06	4.90	3.87	20.20
35	27 Aug - 2 Sept	26.80	80.40	72.40	6.00	11.93	3.67	5.73	23.15
36	3 - 9 Sept	25.70	84.80	162.60	2.90	4.90	6.23	6.67	25.90
37	10 - 16 Sept	25.70	82.60	86.40	3.23	6.50	4.60	6.93	27.50
38	17 - 23 Sept	26.20	73.50	0.40	5.63	7.46	7.20	7.27	29.70
39	24 - 30 Sept	25.70	62.90	34.00	8.53	4.93	4.33	9.10	30.30
40	1 - 7 Oct	26.50	52.90	0.00	15.30	2.33	3.63	10.93	32.10
41	8 - 14 Oct	25.10	48.30	0.00	12.80	1.93	5.83	12.67	33.60
42	15 - 21 Oct	24.60	48.90	0.00	10.16	1.90	3.90	11.06	28.45
43	22 - 28 Oct	22.70	42.90	0.00	11.20	2.23	2.80	7.60	26.50
44	29 - 4 Nov	20.50	48.20	0.00	11.70	1.63	3.33	8.13	24.30
45	5 - 11 Nov	20.20	48.10	0.00	8.63	1.13	1.77	4.23	22.10
46	12 - 18 Nov	20.50	45.50	0.00	6.03	1.00	1.46	2.06	21.60
47	19 - 25 Nov	19.60	52.10	0.00	8.33	0.00	1.20	3.67	20.30
Coefficient of correlation (r_1) for population and mean Temperature				-0.28	0.59*	0.41	0.26	0.47	
Coefficient of correlation (r_2) for population and relative humidity				-0.70*	0.75*	0.47*	-0.35	-0.17	
Coefficient of correlation (r_3) for population and total rainfall				-0.13	-0.11	0.26	0.01	-0.03	

* Significant ($p=0.05$)

SMW - Standard Meteorological Week

The whitefly appeared in the III week of July (29th meteorological week) and continue up to IV week of November (47th SMW). The population increased gradually and touched its peak with mean population of 7.2 whiteflies per plant in IV week of September (38th SMW); thereafter, the population declined gradually and reached up 1.20 whiteflies per plant during 40th SMW. The population exhibited positive correlation with mean temperature, mean relative humidity during the study year. Shanab and Awad-Allah (1982) reported that whitefly on tomato on appeared in May and reached to its peak during July to October. He also reported that the higher temperature declined the pest incidence, whereas scattered rain and high relative humidity favoured the population build-up. However, Farman *et al.* (2004) observed that the whitefly infestation started on brinjal in mid of May and reached to its peak in July. Bharadia and Patel (2005) reported maximum population of whitefly in the fourth week of October. This might be due to variable climatic conditions of that particular region and time of cultivation of the crop.

The infestation of jassids, initiated in the II week of August (32nd SMW) and continued up to IV week of November (47th SMW). The population increased gradually and touched its peak with a mean of 12.67 jassids per plant during the II week of October (41st SMW); thereafter, the population declined gradually and reached up to 3.67 jassids per plant in IV week of November (47th SMW). Gambhiri and Kumar (1998), observed higher incidence of jassids during the August and September. Singh *et al.* (2005), reported temperature ranging from 20.0 to 22.5°C with 69 per cent relative humidity as the most suitable conditions for longevity of adults.

The damage to fruits started in the III week of August (33rd SMW) with 17.80 per cent damage. The fruit infestation gradually increased and touched its peak (33.60% fruit infestation/plant) during 41st SMW and then again started declining gradually. Sharma and Bhardwaj (2004) studied the population dynamics of *H. armigera* on tomato crop in rainy season. The infestation of fruit borer commenced in the first week of October and continued till 3rd week of November during 1999-2000. The maximum infestation (34.10%) was observed during 4th week of October and the infestation level was 34.84 per cent.

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