



Population dynamics of chilli thrips *Scirtothrips dorsalis* hood and mites; *Polyphagotarsonemus latus* (Banks)

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Abstract

The experiment entitled Incidence of various insect pests and their seasonal History on chilli crop in Malwa region of Madhya Pradesh conducted during Rabi 2018-2019 and 2019 -2020 in the department of Entomology of School of agriculture at Dr. B.R. Ambedkar University of social science Mhow Indore (M.P.). during the year of 2018 - 2019 & 2019 - 2020, During the year of 2018-19, correlation studies between thrips and mites population with maximum and minimum temperature showed significant positive correlation between them (+0.426, +0.534 and +0.042, 0.013) and relative humidity (+0.543) respectively. Whereas, significantly negative correlation were observed between thrips and mites population with relative humidity (-0.814) and rainfall (-0.393 and -0.400). During the year of 2019-20, correlation studies between thrips and mites population with maximum and minimum temperature showed significant positive correlation between them (+0.521, +0.063 and +0.048) and relative humidity (+0.843) respectively. Whereas, significantly negative correlation were observed between thrips and mites population with relative humidity (-0.954) and rainfall (-0.421 and -0.450) respectively.

Keywords: *Scirtothrips dorsalis*, chilli crop, *Polyphagotarsonemus latus*

Introduction

Chilli (*Capsicum annum* L.) is one of the important spice cum vegetable crops of India and is being widely cultivated throughout warm temperate, tropical and subtropical countries. *Capsicum annum* L. (2n=24) is one of the important cash crops grown in almost all parts of the country and is widely grown in the tropics and subtropics as well as under glass houses in temperate regions.

Chilly occupied an area of 843 thousand hectares in India with annual production of 3678 thousand million tonnes in 2017-18 (Anonymous, 2018) ^[1]. Its productivity was reported to be 1.95 tonnes / hectare (Anonymous, 2015) ^[2]. In India, chilli is grown in an area of 7.43 L ha, with a production of 14.53 L tons. The important chilli growing states in India are MP, Orissa, Maharashtra, Karnataka and also in a number of other states as a round the year crop. In Madhya Pradesh, chilli is cultivated in an area of 1.89 L hectares with a production of 2.08 L tons. Guntur district in Andhra Pradesh alone contributes to over 35% in the area under chilli crop in India. The area Madhya Pradesh under chilli crop was 25.75 thousand hectare with annual production of 514.1 thousand million tonnes in 2015-16. The major chilli producing districts of Madhya Pradesh are Khandwa, Jhabua, Alirajpur, Devas, Shivpuri, Shahdol and Khargone (Anonymous, 2016) ^[3]. The area under Madhya Pradesh is high whereas, production and productivity is less significant. Although there are number of factors responsible for depressing the yield of chilli but incidence of various insect pests is one of major bottlenecks of production. The insect pests which cause significant damage to the crop are comprises of more than 39 genera and 51 species of insects and mite species in the field as well as in

the storage (Hosamani *et al.*, 2005) ^[5]. Pests are dynamic in nature and successions of pests occur with the nature of the agro-ecosystem and reports are available on the succession of the insect pests of chilli from the different parts of the country.

Aphids (*Myzus persicae*), thrip (*Scirtothrips dorsalis*), mites (*Polyphagotarsonemus latus*) and fruit borer (*Helicoverpa armigera*) are the major insect pests of chilli in Karnataka and elsewhere in the country, often resulting in significant crop losses (Ahmed *et al.*, 2005 and Kandasamy *et al.*, 1990) ^[4, 6]. As pesticide residues in chilli are of great concern from the point of exports and domestic consumption as well, nonchemical pest management strategies such as growing border crop of maize for the management of chilli pests is better approach.

Looking to the importance of insect pests in chili, it is necessary to develop an updated database of activity of insect pests and natural enemies in chilli in the zone besides working out the role of sowing dates & weather parameters for modifying the insect pest's dynamics. Simultaneously, the evaluation of safer means of insect pest's management needs attention.

Material and Methods

Population Dynamics of Chilli Thrips and Mites

Observation was recorded on 5 randomly selected plants/plot once in a standard meteorological week, from the first appearance of the pest and to maturity of the crop, corresponding weekly record of meteorological data *viz.*, minimum and maximum temperature, morning and evening relative humidity, total rainfall, number of rainy days, wind speed, sunshine, will be recorded.

The influences of different meteorological parameters on population will be assessed by the correlation analysis.

Table 1: Weekly Meteorological data recorded from Agricultural College Farm, Mhow, and Indore during crop growth period (1st Nov 2020 to 30th Dec 2020)

STD Week No.	STD Week period 2018—19	Temperature		Relative humidity (%)		Rainfall (mm)	Evaporation (mm.)
		Max	Min	Morn	Even	Weekly	Weekly
28	Sep. 9-15	34.30	28.5	91.5	71.7	063.2	2.7
29	Sep. 16-22	34.43	25.7	89.6	76.7	058.0	3.4
30	Sep. 23-29	34.16	25.5	94.0	72.7	070.0	2.1
31	Sep.-Oct. 25-1	34.78	25.6	91.7	73.8	045.4	3.9
32	Oct. 6-12	32.80	24.8	93.5	87.1	092.2	3.3
33	Oct 13-19	33.76	24.6	91.5	74.8	174.8	2.9
34	Oct 20-26	32.28	24.9	94.5	70.8	059.8	3.2
35	Oct- Nov 27-2	32.00	24.8	88.1	76.4	032.4	3.7
36	Nov. 3-9	29.77	24.9	73.2	61.8	000.0	5.8
37	Nov.. 10-16	30.19	24.9	83.4	48.7	000.0	6.1
38	Nov.. 17-23	30.40	23.8	78.4	57.7	044.0	3.9
39	Nov. 24-30	29.74	25.4	82.1	52.4	003.0	4.5
40	Dec. 1-7	29.98	22.6	75.5	55.9	036.4	2.2
41	Dec. 8-14	21.18	22.3	92.4	64.0	039.0	3.2
42	Dec. 15- 21	24.96	20.6	89.2	46.4	000.0	3.2
43	Dec. 22-28	25.92	17.0	88.4	41.1	000.0	2.8
44	Dec. – Jan 29-4	24.56	14.6	86.4	38.1	000.0	3.5

Similarly observations was recorded in six leaves covering two leaves each from upper, middle and lower canopy of the plant. Population of nymphs and adults of thrips was recorded on these leaf. In case of mites observations 15 leaves were collected from five locations and five plants. These leaves were kept in separate polythene bags and observations will be taken under the stereo zoom binocular microscope.

Result and Discussion

Correlation is Significant at the 0.01 Level

During the year of 2018-19, correlation studies between thrips and mites population with maximum and minimum temperature showed significant positive correlation between them (+0.426, +0.534 and +0.042, 0.013) and relative humidity (+0.543) respectively. Whereas, significantly negative correlation were observed between thrips and mites population with relative humidity (-0.814) and rainfall (-0.393 and -0.400).

Table 2: Correlation between population of major sucking pests and weather parameters during 2018-19

Insect Pests	Weather parameter			
	Rainfall (mm)	Relative Humidity (%)	Temperature (°C)	
			Max	Min
Chili Thrips	-0.393	+0.543	0.426*	0.042
Chili Mites	-0.400	-0.814	0.534*	0.013

*Correlation is significant at the 0.05 level.

During the year of 2019-20, correlation studies between thrips and mites population with maximum and minimum temperature showed significant positive correlation between them (+0.521, +0.063 and +0.048) and relative humidity

(+0.843) respectively. Whereas, significantly negative correlation were observed between thrips and mites population with relative humidity (-0.954) and rainfall (-0.421 and -0.450).

Table 3: Correlation between population of major sucking pests and weather parameters during 2019-20

Insect Pests	Weather parameter				
	Rainfall (mm)	Relative Humidity (%)		Temperature (°C)	
		Max	Min	Max	Min
Chili Thrips	-0.421	-0.552	-0.459	0.521*	0.063
Chili Mites	-0.450	+0.843	-0.633	-0.419*	0.048

Table 4: Incidence of population dynamics of chili thrips and mites during the 2018-19 in Malwa Region

Sr. No.	Standard Week	Thrips per 5 leaves	Mites per 5 leaves
1	21	0	0
2	22	1.44	1.80
3	23	2.20	4.87
4	24	3.65	4.60
5	25	5.78	4.98
6	26	6.78	5.23
7	27	4.96	5.87

8	28	5.58	3.74
9	29	6.69	3.09
10	30	5.05	4.65
11	31	7.38	6.72
12	32	7.71	7.98
13	33	8.15	6.64
14	34	8.59	6.55
15	35	11.21	7.49
16	36	8.11	7.37
17	37	10.90	8.21
18	38	11.04	8.94
19	39	8.41	9.12
20	40	8.15	8.11
21	41	8.20	8.54

In the present study we found that there was gradual rise in the thrips incidence after transplanting during the year 2018-19. The first appearance of thrips was observed when crop was two weeks old i.e. during 26th standard week Table 6. The population increased steadily and touched its peak during the first week of October with a mean of 11.21 thrips per leaf i.e. during the 41th week. After which the pest density remained more or less around the same figure. From the 47th standard week of November, the population started

gradually 8.20.

Similarly, the first appearance of thrips was observed when crop was two weeks old i.e. during 23rd standard week Table6. The population increased steadily and touched its peak during the first week of October with a mean of 11.21 thrips per leaf i.e. during the 41th week. After which the pest density remained more or less around the same figure. From the 47th standard week of November, the population started gradually 8.20.

Table 5: Incidence of population dynamics of chili thrips and mites during the 2019-20 in Malwa Region

Sr. No.	Standard Week	Thrips per 5 leaves	Mites per 5 leaves
1	21	0	0
2	22	1.44	1.80
3	23	2.20	4.87
4	24	3.65	4.60
5	25	5.78	4.98
6	26	6.78	5.23
7	27	6.16	5.87
8	28	5.58	3.74
9	29	6.69	3.09
10	30	5.05	4.65
11	31	7.38	6.72
12	32	7.71	7.98
13	33	8.15	6.64
14	34	8.59	6.55
15	35	11.01	7.49
16	36	8.11	7.37
17	37	10.90	8.21
18	38	11.04	8.94
19	39	7.41	9.12
20	40	6.15	8.11
21	41	8.11	8.54

In the present study we found that there was gradual rise in the thrips incidence after transplanting during the year 2019-20. The first appearance of thrips was observed when crop was two weeks old i.e. during 25th standard week Table 7. The population increased steadily and touched its peak during the first week of October with a mean of 11.04 thrips per leaf i.e. during the 41th week. After which the pest density remained more or less around the same figure. From the 41th standard week of November, the population started gradually 8.11.

Similarly, the first appearance of thrips was observed when crop was two weeks old i.e. during 24th standard week Table 7. The population increased steadily and touched its peak during the first week of October with a mean of 9.12 thrips per leaf i.e. during the 41th week. After which the pest density remained more or less around the same figure. From the 41th standard week of November, the population started gradually 8.54.

Discussion

Correlation studies between thrips and mites population with maximum and minimum temperature showed significant positive correlation. Whereas, significantly negative correlation were observed between thrips and mites population with the relative humidity.

Non- significant negative correlation was also recorded between whitefly and aphid population with minimum, maximum temperature and relative humidity. Whereas, in jassid with maximum temperature had negative and relative humidity had significantly positive correlation and significantly positively correlated with minimum temperature.

Screening of Chilli Varieties against Thrips

On the basis of the mean data of 10 week observations recorded at different dates after sowing of different

varieties. Minimum number of thrips (1) was recorded in Suryamukhi which was found significantly lesser number of thrips than the rest of varieties except Akashi. Among varieties, maximum thrips population (2.6) in Sonal which was found significantly higher than the rest of the varieties except in Bhangar, Pride 151 and Bullet. The variation in susceptibility among varieties could be due to certain inherited characters as well as due to variable environmental conditions from region and year to year.

These findings get support from those of Muhammad Rafiq Kethran *et al.* (2014) ^[7] different strategies have to be involved for keeping the pest in check and stabilizing the productivity of the cropping system. Date of planting is one of the crop habitat diversifications that are to be looked into, to minimize the incidence of insect pests on chilli crop so that its yield can be enhanced. The present study was conducted to observe the activity of insect pests of chilli crop using variety P-777 at Kunri, Mirpur Khas Sindh during (2014) which was based on a randomized complete block design (RCBD) with four sowing dates, i.e. January 15th (SD1), January 30th (SD2), February 15th (SD3) and February 28th (SD4) and replicated thrice. The observation of insect pests was recorded at weekly intervals from first week of transplanting up to maturity. The results showed that the maximum mean aphids, thrips, jassids whitefly and fruit borer population of 0.527, 3.68, 0.46, 5.49 and 0.427 leaf-1 were found in SD4 and minimum of 0.36, 1.83, 0.01, 3.41 and 0.27 leaf-1 were present in SD1.

Reference

1. Anonymous Horticultural Statistics at a Glance, 2018. Available from <http://agricoop.nic.in/sites/default/files/Horticulture%20Statistics%20at%20a%20Glance-2018.Pd>
2. Anonymous Horticultural Statistics at a Glance, 2015. Available from <http://agricoop.nic.in/sites/default/files/Horticulture%20Statistics%20at%20a%20Glance-2015.Pd>
3. Anonymous Horticultural Statistics at a Glance, 2016. Available from <https://www.statista.com/statistics/870940/chili-production-by-state-india/>.
4. Ahmed M. Marketing of chillies: problems and prospects. Agriculture Marketing Information Service Directorate of Agriculture (Economics and marketing) Punjab Lahore, Pakistan, 2005.
5. Hosamani AC, Thulasiram K, Patil BV, Bheemana M, Hanchinal SG. Fenpropathrin (Meothrin) 30 EC an ideal insecticide for chilli (*Capsicum annum*L) pest management. *Pestology*,2005;24(2):21-24.
6. Kandasamy C, M Mohanasundaram, P Karuppachamy. Evaluation of insecticides for the control of thrips. *Scirtothrips dorsalis* Hood in chillies (*Capsicum annum* L.). *The Madras Agric. J*,1990;77:169-172.
7. Muhammad Rafiq Kethran, YingYing Sun, Shahbaz Khan, SanaUllah Baloch, LL Wu, TT Lu Yang Yang *et al.* Effect of Different Sowing Dates on Insect Pest Population of Chillies (*Capsicum annum* L *Journal of Biology, Agriculture and Healthcare* www.iiste.org, 2014, 4:25.