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## Studies on seasonal incidence of thrips (*Scirtothrips* sp.) on pomegranate (*Punica granatum*) and it's correlation with abiotic factors

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### Abstract

The present investigation was conducted at Dry Land Horticulture Research Farm, Pt. Shiv Kumar Shastri College of Agriculture & Research Station, Surgi; district Rajnandgaon during *Kharif-Rabi*, 2020-21. In the pest succession studies, twenty four insect pests were recorded causing damage at various growth stages of pomegranate. Among them thrips; *Scirtothrips* sp. was recorded as major insect pests of pomegranate. The studies revealed that the first appearance of thrips was during 1<sup>st</sup> week of August (31<sup>st</sup> SMW) with a mean population 2.50 thrips/5 cm shoot and peak population 5.50 thrips/5 cm shoot was recorded during third week of December (51<sup>st</sup> SMW). Study on correlation with abiotic factors revealed a highly significantly negative relationship was found between thrips with maximum temperature ( $r = -0.457$ ) while morning relative humidity showed highly significantly positive correlation ( $r = 0.449$ ).

**Keywords:** Pomegranate, *Punica granatum*, thrips, *Scirtothrips* sp, abiotic factor

### Introduction

Pomegranate (*Punica granatum* L.) is an important fruit crop grown in India. It is originated in Iran and extensively pomegranate farming is done in the Mediterranean countries like Spain, Morocco, Egypt, Iran, Afghanistan and Baluchistan. It is cultivated to some extent in Myanmar, China, USA and India. India ranks first in pomegranate cultivation in the world (Balikai *et al.*, 2011). Pomegranate fruit is nutritious, rich in minerals, vitamins and proteins. Pomegranates have an impressive nutrient profile one cup of arils (174 grams) contains 7 gm fibers, 3 gm proteins, 30% vitamin C of the RDI, 36% vitamin K of the RDI, 16% folate of the RDI and 12% potassium of the RDI (Anonymous, 2018). Like any other crop pomegranate is also susceptible to attack of several insect pests.

The pomegranate, (*Punica granatum*), belongs to family Lythraceae. An attractive shrub or small tree, with average height of 20-30 feet, the pomegranate is much-branched, more or less spiny and extremely long-lived. The leaves are evergreen or deciduous, showy flowers are singly or 5 in cluster form. Pomegranate produce best on deep, heavy loams, but are adapted to many soil types from pure sand to heavy clay. Growth on alkaline soil is poor. Optimum growth is associated with deep fairly heavy, moist soil of pH (5.5-7.0). As many as 50 different insect pest species have been reported on various parts of pomegranate from different parts of India. Pomegranate trees are attacked by about 45 species of insects (Butani, 1979), 32 insect and non-insect pests (Balikai, 2000) <sup>[5]</sup>, more than 50 species of insects (Varghese and Jayanthi, 2001) and 33 insect pests (Balikai *et al.*, 2003). The present study was under taken to get the information of seasonal incidence of thrips on pomegranate which is essential as this provide information on status and losses caused by thrips and its correlation with the weather parameters also help in identifying the vulnerable stages of the crop. This information helps in developing an efficient management model for the insect pests attacking at various growth stages of crop.

### Materials and Methods

Field experiments were conducted at Dry Land Horticulture Research Farm, Pt. SKS College of Agriculture & Research Station, Surgi, Rajnandgaon during *kharif rabi*, 2021-22. To know the seasonal incidence of insect pests associated with the pomegranate crop, population of fruit borer and thrips were taken at weekly intervals on the *Bhagwa* variety of pomegranate. Population of thrips was recorded by counting the number of nymphs and adults from

randomly selected five new shoots (each of 5 cm shoot length) from all four directions (E, W, N, S) of each plant, by shaking the shoots on white hard cardboard. The data obtained was correlated with various abiotic factors and correlation coefficient was worked out. The graphical representation was also applied to depict the seasonal incidence of thrips and fruit borer.

### Result and Discussion

Seasonal incidence of thrips; *Scirtothrips* sp. and fruit borer; *Deudorix* sp infesting pomegranate crop during *kharif-rabi*, 2021-22 is presented in Table 1.1. The incidence of thrips was first recorded on pomegranate in the first week of August (31<sup>st</sup> SMW) with a mean population of 2.50 thrips/5 cm shoot. This pest was active throughout the year on pomegranate crop. Its population increased slowly and reached to first peak was 3.87 thrips/5 cm shoot during the fourth week of August (34<sup>th</sup> SMW). Thereafter, the pest population suddenly declined up to 1.00 thrips/5 cm shoot due to rainfall of 33.68 mm. The maximum population of thrips 5.50 thrips/5 cm shoot recorded during fourth week of December (51<sup>st</sup> SMW). After that, the population was gradually declined and reached to minimum population of 0.50 thrips/5 cm shoot during fourth week of March (13 SMW) with the seasonal mean of 2.63 thrips/5 cm shoot. Butani and Verma (1980) and Jadhao *et al.* (2015) reported that thrips *S. Dorsalis* as a polyphagous pest and also found on pomegranate crop throughout the year. This finding is in agreement with the present studies. The population of pomegranate thrips was reached to a maximum of 12.50 thrips/5 cm twig during second fortnight of December was reported by Ayyar (2006) which is in accordance with the present findings.

### Correlation and regression with different weather parameters

Studies on correlation indicated that the population of thrips was highly significant negatively influenced with maximum temperature ( $r = -0.457$ ). However, morning relative humidity showed highly significant positive impact on thrips population ( $r = 0.449$ ). The finding of Bhagas (2015) supported the present investigation where they reported that thrips population was significantly negatively correlated with maximum and minimum temperature whereas positive and significant relationship with morning and evening relative humidity with the population of *S. dorsalis*. A significant and negative correlation was recorded between maximum temperature ( $-0.54^{**}$ ) and *S. dorsalis* population, reported by Venu Gopal (2016) which is in agreement to the present studies. A positive and significant correlation among the population of *S. dorsalis* and that of morning RH and evening RH were reported by Jadhav *et al.* in 2019 [8] which is in accordance with the present one.

Regression equation for maximum temperature was:

$$y = 8.223 - 0.179x \quad (R^2 = 0.209)$$

Where, x = maximum temperature (°C)

The above equation revealed that increase in every unit of maximum temperature, thrips population decreased by 0.179.

Regression equation for morning relative humidity was:

$$y = -4.512 + 0.082x \quad (R^2 = 0.201)$$

Where, x = morning relative humidity (%)

The above equation indicated that every unit increase in morning relative humidity, the population of thrips also increased by 0.082.

To see the combined effect of weather parameters on thrips population, multiple regression equation was derived and expressed as:

$$y = -0.329 - 0.002 X_1 - 0.183 X_2 - 0.035 X_3 + 0.001 X_4 + 0.084 X_5 + 0.390 X_6 \quad (R^2 = 0.449)$$

The above equation indicated that coefficient of multiple regression  $R^2$  was non-significant in all-weather parameters.

On the basis of present investigation maximum and minimum temperature of 27.66°C and 10.27°C and morning and evening relative humidity of 85.71% and 29.14%, respectively with no effect of rainfall were found congenial for thrips multiplication in pomegranate ecosystem.

**Table 1.1:** Weekly population of thrips on pomegranate during *kharif-rabi*, 2021-22 at Surgi, Rajnandgaon

SMW	Date of observation	Thrips / 5cm shoot
31	05-08-2021	2.50
32	12-08-2021	1.46
33	19-08-2021	2.15
34	26-08-2021	3.87
35	02-09-2021	1.00
36	09-09-2021	2.10
37	16-09-2021	2.58
38	23-09-2021	3.18
39	30-09-2021	4.72
40	07-10-2021	3.02
41	14-10-2021	2.63
42	21-10-2021	0.52
43	28-10-2021	2.76
44	03-11-2021	1.10
45	11-11-2021	4.50
46	18-11-2021	3.92
47	25-11-2021	1.25
48	02-12-2021	2.80
49	09-12-2021	3.32
50	16-12-2021	4.20
51	23-12-2021	<b>5.50</b>
52	31-12-2021	3.82
1	07-01-2022	2.30
2	13-01-2022	2.24
3	21-01-2022	4.00
4	28-01-2022	4.72
5	04-02-2022	3.56
6	11-02-2022	3.10
7	18-02-2022	2.32
8	25-02-2022	2.00
9	04-03-2022	1.48
10	11-03-2022	1.27
11	17-03-2022	0.95
12	25-03-2022	0.85
13	31-03-2022	0.50
Seasonal mean		2.63

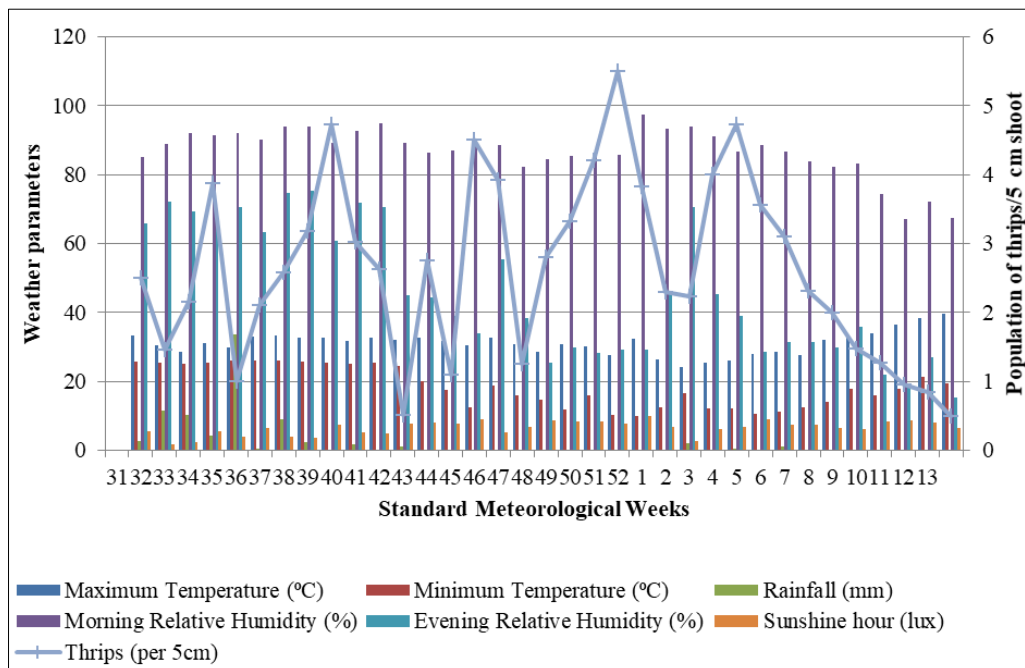
**Table 1.2:** Effect of weather parameters on seasonal fluctuation of major insect pests on pomegranate during *kharif-rabi*, 2021-22 at Surgi, Rajnandgaon

SMW	Date of observation	Temperature (°C)		Rainfall	Relative Humidity (%)		Sunshine	Thrips/5 cm shoot
		maximum	minimum		morning	evening		
31	05-08-2021	33.28	25.86	2.80	85.14	65.86	5.53	2.50
32	12-08-2021	30.48	25.46	11.68	89.00	72.28	1.84	1.46
33	19-08-2021	28.44	25.13	10.17	91.86	69.43	2.41	2.15
34	26-08-2021	31.00	25.46	4.26	91.43	69.14	5.46	3.87
35	02-09-2021	29.76	25.90	33.68	92.14	70.57	4.02	1.00
36	09-09-2021	32.88	25.95	0.43	90.14	63.28	6.53	2.10
37	16-09-2021	33.17	25.97	9.14	94.00	74.71	3.84	2.58
38	23-09-2021	32.68	25.77	2.34	94.00	75.43	3.50	3.18
39	30-09-2021	32.80	25.26	0.00	89.28	60.71	7.48	4.72
40	07-10-2021	31.80	24.96	1.83	92.71	71.80	5.20	3.02
41	14-10-2021	32.53	25.26	0.00	95.00	70.43	4.84	2.63
42	21-10-2021	31.94	24.41	1.00	89.14	44.86	7.66	0.52
43	28-10-2021	32.56	20.11	0.00	86.43	44.43	7.93	2.76
44	03-11-2021	31.80	17.43	0.00	86.86	39.00	7.80	1.10
45	11-11-2021	30.31	12.53	0.00	89.71	34.00	9.03	4.50
46	18-11-2021	32.67	18.93	0.00	88.43	55.43	5.17	3.92
47	25-11-2021	30.67	15.90	0.05	82.14	38.28	6.93	1.25
48	02-12-2021	28.60	14.66	0.00	84.43	25.57	8.78	2.80
49	09-12-2021	30.67	11.88	0.00	85.28	29.71	8.44	3.32
50	16-12-2021	30.16	15.80	0.00	86.14	28.28	8.48	4.20
51	23-12-2021	27.66	10.27	0.00	85.71	29.14	7.83	5.50
52	31-12-2021	32.47	9.88	0.00	97.28	29.14	9.93	3.82
1	07-01-2022	26.33	12.44	0.00	93.28	45.43	6.87	2.30
2	13-01-2022	24.28	16.60	2.14	94.00	70.57	2.84	2.24
3	21-01-2022	25.34	12.20	0.00	91.00	45.43	6.07	4.00
4	28-01-2022	25.97	12.07	0.43	86.71	39.00	6.74	4.72
5	04-02-2022	27.81	10.74	0.00	88.43	28.43	8.86	3.56
6	11-02-2022	28.47	11.36	1.00	86.57	31.43	7.47	3.10
7	18-02-2022	27.64	12.34	0.00	83.86	31.57	7.30	2.32
8	25-02-2022	31.89	14.21	0.00	82.14	29.71	6.33	2.00
9	04-03-2022	33.08	17.88	0.00	83.28	35.86	6.16	1.48
10	11-03-2022	33.81	16.10	0.00	74.28	21.86	8.53	1.27
11	17-03-2022	36.53	17.94	0.00	67.00	18.28	8.71	0.95
12	25-03-2022	38.50	21.46	0.00	72.14	27.00	7.94	0.85
13	31-03-2022	39.52	19.53	0.00	67.50	15.17	6.57	0.50
Overall seasonal mean								<b>2.63</b>

**Table 1.3:** Correlation coefficient (r) of different weather parameters on thrips of Pomegranate

Weather parameter	Correlation coefficient (r)
Maximum Temperature (°C)	-0.457**
Minimum Temperature (°C)	-0.339
Rainfall	-0.248
Morning Relative Humidity (%)	0.449**
Evening Relative Humidity (%)	0.058
Sunshine hours (lux)	0.177

\*Significant at 5%, \*\*Significant at 1%



**Fig 1.1:** Effect of weather parameters on seasonal fluctuation of thrips on pomegranate during *kharif-rabi*, 2021-22 at Surgi, Rajnandgaon.

## Conclusion

The result of present study concluded that the first appearance of thrips population was recorded during the first week of August (31<sup>st</sup> SMW) with the population 2.50 thrips/5 cm shoot. Thrips was seen to be active throughout the cropping season with population range from 0.50 to 5.50 thrips/5 cm shoot. Total five peaks of thrips were recorded out of which, the highest peak population of 5.50 thrips/5 cm shoot was recorded during third week of December (51<sup>st</sup> SMW) with the seasonal mean 2.63 thrips/5 cm shoot.

The average seasonal fluctuation in the population of *Scirtothrips* sp. was first seen in the first week of August with 2.50 thrips/5 cm shoot which was associated with 33.28°C of maximum temperature and 25.86°C of minimum temperature, morning and evening relative humidity of 91.43% and 69.14%, respectively with rainfall of 4.26 mm. During the course of study, highest peak of 5.50 thrips/5 cm shoot was recorded during third week of December with the coincide of 27.66°C and 10.27°C maximum and minimum temperature and 85.71 and 29.14 per cent morning and evening relatively humidity, respectively with no effect of rainfall. Population of thrips was highly significant negatively influenced with maximum temperature ( $r = -0.457$ ). However, morning relative humidity showed highly significant positive impact on thrips population ( $r = 0.449$ ).

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