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Seasonal incidence of grapevine thrips (*Scirtothrips dorsalis* Hood), along with its natural enemies

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Abstract

The present study entitled "Seasonal incidence of grapevine thrips (*Scirtothrips dorsalis* Hood) along with its natural enemies" was undertaken at Onion and Grape Research Station Pimpalgaon Baswant., (Maharashtra) - 422209 during *rabi* 2024-25.

The population dynamics of *Scirtothrips dorsalis* Hood on grapevine were studied in relation to various weather parameters, recorded weekly as per the Standard Meteorological Week (SMW). Initial incidence was noted during the 44th SMW (October 29th to November 4th) with an average of 1.2 thrips per shoot, while peak incidence occurred in the 50th SMW (December 10th to 16th) with 18.6 thrips per shoot. During this peak period, the maximum and minimum temperatures were 28.1°C and 10.12°C, respectively, with morning and evening relative humidity recorded at 89.5% and 69.4%. Correlation analysis revealed a significant negative relationship between thrips incidence with maximum temperature (r = -0.560**) and significantly positive correlation with evening relative humidity (r = 0.500*). Remaining weather factors showed non-significant correlation.

Keywords: *Scirtothrips dorsalis*, grapevine thrips, population dynamics, weather parameters, thrips incidence

Introduction

Grape (*Vitis vinifera* L., 2n = 38), a perennial vine belonging to the family Vitaceae, originated in the Mediterranean region. It was domesticated approximately 6,000-8,000 years ago in the Transcaucasia area from wild populations of *V. vinifera* subsp. *sylvestris*. In India, grape was introduced around 1300 AD from Iran and Afghanistan (Bose *et al.* 1999) [3]. Presently, it is one of the most commercially important fruit crops. Globally, grape production is led by China (12.67 million tons), followed by Italy, France, Spain, USA, and Türkiye. India ranks 9th in grape production with about 3.90 million metric tons from 176,000 hectares. Maharashtra contributes approximately 70.67% (2.47 million MT) to the national output (PIB, 2nd Adv. Estimate, 2021-22) [1], with major grape-producing districts including Nashik, Sangli, Satara, Kolhapur, Ahilyanagar, and Pune. The national average productivity is 22.1 t/ha, while progressive vineyards under intensive management often achieve 30-35 t/ha. Grapes are mainly consumed as fresh fruit and are also processed into raisins, juice, wine, seed oil, and value-added products like anthocyanin capsules and pomace powders (Sharma and Shabeer Ahammad, 2019) [15]. They are rich in antioxidants such as resveratrol, and are a source of essential nutrients including vitamin C (3.68 mg/100 g), potassium (175.72 mg/100g), and iron (0.267 mg/100g) (Yadav *et al.* 2009) [16].

In India, over 85 insect pest species have been recorded on grapes (Mani *et al.* 2008) [9], while 459 species have been documented globally (Reddy, 2019)[12], including members of Hemiptera, Lepidoptera, and Coleoptera. Key insect pests in Indian vineyards include thrips (*Scirtothrips dorsalis*, *Rhipiphorothrips cruentatus*), flea beetles (*Scelodonta strigicollis*), mealybugs (*Maconellicoccus hirsutus*), shot hole borer (*Xyleborus crassiusculus*), grapevine girdler (*Sthenias grisator*), and leaf rollers (*Sylepta lunalis*) (Atwal & Dhaliwal, 2005)[2]. Among these, thrips have emerged as a major constraint in recent years. In India, *Scirtothrips dorsalis* Hood, *Rhipiphorothrips cruentatus* Hood, and *Thrips hawaiiensis* Morgan are reported on grapevines (Butani, 1979; Rahana *et al.* 2022) [4, 11]. *S. dorsalis* feeds on the lower surface of leaves, flowers, and berries, causing leaf curling, silvery patches, and scab-like fruit damage, which severely reduces marketability by over 90% (Kulkarni *et al.*, 2007) [7].

In Maharashtra, particularly in Nashik district, grape farmers struggle with effective thrips man, while progressive vineyards under intensive management often achieve 30-35 t/ha. Grapes areagement due to the lack of detailed data on their seasonal incidence and population dynamics. Thrips populations are strongly influenced by climatic factors like temperature, humidity, rainfall, and sunshine hours, which directly affect incidence timing and severity (Rienth *et al.* 2021)[14]. Therefore, the present study was undertaken to assess the seasonal incidence of *Scirtothrips dorsalis* Hood on grapevines along with its natural enemies, monitor associated weather parameters and analyze their correlation. This study aims to provide grape growers with climate-resilient, economically viable, and scientifically validated pest management strategies, thereby reducing yield losses and improving fruit quality and export potential.

Materials and Methods

The occurrence and seasonal incidence studies of thrips (*Scirtothrips dorsalis* Hood) (Thripidae: Thysanoptera) were carried out at Onion and Grape Research Station, Pimpalgaon Baswant. The observations were initiated after pruning in October 2024. A small plot of two rows including 24 grapevines each row was kept unprotected. Among them ten vines were selected randomly. Out of these 10 randomly selected vines, ten shoots per vine were tapped to record the thrips population per meteorological week such weekly observation as per Standard Meteorological Week commencing from October pruning to till harvesting were continued. (Duraimurugan and Jagadish, 2004)[5]. The thrips population was correlated with weather parameters *viz*., maximum temperature, minimum temperature, morning and evening relative humidity, rainfall and sunshine hour to quantify the impact of abiotic factors on the incidence levels of thrips.

The data of weather parameters was obtained from Automatic Weather Station (AWS) of Onion and Grape Research Station, Pimpalgaon Baswant.

Results and Discussion

The seasonal incidence of *Scirtothrips dorsalis* Hood on grapevine was intensively studied under field conditions during the *Rabi* 2024–25 seasons at Onion and Grape Research Station, Pimpalgaon Baswant. The weekly observations recorded from the 43rd

(2024) to the 13th (2025) Standard Meteorological Week (SMW) revealed a clear trend of thrips incidence of grapevine. The first incidence of thrips was observed during the 44th SMW (October 29th to November 4th), with a mean population of 1.2 thrips per shoot. This initial incidence coincided with the emergence of new vegetative shoots after pruning. A steady rise in population was observed in the subsequent weeks reached its peak during the 50th SMW (December 10th to 16th), and recorded the highest population of 18.6 thrips per shoot. This peak incidence period coincided with the flowering stage of grapevine, which provides tender tissues and floral structures favorable for thrips feeding and oviposition. The incidence then gradually declined as the crop entered the fruit-setting and berry development stages, with the hardening of tissues making them less suitable for thrips survival.

The population of coccinellid beetles, known predator of thrips, began appearing from the 44th Standard Meteorological Week (SMW) of 2024 which was 0.9 beetles per plant and continued till the 5th SMW of 2025 with 0.7 beetles per plant. The population gradually increased and reached its peak at 50th (SMW) with 2.8 beetles per plant, suggesting possible predator-prey relationship with thrips.

During the peak incidence, specific meteorological conditions were noted: maximum temperature was 28.1 °C, minimum temperature was 10.12 °C, morning relative humidity was 89.5%, evening relative humidity was 69.4%, there was no rainfall, and sunshine hours were slightly reduced. These environmental parameters appeared to support optimal development and survival of thrips. Thrips damage symptoms were observed which as presented in plate.1

These findings are strongly supported by earlier research viz., Kulkarni *et al*. (2008) [8] observed a population peak of 8–10 thrips per shoot during November and December which coincided with the flowering period. Similarly, Reddy *et al*. (2019) [13] documented the highest incidence between the 50th and 2nd SMW, with population levels ranging from 8.28 to 8.53 thrips per shoot. Goutham (2009) [6] also reported peak thrips populations between the second week of December and last week of January, under temperature ranges between 29.5 °C and 31.4 °C.

Plate 1: Comparison of thrips damage symptoms on grape shoots: Normal vs. Infected

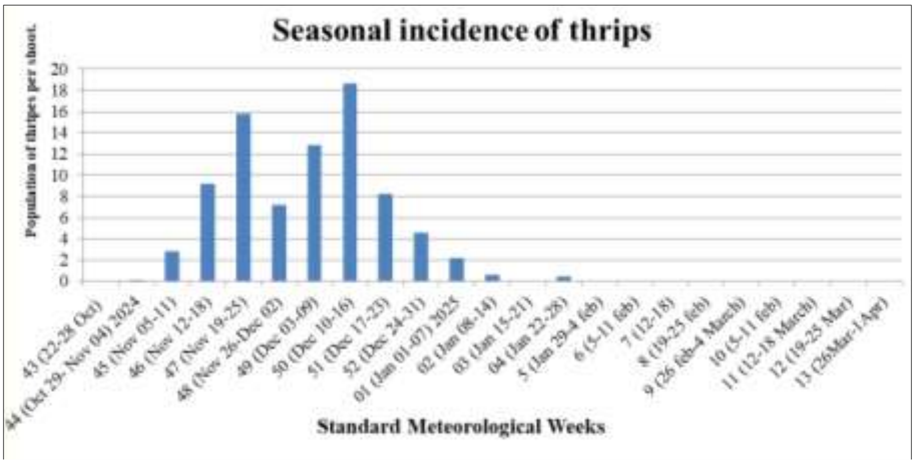

Fig 1: Incidence of thrips on grapes (October 2024 to April 2025)

The correlation studies conducted between thrips incidence on grapevine and prevailing weather parameters during the *rabi* season of 2024-25 revealed that temperature and humidity played a crucial role in influencing thrips population. The maximum temperature exhibited a statistically significant negative correlation with thrips incidence at 1% level of significance (r = -0.560**), indicating that lower daytime temperatures favored population buildup. Similarly, minimum temperature showed a non-significant but negative correlation (r = -0.165), suggesting that cooler nights might also contribute to pest proliferation, though not conclusively. Relative humidity emerged as an important factor, with morning relative humidity showing a weak positive correlation (r = 0.253), while evening relative humidity showed a significant positive correlation at 5% level of significance (r = 0.500*), indicating that high evening moisture levels support thrips activity and reproduction. Other weather parameters such as rainfall (r = 0.356) and sunshine hours (r = -0.180) exhibited non-significant correlations, with rainfall displaying a weak positive trend and sunshine hours showing a weak negative trend. These results are in agreement with findings by Kulkarni *et al.* (2008)[8], Reddy *et al.* (2019)[12] and Nagaraj *et al.* (2017)[10],who similarly reported negative correlations between thrips population with temperature, and positive associations with relative humidity.

Table 1: Seasonal Incidence of Grapevine Thrips, *Scirtothrips dorsalis* Hood (Year 2024-2025)

Meteorological Week (2024-2025)	Temperature		Humidity		Rainfall (mm)	Sunshine Hours	Thrips	Coccinellids
	Max.	Mini.	Mor.	Eve.				
43 (22-28 Oct) (2024)	34.1	19.2	98.0	78.6	2.6	9	0.0	0.0
44 (Oct 29- Nov 04)	34.2	17.7	98	68.3	0	8.7	1.2	0.9
45 (Nov 05-11)	32.4	15.8	95.8	64.9	0	8.4	2.8	1.2
46 (Nov 12-18)	31.6	16.2	90.5	70.5	0	8.2	9.2	1.6
47 (Nov 19-25)	29.8	13.8	93.4	70.6	0	7.7	15.8	1.5
48 (Nov 26-Dec 02)	28.4	13.4	85	61.1	0	7.7	7.2	1.9
49 (Dec 03-09)	30.8	18.22	93	77.2	27.3	6.3	12.8	2.6
50 (Dec 10-16)	28.1	10.12	89.5	69.4	0	9.6	18.6	2.8
51 (Dec 17-23)	29.8	11	94.6	68.5	0	7.1	8.2	2.4
52 (Dec 24-31)	28.9	16.5	98	90.8	4.7	5.5	4.6	2.6
01 (Jan 01-07) (2025)	30.4	12.1	97.6	65.7	0	8.5	2.2	1.8
02 (Jan 08-14)	27.4	11.7	97.7	74.4	0	6.3	0.6	1.9
03 (Jan 15-21)	29.4	14	98	73.7	0	7.7	0	1.4
04 (Jan 22-28)	32.2	13.4	98	63.9	0	9	0.4	0.9
5 (Jan 29-4 Feb.)	33	13	95	51	0	7.8	0	0.7
6 (5-11 Feb.)	32.2	14.4	93.4	58.4	0	8.7	0	0
7 (12-18 Feb.)	33.7	10.9	89.6	39.9	0	10.2	0	0
8 (19-25 Feb.)	34.3	12.5	83.9	44.4	0	10	0	0
9 (26 feb-4 March)	34.8	15.2	80.6	42.2	0	8.8	0	0
10 (5-11 March)	35.81	14.17	59.06	26.99	0	9.4	0	0
11 (12-18 March)	37.63	17.19	66.53	28.73	0	8.8	0	0
12 (19-25 March)	36.96	15.96	56.79	24.8	0	8.9	0	0
13 (26Mar-1Apr)	37.97	18.87	58.40	28.66	0.00	6.2	0	0

Table 2: Correlation between grapevine thrips (*Scirtothrips dorsalis* Hood) incidence and weather parameters (2024-2025)

Sr. No.	Meteorological parameters						
	Max. Temp.	Min. Temp.	Morn. Humidity	Eve. Humidity	Rainfall	Sunshine Hours	Incidence of thrips
1	-0.560**	- 0.165 NS	0.253 NS	0.500*	0.356 NS	-0.180 NS	1*

**Correlation is significant at the 0.01 level. (0.5368) *Correlation is significant at the 0.05 level. (0.4227)
NS - Non Significant

Multiple linear regression models were also carried out for thrips population and weather parameters which were presented in (Table 2).

Y = a + bx

Y= Incidence of thrips

a= Intercept

b = Slope

x= Weather factor

The multiple linear regression analysis was employed to assess the combined effect of various meteorological parameters on the population dynamics of *Scirtothrips dorsalis* Hood on grapevine during the *rabi* season of 2024-25. This study indicated that evening relative humidity, rainfall, and sunshine hours would increase the number of thrips by 0.416, 0.300, and 1.677 units respectively. However, among these none were statistically significant at $p<0.05$, as their p-values were 0.135, 0.138, and 0.159 respectively. Whereas, every unit increase in temperature maximum and temperature minimum as well as morning relative humidity would decrease the incidence of thrips by -381, -583, and -471 respectively. Among these, morning relative humidity showed a statistically significant negative effect (p = 0.029, t-value = -2.413), indicating it had the strongest individual influence among all predictors. The weather parameter during October pruning influenced the incidence of thrips to the extent of 59.30 per cent (R^2 = 0.5930). These findings corroborate the results reported by Reddy *et al.* (2019) [12] and Goutham (2009) [6], who similarly observed that climatic factors, especially temperature and humidity, significantly influenced the seasonal incidence of thrips. Hence, the regression analysis confirms that predictive models integrating multiple climatic parameters provide a more reliable approach for forecasting thrips outbreaks and can be instrumental for timely pest management decisions in viticulture.

Regression

sY= 27.370 - 0.381 (X_1) - 0.583 (X_2) - 0.471 (X_3) + 0.416.(X_4) + 0.300 (X_5) + 1.677 (X_6)(R^2) = 0.5930

Table 3: Multiple linear regression analysis between incidence of grapevine thrips and weather parameters during 2024-2025.

Parameter	t-value	P-value
Y= number of thrips	0.788	0.443
X_1=Temperature maximum	-0.290	0.776
X_2=Temperature minimum	-0.572	0.576
X_3=Relative Humidity morning	-2.413	0.029
X_4=Relative Humidity evening	1.579	0.135
X_5=Rainfall	1.568	0.138
X_6=Sunshine Hour	1.481	0.159

t-values indicating significance of weather parameters affecting thrips at 5% level.

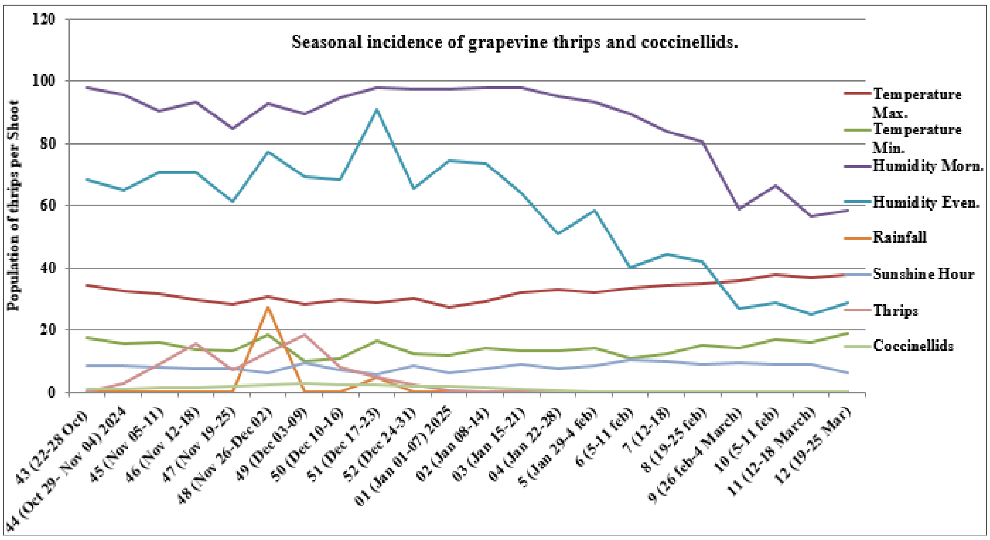

Fig 2: Impact of weather parameters on population of grape thrips and coccinellids.

Conclusion

The incidence of *Scirtothrips dorsalis* Hood on grapevine peaked during the 50th Standard Meteorological Week (December 10^{th}–16^{th}, 2024), coinciding with the flowering stage. A similar peak in coccinellid beetle population was also recorded during the same week, indicating a possible predator–prey relationship. Thrips incidence showed a highly significant negative correlation with maximum temperature (r = -0.560**) at the 1% level, and a significant positive correlation with evening relative humidity (r = 0.500*) at the 5% level. Morning relative humidity exhibited a non-significant positive trend, whereas rainfall and sunshine hours had no significant influence on thrips population. Multiple regression analysis revealed that morning relative humidity exerted a statistically significant negative effect (p = 0.029, t = -2.413), indicating it had the strongest individual influence among the weather parameters. The model explained 59.30% of the variation in thrips incidence (R^2 = 0.5930).

Author Contribution

1. Avhad P.S.[1]* contributed to the conceptualization, data collection, experimentation, data analysis, and manuscript writing.
2. M. P. Badgujar[2] provided overall guidance, research supervision, and critical revision of the manuscript.

3. P. V. Kuldharan[3] contributed expertise in plant pathology and assisted in disease-related observations and interpretation.
4. D. T. Wayal[4] provided entomological support, particularly in pest identification, monitoring, and analysis.
5. H. S. Shinde[5] offered expertise in horticulture and contributed to agronomic practices and crop management strategies.

Declaration

I hereby declare that the research work entitled "Seasonal Incidence of Grapevine (*Scirtothrips dorsalis* Hood) Thrips Along With Its Natural Enemies" submitted to International Journal of Advanced Biochemistry Research, is the original work carried out by me under the guidance of Dr. M. P. Badgujar at [Onion and Grape Research Station, Pimpalgaon Baswant.]

All sources of information and data from other researchers have been duly acknowledged and referenced. I take full responsibility for the authenticity of the data and contents of this work.

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References

1. Anonymous. Horticultural Crops 2021-22 (Second Advance Estimate). PIB; 2021. Available from: https://static.pib.gov.in/WriteReadData/specificdocs/documents/2022/jul/doc202271470601.pdf. Accessed 2025 Jan 20.
2. Atwal AS, Dhaliwal GS. Agricultural Pests of South Asia and Their Management. 4th ed. Ludhiana: Kalyani Publishers; 2005. p. 307–310.
3. Bose TK, Mitra SK, Farooqi AA, Sadhu MK. Grapes. In: Tropical Horticulture. Vol. 2. Calcutta: Naya Prakash; 1999. p. 259–268.
4. Butani DK. Insects and Fruits. New Delhi: Periodical Export Book Agency; 1979. p. 190–194.
5. Duraimurugan P, Jagadish A. Control of *Scirtothrips dorsalis* (Hood) damaging rose flowers. J Appl Zool Res. 2004;15(2):149–152.
6. Goutham K. Occurrence and insecticidal management of thrips on grapevine [MSc thesis]. Hyderabad: Acharya N.G. Ranga Agricultural University; 2009. p. 21–58.
7. Kulkarni NS, Adsule PG. Bio-efficacy of Proclaim 05 SG (Emamectin Benzoate) for the management of thrips in grapes. Pestology. 2007;31(9):30–32.
8. Kulkarni NS, Sawant SD, Adsule PG. Seasonal incidence of insect pests on grapevine and its correlation with weather parameters. Acta Hortic. 2008;(785):313–320.
9. Mani M, Kulkarni NS, Banerjee K, Adsule PG. Pest management in grapes. Pune: National Research Centre for Grapes; 2008. Extension Bulletin No. 2. 44 p.
10. Nagaraj RP, Nadaf AM, Gangadhar BN, Patil DR, Sagar BS. Seasonal incidence of thrips, *Scirtothrips dorsalis* (Hood) on grapes, *Vitis vinifera* L. (Cv. Thompson Seedless) in Bijapur. Int J Curr Microbiol Appl Sci. 2017;6(9):3295–3300.
11. Rahana RR, Raghavendra KV, Joshi S, Chander S, Dubey SC, Prakash R. Invasive chilli thrips: General guidelines for management. Bengaluru: NBAIR and NCIPM; 2022. Extension Bulletin.
12. Reddy AJ. Seasonal incidence and biorational management of grape thrips (*Rhipiphorothrips cruentatus* (Hood)) [MSc thesis]. Rahuri: Mahatma Phule Krishi Vidyapeeth; 2019. p. 23–25.
13. Reddy AJ, Saindane YS, Datkhile RV, Deore BV. Seasonal incidence of grapevine thrips and their correlation with weather parameters. J Entomol Zool Stud. 2020;8(1):1170–1173.
14. Rienth M, Vigneron N, Darriet P, Sweetman C, Burbidge C, Bonghi C, *et al*. Grape berry secondary metabolites and their modulation by abiotic factors in a climate change scenario—A review. Front Plant Sci. 2021;12:643258.
15. Sharma AK, Shabeer Ahammad TP. “Zero Waste” processing technology for high value product from Manjari Medica: A grape variety of ICAR. Pune: ICAR-NRCG; 2019. Extension Bulletin No. 37.
16. Yadav M, Jain S, Bhardwaj A, Nagpal R, Puniya M, Tomar R, *et al*. Biological and medicinal properties of grapes and their bioactive constituents: An update. J Med Food. 2009;12(3):473–484.