Original Research Article

SEASONAL ABUNDANCE OF THRIPS IN *RABI* ONION UNDER SOUTHERN TELANG CLIMATIC CONDITIONS

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ABSTRACT

Aims: Onion (*Allium cepa* L.) belongs to family Amaryllidaceae (Alliaceae) is one of the most important commercial vegetable and condiment crop grown in India. Given the economic significance of the crop, the current study was conducted to determine the population fluctuations in thrips population in relation to weather parameters.
Study design:RBD (One factor Analysis)
Place and Duration of Study: Theexperimentwascarriedout at Vegetable Research Station, ARI, SKLTSHU, Rajendranagar, Hyderabad during *Rabi* 2023-24.
Methodology: 300 m^2 plot was demarcated for seasonal incidence studies and the area was divided into five quadrants *i.e.,* four on the corners and fifth was taken in the middle of the plot. The observations were recorded on the number of thrips per plant by selecting 10 plants randomly from each quadrant at weekly intervals *i.e.,* SMW wise from transplanting till harvest during morning hours between 7.00 AM to 9.00 AM through visual counting by tapping method using 10X magnifying lens (Apexel 2 in 1 12x/24x Super Macro Mobile Lens).
Results: The initial infestation of thrips (5.64 thrips/plant) was observed during the seedling stage *i.e.,* fifteen days after transplantation (51st SMW) and the peak population of the (42.34 thrips/plant) was recorded during 8th SMW at the physiological maturity stage. It was observed that there was a significantly positive correlation with maximum temperature (r=0.831**) and minimum temperature (r=0.602*), was found to be non-significant and negatively correlated with morning relative humidity (r=-0.496), significant and negatively correlated with evening relative humidity (r=-0.837**).
Conclusion: Studies on the seasonal abundance of thrips in *Rabi* onion are essential for understanding their population fluctuations and aid in developing forecasting models and devising appropriate management strategies based on the crop's growth stage.

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Keywords: Seasonal abundance, onion thrips, *rabi*2023-24, correlation, weather parameters.

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1. INTRODUCTION

Onion (*Allium cepa* L.) belongs to family Amaryllidaceae (Alliaceae) is one of the most important commercial vegetable and condiment crop grown in India for more than 5000 years. It is consumed throughout the socio- economic spectrum[1]. India is the second largest onion producing country in the world, next to China. Nutritional values in raw onion are 107.3 mg, 136.8 mg, 3.78 %, 86 %, 9.11 mg, 3.17 mg, 60.4 mg and 4.7 % of phosphorus, potassium, soluble protein, water, sodium, magnesium, calcium, and soluble sugars, respectively. It also contains 9 - 10 % of carbohydrates in the form of glucose and fructose, 0.9 - 2.6 % of fiber of total weight of onion [2]. Onion crop is subjected to attack by various insect pests right from seedling stage to harvest, that can reduce yield and quality. The major pests infesting onion crop are thrips, *Thrips tabaci* (Lindeman), head borer, *Helicoverpa armigera* (Hubner), onion maggot, *Delia antiqua* (Meigen), tobacco caterpillar, *Spodoptera litura* (Fabricius) and cut worm, *Agrotis ipsilon* (Hufn.) [3]. Among the insect pests, onion thrips, *Thrips tabaci* is one of the major limiting factor in reducing

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the productivity and reported to cause significant economic losses up to 30 – 50 % [4].

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It is a cosmopolitan pest which is recorded on more than 300 species of host plants *viz.,* cabbage, cotton, carnation, garlic, onion and cereals especially wheat [5]. Both nymphs and adults are the damaging stages which feed by rasping the leaves and other tissues of plant and suck the oozing sap. As a result of continuous feeding, the plant leaves curl, wrinkle, show silver patches and streaks and gradually dry up, resulting in shrivelled bulb and seed formation. Besides direct damage to foliage, it can indirectly aggravate purple blotch [6]. It is also a vector of “Iris Yellow Spot Virus” which is a tospovirus causing adverse effects on bulb and seed yield of onion crop in India. It is well established fact that incidence of insect pests depends on climatic condition, crop growth stage and natural enemies at a particular time. Hence knowledge on seasonal incidence and abiotic factors like temperature, rainfall, relative humidity cause a significant effect on the infestation of the specific pest on a given crop. So, a basic understanding of the relationship of these climatic factors with thrips population is important for developing an integrated pest control strategy for thrips in onion crop for a given climatic trend. Therefore, keeping the above facts in view, the present study was carried out in *rabi* onion to know the seasonal abundance of onion thrips and its relation to weather parameters.

2. MATERIAL AND METHODS

Theexperimentwascarriedout at Vegetable Research Station, ARI, SKLTSHU, Rajendranagar, Hyderabad during *Rabi* 2023-24 at an elevation of 243.84 m above Mean Sea Level, lying between 17° 19' 36.99" N latitude and 78° 23' 32.57" E longitude. Agro-climatically it falls under the Southern Telangana Zone (STZ). Seedlings of onion varietyAgrifound dark red were raised in a nursery (18.75 m^2) and 30 day old seedlingswere transplanted in main field with a spacingof30×10cm.300 m^2 plot was demarcated for seasonal incidence studies and the area was divided into five quadrants *i.e.,* four on the corners and fifth was taken in the middle of the plot. The observations were recorded on the number of thrips per plant by selecting 10 plants randomly from each quadrant at weekly intervals *i.e.,* SMW wise from transplanting till harvest during morning hours between 7.00 AM to 9.00 AM through visual counting by tapping method using 10X magnifying lens (Apexel 2 in 1 12x/24x Super Macro Mobile Lens). The mean population of thrips per plant was calculated and the data was correlated with weather parameters *viz.,* maximum and minimum temperature (°C), morning and evening relative humidity (%), rainfall (mm), rainy days, sunshine hours, wind speed (km/hr), evaporation (mm) which was collected from Meteorological Observatory of Agro Climate Research Centre, PJTSAU, Rajendranagar, Hyderabad, Telangana.

3. RESULTS AND DISCUSSION

3.1 Seasonal abundance of *Thrips tabaci* L. infesting *Rabi* onion:

Weekly observations of the thrips population on onion plants were taken from December, 2023 to April, 2024 on 10 randomly selected plants per quadrant. The thrips population gradually increased during the crop period and ranged between 5.62 – 42.34 thrips/plant. The initial infestation of thrips (5.64 thrips/plant) was observed during the seedling stage *i.e.,* fifteen days after transplantation (51st SMW) where in maximum & minimum temperature, morning & evening relative humidity, sunshine, windspeed, evaporation were 27.57ºC, 13.71ºC, 76.42 %, 38.85 %, 6.07 hours, 3.14 km/hr, 3.06 mm respectively. The above findings are in confirmation with the earlier research work done by [7][8].The peak population of thrips(42.34 thrips/plant) was recorded during 8th SMW at the physiological maturity stage. At this point the weather data was 27.85 %, 81.28 %, 36.21ºC, 17.71ºC, 8.8 hours, 3.61 km/hr, 5.5 mm of evening relative humidity, morning relative humidity, maximum temperature, minimum temperature, sunshine hours, wind speed, evaporation respectively. After the peak incidence, there was a gradual decline in thrips population *i.e.,* 41.29, 32.16, 26.29 thrips/plant during the 9th, 10th, 11th standard meteorological weeks respectively. Similar findings were observed by [9][10][11].

3.2 Correlation studies on the incidence of thrips population with weather parameters

The data pertaining to incidence of thrips population was given in Table 1 and correlation of thrips population with weather parameters was presented in Table 2. It was observed that there was a significantly positive correlation with maximum temperature (r=0.831**) and minimum temperature (r=0.602*). This positive correlation with temperature was because, maximum temperature favoured faster development and higher number of generation of thrips [12] (Bergant *et al.,* 2003) as they breed fast during dry weather so as to attain harmful proportions [13][14]. The thrips population was found to be non-significant and negatively correlated with morning relative humidity (r=-0.496), significant and negatively correlated with evening relative humidity (r=-0.837**). The population was found to be non-significant and positively correlated with sunshine hours (r=0.272), and there was a significant and positive correlation with wind speed (r=0.595*) and evaporation (r=0.876**). There was no rain recorded during the crop period and hence no correlation was done with rainfall and rainy days. The results are in accordance with [15], who reported that thrips population was positively correlated with maximum (r=0.848**) and minimum temperature (r=0.637**), it was negatively correlated with morning relative humidity (r=-0.803) and evening relative humidity (r=-0.686) and the population was positively correlated with wind velocity (r=0.268) and sunshine hours

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(r=0.663). The data was in accordance with [11][16][17][18][19].

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Table1 Seasonal abundance of thrips in onion in relation to weather parametersduring *Rabi*, 2023-24.

SMW	Thrips * (No./plant)	Temperature (°C)		Relative Humidity (%)		Sunshine hours (hrs)	Windspeed (km/hr)	Evaporation (mm)
		T_{max}	T_{min}	RH-I	RH-II			
51 (17 - 23 DEC)	5.64	27.57	13.71	76.42	38.85	6.07	3.14	3.06
52 (24 - 31 DEC)	9.16	29.07	13.28	89.28	37.28	7.34	2.70	3.11
1 (1-7 JAN)	11.21	28.71	15.35	89.71	38.14	7.64	3.91	3.12
2 (8-14 JAN)	16.14	29.42	16.64	87.57	36.28	5.17	3.65	2.95
3 (15-21 JAN)	19.81	31.14	16.21	83.42	37.00	7.40	3.11	3.85
4 (22-28 JAN)	21.07	30.57	17.21	84.42	39.28	6.70	3.87	4.05
5 (29JAN- 4FEB)	25.01	30.78	15.57	87.28	31.71	19.24	3.35	4.27
6 (5-11 FEB)	27.23	33.85	18.64	83.71	34.57	8.20	3.82	4.94
7 (12-18 FEB)	33.95	33.14	15.28	83.00	21.14	9.32	4.37	5.52
8 (19-25 FEB)	42.34	36.21	17.71	81.28	27.85	8.80	3.61	5.50
9 (26 FEB-4 MAR)	41.29	36.07	19.35	71.85	26.42	9.21	4.58	5.95
10 (5-11 MAR)	32.16	34.28	21.07	75.71	28.14	8.10	4.28	6.42
11 (12-18 MAR)	26.29	34.07	22.50	76.71	32.57	5.42	4.92	5.98

SMW- Standard Meterological week, T_{max}-Max temperature, T_{min}-Min temperature,RH-I -Morning Relativehumidity, RH-II – Evening Relativehumidity, * Mean population of five replicates.

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. Table2Correlation coefficient of onion thrips in relation to weather parameters during *Rabi*, 2023-24.

Weather parameters	Thrips incidence Correlation coefficient ('r' value)
T_{max} (ºC)	0.831^{**}
T_{min} (ºC)	0.602^{*}
RH-I (%)	-0.496^{NS}
RH-II (%)	-0.837^{**}
Sunshine hours	0.272^{NS}
Windspeed (km/hr)	0.595^{*}
Evaporation (mm)	0.876^{**}

NS – Non-Significant, * Significance at 5 % level, ** Significance at 1 % level

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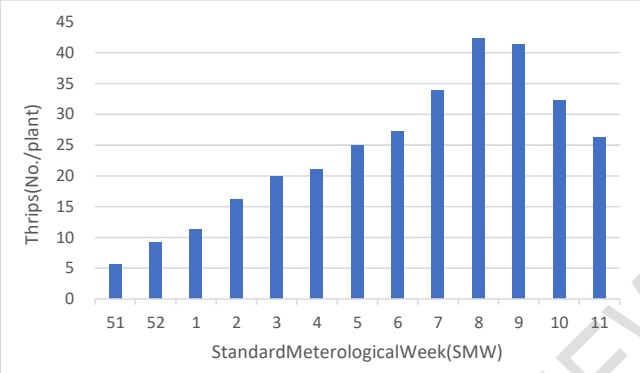

Fig1.Seasonalabundanceofonionthrips (*Thripstabaci*)during *Rabi*2023-24

4. CONCLUSION

The incidence of thrips was recorded during 51st SMW and attained its peak during the 8th SMW and a further decline in thrips population was noticed. A notably positive association was observed with both the minimum temperature and the maximum temperature where as it had a significant negative correlation with evening relative humidity and a non-significant negative correlation with morning relative humidity. The population showed a significant and positive association with wind speed and evaporation, but non-significant and positive correlation with sunshine hours.

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4.1 FUTURE SCOPE

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Studies on the seasonal abundance of thrips in *Rabi* onion are essential for understanding their population fluctuations and aid in developing forecasting models and devising appropriate management strategies based on the crop's growth stage. It also helps in long term planning by providing valuable data regarding thrips incidence and allowing farmers to identify trends & their patterns. It also promotes environmental sustainability by reducing the reliance on broad-spectrum insecticides through targeted application. This approach promotes sustainable agricultural practices and reduces chemical residues in the environment as well as harvested crops.

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