Seasonal Activities of thrips(*Thripstabaci* Lindeman.) in onion and theirRelation with the Various Environmental Factors

Abstract:

Aim: To study the population dynamics of thrips(*Thripstabaci* Lindeman)infesting onion in relation to weather parameters

Study Design: Field trail; Randomized Block Design.
Place and Duration of Study: The study was conducted atCollege farm at Navsari Agricultural University (NAU) Southern Gujarat, INDIA during Rabi of 2022-23 and 2023-24.

Methodology: For observations of thrips (*Thripstabaci*Lindeman), the whole experimental plot was divided in five sectors and 5 plants were randomly selected from each sector. The observations on absolute thrips population were recorded at weekly interval by counting the number of thrips per plant during morning hours starting from one week after transplanting till to harvesting of the crop.

Results: Thrips population initiated during 3rd week of December (51st Standard Meteriological Week) during both the year in the range of 2.25 to 15.87, 1.60 to 24.50 and 2.51 to 18.85 thrips per plant with an average of 6.67, 10.54 and 8.60 per plant during 2022, 2023 and in average of two years. The highest peak (15.87 /plant) was observed during 3rd week of February (8th Standard Meteriological Week) in 2022 whereas, during 4th week of February (9th Standard Meteriological Week) in 2023 as well as in average of two years with a population of 24.50 and 18.85 per plant, respectively. Thrips population had highly significant positive correlation with MaxT (r=0.678) whereas, highly significantly negatively correlated with Evening Relative Humidity (r = -0.727) during 2022. The population of thrips highly significantly positively correlated with Bright Sunshine Hours (r=0.672) during 2023. The other weather parameters had no role on incidence of thrips as the results were non-significant.

Conclusion: results of population dynamics of thrips (*Thripstabaci*) on Onion for both the years, it can be concluded that the infestation of thrips was higher during 5th week of January to 1st week of March on onion.

Keywords: Thrips, *Thripstabaci,* Lindeman.), Onion, Population dynamics, Weather parameters

Introduction:

The onion (*Allium cepa* L.) is a common vegetable plant in the *Alliaceae* family. The onion commonly known as the bulb onion or common onion is the genus Allium's most frequently farmed species. Onion (*A. cepa*) is one of the important vegetables (bulb) crop, believed to have originated from Central Asia. In India, it is cultivated for more than 5000 years. According to colour, there are red, white and yellow types. Red and white varieties are grown in India. Onions is a critical source of numerous phytonutrients as flavonoids, fructooligo saccharides (FOS), and thiosulfates and other sulfur compounds, identified as crucial factors of the Mediterranean eating regime Liguori*et al.,*[7]. Onion is a main supply of phytochemicals beneficial for human health and wealthy in sulphur compounds accountable for their usual odour and flavour Loredana *et al.,* [8]. In Gujarat, major onion growing districts are Bhavnagar, Junagadh, Jamnagar, Rajkot, Amreli, Surendranagar, Mehsana, Surat and Kheda. The area production in onion in Gujarat state have increased during last decade. The area under cultivation was about 100 thousand ha and production of about 25.55 lacs MT. According to Hill [4], insect pest attacking the onion are onion thrips (*Thripstabaci* Lindeman), onion fly (*Delia hylema*), aphids (*Myzusascalomicus*), cut worm (*Agrotisipsilon*), onion maggot (*Delia anticua*), army worm (*Spodopteraexiqua*) and leaf miner (*Liriomyzatrifolii*B.). Of these thrips, *T. tabaci*

is one of the common and the most damaging pest of onion. This polyphagous insect occurs worldwide and attacksvirtually all Allium crops Lal and Singh, [6] and Gupta *et al.,* [3]. Thrips attack onion at all the stages of crop growth, but their number increases from bulb initiation and remains high up to bulb development till maturity. Nault*et al.,*[9] reported about 30-50 per cent and also causes significant reduction (28-73%) in the bulb size. Moreover, weather parameters also play a pivotal role in the biology of any insect pests. Temperature, humidity, sun shine hours and wind velocity are the most crucial weather parameters influencing the rate of growth and development of insect pests.

2.0- Materials and Methods:

2.1 Research location

Onion was transplanted during third week of December and raised by adopting recommended agronomical practices at College Farm, N. M. College of Agriculture, NavsariAgricultural University, Navsari. The crop was sown during Rabi in the years 2022-23 and 2023-24.

2.2- Methodology

The Agrifound light red variety of onion raisedon the experimental plot of 20 × 20 m^2 size with the spacing 15 cm x 10 cm. The crop was sown in second week of December. The plot was kept insecticide free for pest development. For observations of thrips, the whole experimental plot was divided in five sectors and 5 plants were randomly selected from each sector. The observations on absolute *Thripstabaci* population were recorded at weekly interval by counting the number of thrips per plant during morning hours starting from one week after transplanting till to harvesting of the crop.

The data on weather parameters were collected from meteorological observatory of College farm, Department of Meterology, N. M. College of Agriculture, Navsari Agricultural University for the investigation. The relationship between meteorological variables viz., maximum temperature (MaxT), minimum temperature (MinT), morning relative humidity (RH1), evening relative humidity (RH2), bright sunshine hours (BSS) and wind speed (WS) and pest population was studied. The weekly mean observation made on insect pests was subjected to Pearson's correlation coefficient analysis. Also, correlation analysis was conducted for the data of number of thrips per plant with weather parameters.

3.0 Result and Discussion:

The data presented in the (Column 4 in Table 1), reveals that the pest population started from 2ndWeek After Transplanting, i.e., 51stStandard Meteriological Week. The pest population of thrips fluctuated from 1.82 to 15.87 thrips/plant. The pest activity gradually increased from the 1stStandard Meteriological Week to 3rdStandard Meteriological Week, then a slight decline was seen the following week i.e., on 4thStandard Meteriological Week. After that, the population gradually increased till the peak pest population was observed. The peak activity was seen in 8thStandard Meteriological Weekwhen highest number of thrips per plant i.e., 15.87 thrips/plant was recorded. After that, it gradually declined till the harvest.

The data recorded in the year 2023-24 (Column 5 in Table 1) (Fig. 1), was found to be similar to the data of the previous season. The pest population started from 2nd week of transplanting during 3rd week of December (51stStandard Meteriological Week) and remained in the field up to 4th week of March (13thStandard Meteriological Week) in the range of 1.60 to 24.50 thrips per plant with an average of 10.54. The population further increased during next week and found increasing upto 4th week of February and reached to the highest peak (24.50 per plant) during 4th week of February (9thStandard Meteriological Week). The incidence of thrips gradually decreased then after upto the harvest of the crop.

The average data of two years on thrips population (Column 6 in Table 1) revealed that the thrips appeared from 3rd week of December (50thStandard Meteriological Week, 2ndWeek After Transplanting)) and persisted throughout the crop season up to 4th week of March (13thStandard Meteriological Week, 16thWeek After Transplanting). The incidence of thrips was at the highest peak (18.85 per plant) during 4th week of February (9thStandard Meteriological Week. The population was

in range of 2.01 to 18.85 thrips per plant with 8.60 mean population. In nutshell, the thrips population in rabi onion crop was observed higher during last week of January to 1st week of March.Patel [11]observed the higher incidence of thrips on onion during first week of February and remained in the field till to crop maturity at Anand. Pansee*t al.*[10]noticed the peak thrips population during 10th meteorological standard week. According to Patel and Patel [12], thrips population initiated after 1st week after transplanting and attended its highest peak during 2nd week of March and remained in field till to crop matured.Chhatrola*et al.*[2] also reported higher activity of thrips in garlic during 9th to 16thweek after transplanting. Kumawat*et al.* [5]recorded the incidence of thrips on onion during 3rd week of February (3.66 /plant) and peaked during the last week of March (40.32thrips /plant).

Table 1: Population dynamics of thrips, *T. tabaci* on onion

Months and Weeks		Weeks after transplanting	Std. Meteorological Week	No. of thrips /plant		Average
				2022	2023	
1		2	3	4	5	6
December	II	1	50	0.00	0.00	0.00
	III	2	51	2.42	1.60	2.01
	IV	3	52	3.10	3.24	3.17
January	I	4	1	2.25	4.84	3.54
	II	5	2	3.94	5.61	4.77
	III	6	3	5.38	3.22	4.30
	IV	7	4	3.61	8.40	6.00
	V	8	5	8.55	12.20	10.37
February	I	9	6	10.73	14.81	12.77
	II	10	7	12.40	16.33	14.36
	III	11	8	15.87	20.54	18.21
	IV	12	9	13.20	24.50	18.85
March	I	13	10	11.68	22.34	17.01
	II	14	11	7.55	15.72	11.63
	III	15	12	4.21	10.11	7.16
	IV	16	13	1.82	5.24	3.53
			Mean	**6.67**	**10.54**	**8.60**

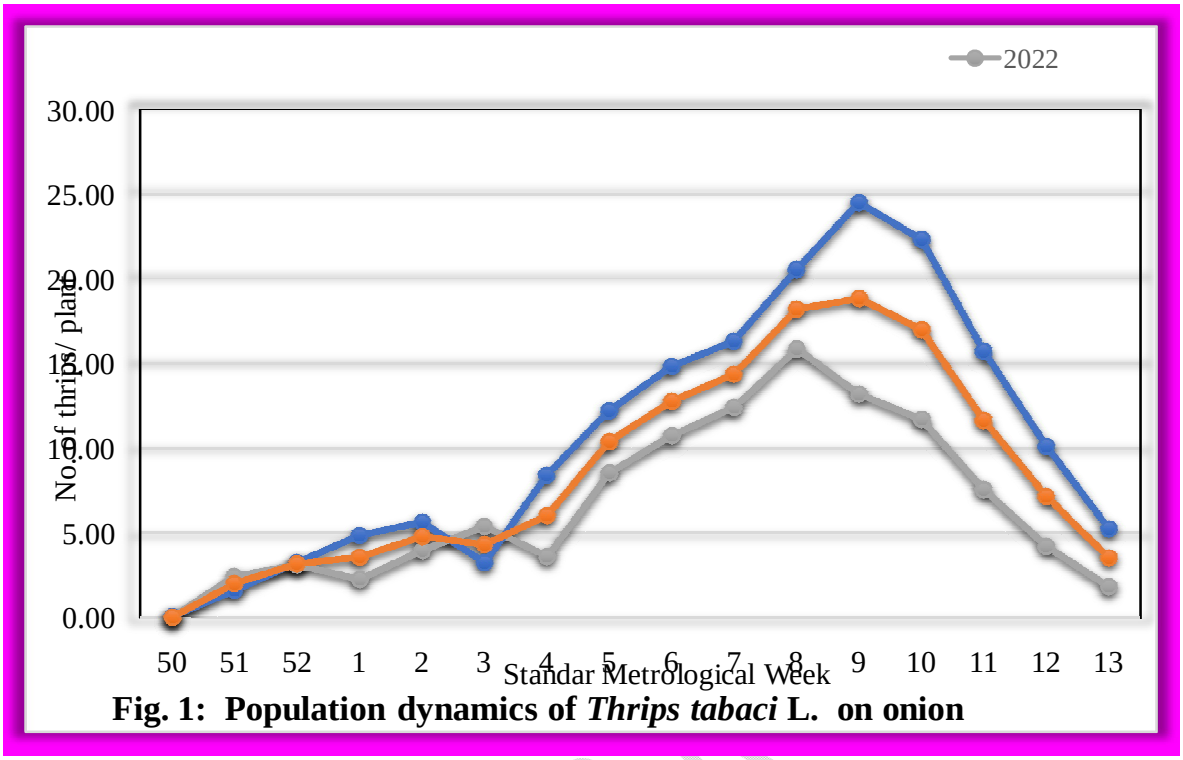

Fig. 1: Population dynamics of *Thrips tabaci* L. on onion

3.2Correlation of thrips Population with Weather Parameters:

The correlation analysis between number of larvae per plant and weather parameters of the year 2022-23.The population of thrips (Column 2 in Table 2) had highly significant positive correlation with MaxT (r=0.678) indicating that as MaxT increased; the incidence of thrips also increased or vice versa. Thrips population was highly significantly negatively correlated with Evening Relative Humidity (r = -0.727). It indicates that as there is a unit increase or decrease in Evening Relative Humidity, the population of thripswas decreased or increased. The other weather parameters Minimum Temperature and Bright Sunshine Hourswere positively correlated with population but the result was non-significant. Similarly, MinT, Temperature Morning Relative Humidity, Evening Relative Humidity, Medium Relative Humidity and Wind Speed were non significantly negatively correlated with thrips population.

During the year 2023-24, the correlation between number of thrips per plant and weather parameters revealed that the population of thrips had highly significant positive correlation with BSS (r=0.672). The population of thrips was positively correlated with Maximum Temperature, while it was negatively correlated with Minimum Temperature, Medium Tempoerture, Morning Relative Humidity, Medium Relative Humidity, Evening Relative Humidity and Wind Speed.

Waiganjo*et al.*[13] concluded that there was significantly negative correlation between thrips population and both maximum and minimum relative humidity. Patel [11] reported that thrips population on garlic significantly positively correlated with bright sunshine hours and morning vapour pressure however, significantly negatively correlated with morning relative humidity, evening relative humidity, evening vapour pressure and mean vapour pressure. Bhonde*et al.*[1]reported that maximum temperature had significant positive correlation with thrips population and minimum temperature, relative humidity (am), relative humidity (pm) and rainfall had non-significant negative correlation with thrips population.

Table 2: Relationship between weather parameters and population of thrips in onion

Weather parameters	Correlation Co-efficient (r)	
	2022	2023
1	2	3
Maximum Temperature, □C (MaxT)	0.678**	0.340
Minimum Temperature, □C (MinT)	-0.209	-0.422
Mean Temperature, □C (MeT)	0.476	-0.135
Morning Relative Humidity, % (MoRH)	-0.298	-0.255
Evening Relative Humidity, % (EvRH)	-0.727**	-0.300
Mean Relative Humidity, % (MeRH)	-0.623	-0.222
Wind Speed, km/hr (WS)	-0.233	-0.102
Bright Sun Shine Hours, hr/day (BSS)	0.354	0.672**

*Significant at 5 per cent level **Significant at 1 per cent level

Conclusion:

With the reference of the above results of population dynamics of thrips on Onion for both the years, it can be concluded that the infestation of thrips was higher during 5th week of January to 1st week of March on onion.Thus, the weather parameters Maximum Temperature, Evening Relative Humidity and Bright Sunshine hours had significant and major role on fluctuation of thrips during season. Hence, with increase or decrease in Evening Relative Humidity, population of thripswas decreased or increased. This knowledge will enable the farmers to keep track of the said pest according to the changing climate.

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