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Seasonal incidence of thrips (*Scirtothrips dorsalis* Hood.) infesting rose under naturally ventilated polyhouse and correlation with weather parameters

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Abstract
A field experiment was conducted in the naturally ventilated polyhouse of Mr. Raju More, at At/post Porle, Tarfe Thane, Tal-Panhala, Dist. - Kolhapur, Maharashtra during the *summer* 2023. The objective was to study the seasonal incidence of thrips (*Scirtothrips dorsalis* Hood,) infesting rose under naturally ventilated polyhouse. The results revealed that seasonal incidence of rose thrips commenced from March onwards, with a density of 17.06 thrips per three leaves at a temperature of 32.7 °C and relative humidity of 82.7 percent. The rise in rose thrips incidence was gradual, starting from the 13th MW to the 21st MW, corresponding to the 4th week of March to the 3rd week of May. The peak infestation occurred in the 14th MW, with 29.24 thrips per three leaves, aligning with a temperature of 36.6 °C and a relative humidity of 78.6 percent. It was observed that high temperatures and increased sunshine hours were conducive for the proliferation of rose thrips.
The correlation analysis for thrips population on leaves and weather parameters in 2023 revealed a positively associated 0.92* with maximum temperature, 0.638 with bright sunshine, and negatively correlated -0.23 for minimum temperature, -0.45* for morning relative humidity (RH-I), and -0.11 for evening relative humidity. The rise in temperature and increased sunshine hours led to increase in population of rose thrips per three leaves.

Keywords: Rose thrips, seasonal incidence, naturally ventilated polyhouse

Introduction
Rose (*Rosa* sp.) is one of the nature's lovely creation and is universally called as "Queen of flower". The word rose is derived from the word "Eros" which means the god of love. In Sanskrit literature, rose is referred as "Taruni Pushpa", "Nati manjula" and "Semantika". Rose belongs to the family Rosaceae. The genus Rosa includes about 120 species out of which simplest seven species are cultivated *viz*., *Rosa chinensis* (Jacq), *Rosa damascene* (Mill), *Rosa foetida*, *Rosa gallica*, *Rosa moschata*, *Rosa multiflora* and *Rosa wichurana*. It's miles appreciably grown in and across the cities of Delhi, Pune, Bangalore and Chandigarh. India has about 88,607 hectare of land under floriculture with a manufacturing of 6,80,600 of flowers. Cultivation of rose under protected conditions has won significance in current years because of its export capability rapidly extended in India. This is because of, yield under protected cultivation became realized greater than 100% when in comparison to that of open field cultivation. Much like open field conditions, the pest occurrence mainly thrips became observed as a primary risk under polyhouse situations.
The thrips species (*Scirtothrips dorsalis* Hood) is a recognized pest of many plants, inclusive of vegetables, roses, greenhouse grown flowers and cotton, thrips (*Scirtothrips dorsalis* Hood) are the appreciably notorious pests and gaining great significance in latest years owing to their devastating nature and harm ability. The larvae and adults of *S. dorsalis* cause damage at all the stages of a flower. *Scirtothrips dorsalis* alone cause 28-95% damage. It is essential to discover and manage thrips on rose because even at low densities on flower can cause petal discoloration. Thrips are tiny insect that reproduce rapidly and congregate in tight locations that may make tough pesticide coverage and feed with rasping type of mouth part and that may result in deformation of leaves and flowers (Duraimurugan & Jagadish 2011) [9].

Tolerance for thrips on floriculture plants is particularly low. While feeding *Scirtothrips dorsalis* destroys plant epidermal and mesophyll cells a protease inside the saliva can also contribute to the damage, this consists of stunted, scarred, deformed boom, leaf drop, scorched, bronzed, and scarred leaves, sepals and petals, for that reason, high densities of *Scirtothrips dorsalis* can cause severe decline or dying of host plants. Host plants are also economically sensitive to feeding harm because even minimum scarring can render the plant unattractive and unsalable.

Industrial rose cultivation under open-field and protected conditions is gaining significance, and area under its cultivation increasing daily. It's far crucial to recognise the insect pest in rose and there's a need to offer adequate protection against numerous insect pests to improve quality and yield of the flowers. Due to wide spread cultivation of rose by people, the crop now desires to be managed by the usage of less pollutant-chemicals. Keeping in view the monetary importance of the crop and the magnitude of the damage because of the insect, the present study has been taken up.

Material and Method

The experiment were carried out at naturally ventilated playhouse of Mr. Raju More, at At/post Porle Tarf Thane, Tal: Panhala, Dist.: Kolhapur, with view to study the seasonal incidence of thrips infesting rose under naturally ventilated polyhouse. Porle is situated at 563 metre above the mean sea level and has subtropical climate. It lies between 16° 41' 28.7052" North latitude and74° 14' 41.5140" East Latitude. Sandy loam garden soil having medium fertility and good drainage was present in polyhouse. The well-established preplanted popular variety of rose 'Top Secret' was selected for conduct of an experiment. All the recommended agronomic practices were followed from time to time to raise good crop.

Method of recording observations for seasonal incidence of thrips

From each plot five plants were randomly selected and observations of thrips population were recorded. The population of thrips were recorded with onset of thrips at weekly interval. Upper, middle and lower leaves of the tagged plant and total of three leaves were collected from each plant for taking the observations from treated and untreated plot, and total of 15 leaves collected from each plot taking the observation. The observations were on rose recorded early in the morning before 8.00 am in each meteorological week on five randomly selected plants. (Meena *et al.* 2017) [3].

Meteorological Parameters

In order to study the effect of climatic condition on the incidence of pest, meteorological parameters *viz*., maximum (T_{max} °C) and minimum temperature (T_{min} °C), relative humidity RH-I & RH-II) and total rainfall (mm) in different meteorological weeks during the crop season were taken into account. The meteorological data were obtained by using digital indoor hygrometer thermometer with clock and meteorological observatory located at RCSM College of Agriculture, Kolhapur for period of March 2023 to August 2023.

Correlation Study

In order to find out the specific impact of different weather parameters on rose thrips (*Scirtothrips dorsalis* Hood,) observations on thrips were correlated with the meteorological data like maximum (T max °C) and minimum temperature (T min °C), relative humidity RH max & RH min (%), Bright sunshine hours in different standard meteorological weeks during the crop season recorded in naturally ventilated polyhouse. Correlation was also worked out over summer season 2023. For the purpose, standard statistical procedure (Steel and Torrie, 1980) [8] and computer facility available at Department of Agricultural Statistics, RCSM College of Agriculture, Kolhapur were used.

Results and Discussion

The research investigated the population dynamics of *Scirtothrips dorsalis* Hood by taking thrips counts on randomly selected and tagged plants. Observations were conducted weekly from March 1, 2023, to August 31, 2023, with accompanying meteorological data detailed in the table.

Table 1 displays thrips counts per three leaves in a naturally ventilated polyhouse, along with temperature (maximum and minimum), morning and afternoon relative humidity and bright sunshine hours. Additionally, Table 2 illustrates correlations between *Scirtothrips dorsalis* Hood incidence and various weather parameters.

The observations on the seasonal incidence of rose thrips indicated that infestation commenced from March onwards, with a density of 17.06 thrips per three leaves at a temperature of 32.7 °C and relative humidity of 82.7 percent. The rise in rose thrips incidence was gradual, starting from the 13th week to the 21st week, corresponding to the 4th week of March to the 3rd week of May. During the 22nd week, the incidence reached 24.02 thrips per three leaves, coinciding with a temperature of 36.5 °C and relative humidity of 82.8 percent. The peak infestation occurred in the 14th week, with 29.24 thrips per three leaves, aligning with a temperature of 36.6 °C and a relative humidity of 78.6 percent. Additionally, during the 19th week, the incidence was notable at 28.17 thrips per three leaves, with a temperature of 36.8 °C and relative humidity of 82.8 percent. It was observed that high temperatures and increased sunshine hours were conducive for the proliferation of rose thrips.

The correlation analysis for thrips population on leaves and weather parameters in 2023 revealed a positively associated 0.92* with maximum temperature, 0.63* with bright sunshine, and negatively correlated -0.23 for minimum temperature, -0.45* for morning relative humidity (RH-I), and -0.11 for evening relative humidity. The rise in temperature and increased sunshine hours led to increase population of rose thrips per three leaves. However, inconsistencies in the impact of certain factors on thrips population were observed, possibly due to non-uniform rainfall occurrences.

These findings align with the research of SD Chaudhari and Sushil Kumar (2020) [7], who also observed a seasonal incidence of rose pests correlating with weather parameters. They observed that thrips activity, specifically *S. dorsalis*, peaked during the 19th MSW, emphasizing positive correlations with maximum temperature and negative correlations with RH and rainfall.

The findings of Vijayalakshmi G *et al*. (2017) [2] indicate that the peak infestation of *S. dorsalis* in groundnut occurred around late March, ranging from 3.20 to 7.1 thrips per leaf during the Rabi season. The study showed a negative correlation between thrips population and morning/evening relative humidity (RH), while a positive correlation exists with maximum temperature (Tmax), minimum temperature

(Tmin), rainfall, and sunshine hours in both Kharif and Rabi seasons.

Correlation analysis, as highlighted by Barot *et al*. (2012) [1], revealed a significant positive correlation between chilli thrips and maximum temperature. Similarly, studies by Ravikumar Havanoor and CM Rafee (2018) [6] and Patel *et al*. (2009) [4] align with the observation that thrips population positively correlates with maximum temperature and negatively correlates with minimum temperature, morning, and evening relative humidity.

In agreement with Kumar *et al.* (2009) [9], the peak incidence of *S. dorsalis* on pomegranate shoots occurred in the first week of March, attributed to the favourable conditions for pest multiplication, particularly the availability of tender shoots. These findings confirm Ananda's (2007) [11] observations of maximum damage during the second fortnight of March on shoots and align with Murugan's (2000) [12] findings of maximum damage during the first fortnight of April and the first week of May on leaves.

Table 1: Population dynamics of rose thrips *Scirtothrips dorsalis* (Hood). in relation to weathers parameter recorded in naturally ventilated polyhouse

Month	MW	Number of rose thrips/ 3 leaves	T Max. (°C)	T Min. (°C)	RH-I (%)	RH-II (%)	BSH (Hrs)
March 2021	10	17.06	32.7	21.8	82.7	58.6	3.13
	11	21.76	33	18.5	81.6	40.4	5.6
	12	18.56	35	18.9	83	64.9	5.8
	13	23.43	34.2	19.9	83.2	61.4	8.35
April 2021	14	29.24	36.6	17.4	78.6	55.9	9.6
	15	27.87	35.3	18.7	80.4	53.9	8.25
	16	25.76	36	16.6	76.9	51.7	5.9
	17	24.44	37.1	18.6	83.8	58.9	7.1
	18	26.12	34.5	16.5	75.2	48	5.9
May 2021	19	28.17	36.8	17	82.8	61.9	8.37
	20	25.23	36.3	18.6	83.8	59.9	5.9
	21	27.1	37.7	16.8	80	65.8	7.5
	22	24.02	36.5	20.3	82.8	51.8	9.2
June 2021	23	20.42	34.4	19.7	79.9	63.8	6.3
	24	17.74	33.2	18.4	73	61.7	7.76
	25	20.66	32.6	16.8	87.8	50.9	7.4
	26	18.46	31.8	18.5	67.9	61.6	4.2
July 2021	27	12.65	30.43	19.3	87.1	54.7	5.3
	28	10.09	30.5	15.9	84	48.8	7.76
	29	14.54	29.8	17.9	86.9	51.4	7.2
	30	12.78	30.3	18.8	90	39.9	4.2
	31	10.65	29.5	14.7	87.1	48.8	2.7
August 2021	32	13.11	28.9	19.6	86.2	56.8	3.4
	33	8.87	28.1	21.7	91.8	67.1	4.2
	34	6.23	28.7	18.8	88.6	71.4	5.1
	35	7.34	29.1	20.5	80.8	65.9	4.2

Table 2: Relationship between rose thrips, *S. dorsalis* Hood and weather parameter

Sr. No	Meteorological Parameter				
	Max. Temp.	Min. Temp.	Relative Humidity Morning	Relative Humidity Evening	Bright Sunshine
	Correlation coefficient values				
1	0.92*	-0.23	-0.45*	-0.11	0.63*

***=** Significant at 5 percent level

The positive correlation coefficient between thrips population on leaves and weather parameters in summer 2023 was determined to be 0.92* for maximum temperature and 0.63* for bright sunshine. In contrast, there was a negative correlation of -0.23 with minimum temperature, -0.45* for morning relative humidity (R.H.1), and -0.11 for evening relative humidity.

Conclusion

The studies conducted to assess the seasonal incidence of rose thrips results revealed that thrips population increased from 11 M.W. (2nd week of March). It is observed that peak population of thrips recorded at 14 M.W. (1st week of April), reaching 29.24 thrips / 3 leaves at a temperature of 36.6°C and 78.6% relative humidity. Analysis for 2023 showed a strong positive correlation of 0.92* with maximum temperature, 0.63* with bright sunshine, and negative correlations of -0.23 with minimum temperature, -0.45* with morning relative humidity (RH-I), and -0.11 with evening relative humidity.

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