



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2020; 8(1): 403-406

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Received: 22-11-2019

Accepted: 24-12-2019

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## Seasonal incidence of chilli thrips on chilli under agro-climatic condition of Allahabad

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### Abstract

During the present study the seasonal incidence of chilli thrips [*Scirtothrips dorsalis* (Hood)] on chilli under agro-climatic condition of Allahabad, at Central research farm, SHUATS, Naini, Allahabad during *kharif* season of July to November 2016 was analyzed. Initial incidence of the chilli thrips was noticed on the 37<sup>th</sup> standard week (September third week) with an average population of 0.32 insect/plant. The chilli thrips, *Scirtothrips dorsalis* population increased and gradually reached the peak level of 6.75 insect / plant at 45<sup>th</sup> standard week (November second week). At that time, average maximum temperature was 37.77 °C and minimum temperature was 21.42 °C, average morning relative humidity was 86.28% and evening 45.42%, average wind velocity was 1.09 km/hour and average sun shine hour was 7.34 hours. There after declined trend was observed due to fall of maximum and minimum temperatures as optimum weather condition are decreasing.

**Keywords:** Chilli (*capsicum annum*), correlation, thrips, seasonal incidence

### Introduction

Chilli (*Capsicum annum* L.) is an indispensable condiment in every household in India which is rich in Vitamin A and C and it is widely used as vegetable, chutneys, spices, condiments, sauces and pickles. Although, the crop has got great export potential besides huge domestic requirement, a number of limiting factors have been attributed for low productivity. The area occupied in India is 7.43 L ha in which the production is 14.53 L tons (Agricultural Statistics at a glance 2015) [1]. Uttar Pradesh occupy about 1.8 thousand ha area with 1.7 thousand tones production. The area occupied in Allahabad region is 2455 ha and the production is 2993 tones (Rai and Pandey 2007) [14].

Chilli thrips, *Scirtothrips dorsalis* (Hood) (Thysanoptera: Thripidae) is a serious pest of chilli in India, responsible for leaf curling (Ananthakrishnan, 1971) [3]. It multiplies appreciably at a faster rate during dry weather periods and the yield loss caused by the thrips is reported to range from 30-90 per cent (Borah, 1987 and Varadharajan, 1994) [5, 16].

Chilli is grown in both tropical and sub-tropical areas at an altitude ranging from sea level to 2000 meter. It is especially liked for its pungency, besides appealing colour it adds to the food (Muthukrishnan *et al.*, 1993) [12].

Chilli thrips *Scirtothrips dorsalis* (Hood), aphids (*Myzus persicae* (Sulzer) Whiteflies (*Bemisia tabaci* Genn) and mites (*Polyphagotarsonemus latus* Banks) are the important sucking pest contributing to decrease in the crop yield (Hosmani, 1993) [8]. The yield loss due to chilli thrips and mites is estimated to be the tune of 50 per cent (Ahmed *et al.*, 1987 and Kandasamy, 1990) [2, 9].

Chilli thrips is a major pest of chili plants. Thrips attacks on chilli plant can cause leaf curling upward. Thrips attacks in chili starts from mild to severe attack. Mild attack symptoms on the leaves are characterized by a silvery white color. Furthermore, the silvery colors become brown. In the affected leaves are black dirt of thrips. Paroxysm occurs when thrips act as vectors of viruses that cause disease in chili plants (Ananthakrishnan, 1993) [4]. Thrips attack plants ranging from larvae to adults by means of scrape and suck.

Chilli thrips have relatively short life cycle due to which they can complete several generation on a crop and cause loss. Economic yield loss may be 11-75% quantitatively and 60-80% qualitatively in the event of serious infestation (Ghosh *et al.*, 2009) [6]. Some times more than 90% yield reduction was reported in chilli because of thrips infestation (Kumar, 1995) [10]. Chilli thrips affected leaves curl 'upward' and 'downward' resulting in typical damage known

as “leaf curl syndrome” and it is also called as “murda complex. Present studies were undertaken to determine the efficacy of Seasonal incidence of chilli thrips on chilli crop. The causes of pest population increase and decrease are the weather factor temperature, relative humidity, rainfall, wind velocity and sunshine etc.

### Materials and Methods

The experiment was conducted during the *kharif* 2016 at the Central Research farm, SHUATS, Naini, Allahabad. In the experiment, the variety under supervision ‘Suryamukhi’ was grown for this study.

The pest population observation was recorded at 7 days interval, from the occurrence or initiation of the pest infestation and was continued up to harvest. The crop was raised / grown as per the recommended package of practices except the plant protection measures. Observations were recorded at three plots from each plot eight plants were selected and tagged further; detailed observations were made at weekly intervals on the incidence of thrips. The population of thrips, were recorded from three leaves one each from the upper, middle and lower position on eight selected plants. The population was recorded under stereo binocular microscope on 2 × 2cm leaf bit area. The incidence and population dynamics of chilli thrips was recorded from the eight randomly selected and tagged plants by correlating with weather parameter. Weather data was recorded simultaneously from the Department of Agriculture Metrology, SHUATS, Allahabad. Among weather parameters, relative humidity, maximum temperature, minimum temperature, sunshine hour and rainfall were considered for correlating with the occurrence and population dynamics of chilli thrips (Roopa and Kumar 2014) [15].

The data thus obtained were converted into the average number of thrips per plant and represented in table 1. To determine the effect of various weather parameters on the

fluctuation of *S. dorsalis* infesting chilli, weather data were collected from meteorology laboratory situated on the farm and the relationship between the insect population and weather parameter was worked out.

### Results and Discussion

Data presented in the incidence of chilli thrips, *Scirtothrips dorsalis* population with weather parameters given in table 1. And figure 1. The occurrence of chilli thrips, *Scirtothrips dorsalis* 2016 rainy season was commenced from 37<sup>th</sup> standard week (September third week) with an average 0.32 insect /3 leaves. The chilli thrips, *Scirtothrips dorsalis* population increased and gradually reached peak level of 6.75 insect / 3 leaves at 45<sup>th</sup> standard week (November second week). Thereafter, declined trend was observed due to fall of maximum and minimum temperatures as optimum weather condition are decreasing. The probable reason for such finding may be that the occurrence of chilli thrips, *Scirtothrips dorsalis* might be due to congenial weather factor like temperature, wind velocity, humidity, and sunshine hours prevailed during the investigation. It was observed that the maximum temperature favored the multiplication of chilli thrips, *Scirtothrips dorsalis* whereas, decline of maximum and minimum temperature lead to decline of the chilli thrips, *Scirtothrips dorsalis* population.

**Table 1:** Coefficient between thrips population and weather parameter in *kharif* season 2016

S.N	Weather parameter	r- value	t- value	F-test
1	Temperature Max (°C)	0.070	0.279	S
2	Temperature Min (°C)	-0.626	-3.209	S
3	Humidity morning %	0.347	1.482	NS
4	Humidity Evening %	-0.227	-0.930	NS
5	Rainfall (mm)	-0.332	-1.406	NS
6	Wind velocity	-0.563	-2.727	S
7	Sunshine (hr/day)	0.542	2.581	S

**Table 2:** Seasonal incidence of chilli thrips *Scirtothrips dorsalis*, during *Kharif* season of 2016.

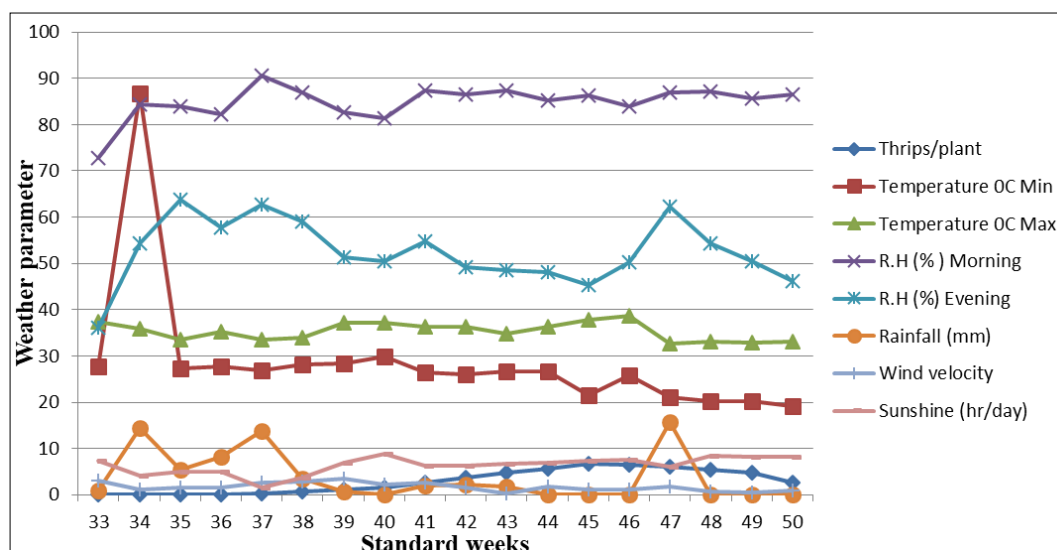
Standard Weeks	Thrips/3 leaves	Temperature °C Min	R. H Max	(%) Morning	Velocity Evening	Rainfall (mm)	Wind (km/hr)	Sunshine (hr/days)
33 <sup>th</sup>	0	37.4	27.8	72.85	36	1	3.02	7.42
34 <sup>th</sup>	0	35.92	28.65	84.42	54.42	14.45	1.23	4.05
35 <sup>th</sup>	0	33.5	27.27	83.85	63.85	5.37	1.67	5
36 <sup>th</sup>	0	35.31	27.65	82.28	57.71	8.17	1.57	5.1
37 <sup>th</sup>	0.32	33.45	26.82	90.57	62.71	13.8	2.58	1.5
38 <sup>th</sup>	0.62	34.05	28.14	87	59.14	3.51	2.8	3.62
39 <sup>th</sup>	1.24	37.22	28.4	82.71	51.42	0.77	3.45	6.91
40 <sup>th</sup>	1.66	37.08	29.8	81.28	50.42	0.01	2.12	8.8
41 <sup>th</sup>	2.58	36.42	26.51	87.28	54.71	1.98	2.56	6.37
42 <sup>th</sup>	3.65	36.25	25.97	86.42	49.28	2.15	1.49	6.31
43 <sup>th</sup>	4.72	34.88	26.68	87.42	48.57	1.77	0.19	6.7
44 <sup>th</sup>	5.73	36.34	26.71	85.14	48.14	0	1.76	6.87
45 <sup>th</sup>	6.75	37.77	21.42	86.28	45.42	0	1.09	7.34
46 <sup>th</sup>	6.53	38.71	25.74	83.85	50.28	0	1.03	7.65
47 <sup>th</sup>	5.97	32.70	21.12	87	62.28	15.8	1.83	6.17
48 <sup>th</sup>	5.42	33.00	20.14	87.14	54.28	0	0.63	8.45
49 <sup>th</sup>	4.86	33.80	20.31	85.71	50.57	0	0.58	8.25
50 <sup>th</sup>	2.64	33.08	19.11	86.57	46.14	0	0.83	8.15

The data presented in table 2 on pest population of chilli thrips was of regular occurrence and caused considerable damage to the crop. Chilli thrips *Scirtothrips dorsalis* was initiated in peak level of 0.32 third week of September (37<sup>th</sup> Standard week) and continue up to third week of December (50<sup>th</sup> Standard week) in peak level of 2.64. Chilli thrips

population increased and gradually reached peak level of 6.75 second week of November (45<sup>th</sup> Standard week). The correlation studies revealed that only sunshine ( $r = 0.542$ ) showed significant positively correlation with minimum temperature ( $r = -0.626$ ), maximum temperature ( $r = 0.070$ ) morning relative humidity ( $r = 0.347$ ) and evening relative

humidity ( $r = 0.227$ ), rainfall ( $r = 0.332$ ) with per cent incidence of chilli thrips (*Scirtothrips dorsalis*) at 1 and 5 per cent level of significance. At the time, average maximum temperature was  $37.77^{\circ}\text{C}$  and minimum temperature was

$21.42^{\circ}\text{C}$ , average morning relative humidity was 86.28% and evening relative humidity 45.42%, average wind velocity was 1.09 km/hour and average sun shine hour was 7.34 hours.



**Fig 1:** Graphical representation of Seasonal incidence of chilli thrips *Scirtothrips dorsalis*, during *Kharif* season of 2016.

The data on correlation between metrological factors and thrips population (Table 1) revealed positive correlation with maximum temperature while the correlation was negative with minimum and mean temperature, maximum, minimum and mean relative humidity and average rainfall. Johari (2016) [7] reported the thrips population and thrips attack percentage in chilli plant fluctuate. Population and thrips attacks on chilli plants are observed at the highest age of 8 weeks after planting. Meena *et al.*, (2013) [11] results revealed that the incidence of thrips [*Scirtothrips dorsalis* (Hood)], whiteflies [*Bemisia tabaci* (Genn)], aphids [*Aphis gossypii* (Glover)] and mites [*Polyphagotarsonemus latus* (Banks)] were appeared on the chilli crop soon after transplanting the peak population of thrips (14.5 and 14.7/ 3 leaves / plant) was recorded in the first week of October. Panicker (2000) [13] observed that the activity of thrips on chilli from first week of September which continued up to second week of January. The pest showed negative correlation with minimum temperature, vapour pressure and relative humidity. Roopa and Kumar (2014) [15] observed the incidence of thrips *Scirtothrips dorsalis* throughout the cropping season with varying intensity ranging from 0.07 to 5.88 with a mean of 3.53 thrips per top, middle and lower three leaves per plant. The infestation of thrips, was initiated in the third week of September and remained continue up to 4<sup>th</sup> week of December.

### Conclusion

Among the weather factors assessed in the present study, relative humidity (minimum and maximum) established significant negative correlation with chilli thrips population increase. The occurrence of chilli thrips, *Scirtothrips dorsalis* 2016 *rainy* season was commenced from 37<sup>th</sup> standard week (September third week) with an average 0.32 insect / 3 leaves. The chilli thrips, *Scirtothrips dorsalis* population increased and gradually reached peak level of 6.75 insect / 3 leaves at 45<sup>th</sup> standard week (November second week). Thereafter, declined trend was observed due to fall of maximum and minimum temperatures as optimum weather condition are

decreasing. It was observed that maximum temperature was favorable to the multiplication of chilli thrips.

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