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# Population Dynamics of Major Insect Pests and Other Arthropods of Rose under Protected Conditions

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**Abstract**
This study investigates the population dynamics of major insect pests and other arthropods affecting rose cultivation under protected conditions in a protective environment at the Department of Entomology, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, from November 2020 to March 2021. The study focuses on thrips (*Scirtothrips dorsalis*), tobacco caterpillar (*Spodoptera litura*), and green aphids (*Macrosiphum rosae*), analyzing their population trends in relation to temperature and relative humidity. Thrips populations ranged from 7.2 to 21.48 per flower, showing significant positive correlations with maximum and minimum temperatures but a negative correlation with evening relative humidity. Tobacco caterpillar populations varied between 0.3 and 2.6 larvae per plant, with no significant correlations to temperature or humidity. Green aphids ranged from 1.8 to 7.15 per bud, showing a significant positive correlation with morning relative humidity. The findings underscore the importance of temperature and humidity in managing pest populations and highlight the need for further research into the biological and ecological factors influencing pest dynamics.

**Keywords:** Floriculture, *Scirtothrips dorsalis*, *Spodoptera litura*, *Macrosiphum rosae*, population dynamics

## Introduction
Flowers have long been recognized for their symbolic meanings, with roses, in particular, conveying a wide range of emotions based on their colors. Floriculture, the cultivation and marketing of flowers and ornamental plants, is a significant branch of horticulture with immense potential for generating employment and profit, especially in India. The floriculture industry has seen substantial growth due to increased global demand for flowers, driven by higher living standards and environmental awareness. The Government of India has identified floriculture as a sunrise industry, emphasizing its export potential. India, with a significant area under rose cultivation, is a major player in the global floriculture market. However, despite leading in the area of cut rose production, India's contribution to global export remains modest. The rose, celebrated as the "Queen of Flowers," is a prominent crop in Indian floriculture, valued for its beauty, fragrance, and utility. Roses face considerable challenges from various pests, which can significantly impact their quality and market value. Common pests include aphids, scales, thrips, and mites, among others, with polyphagous pests posing year-round threats. In polyhouse conditions, major pests like thrips, whiteflies, aphids, and red spider mites can cause substantial damage, affecting both flowers and buds. This study focuses on the population dynamics of these major pests and other arthropods in protected conditions, aiming to provide insights for better pest management and enhanced rose production.

## Materials and Methods
The investigation on Population Dynamics of Major Insect Pests and Other Arthropods of Rose under Protected Conditions, was conducted in the rose polyhouse at the Department of Entomology, Jawaharlal Nehru Krishi Vishwavidyalaya, Krishi Nagar, Jabalpur, from November 2020 to March 2021. Jabalpur, located between 22°49’ and 24°8’ North latitude and 78°21’ and 80°58’ East longitude, sits at an altitude of 411.78 meters above mean sea level6. This agroclimatic zone (VII) features a rice-wheat cropping pattern, with an average annual temperature of 24.6°C, annual rainfall of 1279.50 mm, and varying relative humidity,

peaking in August (84%) and dropping to 18% in April and May. During the study, a thermo-hygrometer recorded daily maximum and minimum temperatures and relative humidity inside the polyhouse. Weekly observations documented the populations of major insect pests and mites

The correlation between pest incidence and abiotic factors was analyzed using the formula:

$$r = \frac{\Sigma XY - n\overline{X}\,\overline{Y}}{\sqrt{(\Sigma X^2 - n\overline{X}^2)(\Sigma Y^2 - n\overline{Y}^2)}}$$

X = Mean of first factor
Y= Mean of second factor
n = Total no. of observations
r = Correlation coefficient

After correlating significant and non-significant findings, t-test value n-2 degrees of freedom were calculated on the following

formula:

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$

**Results and Discussion**

The investigation into the population dynamics of major insect pests of rose under protected conditions from November 2020 to March 2021 revealed distinct patterns for thrips, tobacco caterpillars, and green aphids. The data, illustrated in the provided graph, shows the variation in the population of these pests over the weeks, influenced by the prevailing weather condition

**Table 1:** Incidence of major insect pests infesting rose under protected condition (Noorjahan) at Jabalpur during 2020-21.

| SW | Mean Thrips population/flower | Mean population of *S. litura* larvae/ plant | Mean Green aphids population/bud |
|---|---|---|---|
| 46 | 18.15 | | |
| 47 | 18.9 | _ | _ |
| 48 | 18.25 | | |
| 49 | 16.25 | _ | _ |
| 50 | 12.75 | | |
| 51 | 11.2 | _ | _ |
| 52 | 8.8 | | |
| 1 | 8.2 | _ | _ |
| 2 | 8.1 | | |
| 3 | 7.9 | 0.65 | _ |
| 4 | 7.2 | 0.8 | _ |
| 5 | 6.9 | 0.3 | 4.2 |
| 6 | 7.8 | 1.4 | 4.45 |
| 7 | 8.24 | 1.8 | 5.65 |
| 8 | 11.3 | 2.6 | 6.63 |
| 9 | 14.9 | 2.4 | 7.15 |
| 10 | 16.6 | 2.1 | 5.7 |
| 11 | 17.8 | 1.65 | 4.75 |
| 12 | 18.9 | 1.34 | 3.2 |
| 13 | 21.48 | 1.26 | 1.8 |

**Thrips (*Scirtothrips dorsalis*)**

The thrips population ranged from 7.2 to 21.48 thrips per flower. Thrips first appeared in the second week of November (46th standard week) with temperatures at 31.2°C (max) and 15.5°C (min) and relative humidity at 86% (morning) and 41% (evening). The first peak (18.9 thrips/flower) was observed in the 47th standard week, while the highest peak (21.48 thrips/flower) occurred in the third week of March (13th standard week) with temperatures at 36.8°C (max) and 16.7°C (min) and relative humidity at 57% (morning) and 13% (evening). During extreme winter conditions, the population decreased to 6.9 thrips per flower by the 5th standard week, with temperatures of 21.4 °C (max) and 4.8°C (min) and relative humidity of 73% (morning) and 31% (evening).

Correlation studies indicated that maximum and minimum temperatures had significantly positive correlations with thrips population (r = 0.8, 0.62), while evening relative humidity had a significantly negative correlation (r = -0.53). These findings align with previous studies by Deshmukh *et al.* (2017) [1] and Hegde *et al.* (2010, 2016) [2-3], who reported similar increases in thrips populations during warmer months. Norboo *et al.* (2017) [4] noted a negative impact of temperatures on thrips populations, highlighting the variability in environmental responses across different studies.

**Tobacco Caterpillar (*Spodoptera litura*)**

The tobacco caterpillar population ranged from 0.3 to 2.6 larvae per plant between January and March. The larvae first appeared in the third week of January (3rd standard week) with an initial population of 0.65 larvae per plant. The highest population (2.6 larvae/plant) was recorded during the 8th standard week with temperatures of 28.6 °C (max) and 10.6 °C (min) and relative humidity of 79% (morning) and 28% (evening). The lowest population (0.3 larvae/plant) was observed during the cold weather in the 5th standard week with temperatures of 21.4 °C (max) and 4.8 °C (min) and relative humidity of 73% (morning) and 31% (evening).

Correlation studies revealed that both maximum and minimum temperatures and relative humidity had non-significant correlations with the tobacco caterpillar population. This suggests that other factors, possibly biological or ecological, may play a more significant role in influencing tobacco caterpillar populations in rose polyhouses, and more research is needed to understand these dynamics.

**Green Aphids (*Macrosiphum rosae*)**

The green aphid population ranged from 1.8 to 7.15 aphids per bud between January and March. Green aphids first appeared in the 5th standard week with an initial population of 4.2 aphids per bud when temperatures were 21.4°C (max) and 4.8°C (min) and relative humidity was 73% (morning) and 31% (evening). The highest population (7.15 aphids/bud) was observed during the 9th standard week with temperatures of 32.7°C (max) and 12.4°C (min) and relative humidity of 74% (morning) and 25% (evening). The lowest population (1.8 aphids/bud) occurred in the 13th standard week with temperatures of 36.8°C (max) and 16.7°C (min) and relative humidity of 57% (morning) and 13% (evening). Correlation studies showed a significant positive correlation between morning relative humidity and aphid populations (r = 0.79), while maximum and minimum temperatures and evening relative humidity had non-significant correlations. These results are consistent with Mehrparvar *et al*. (2016) [5], who found that temperature significantly affects aphid density, with higher populations in spring and autumn and reduced numbers in summer due to higher temperatures.

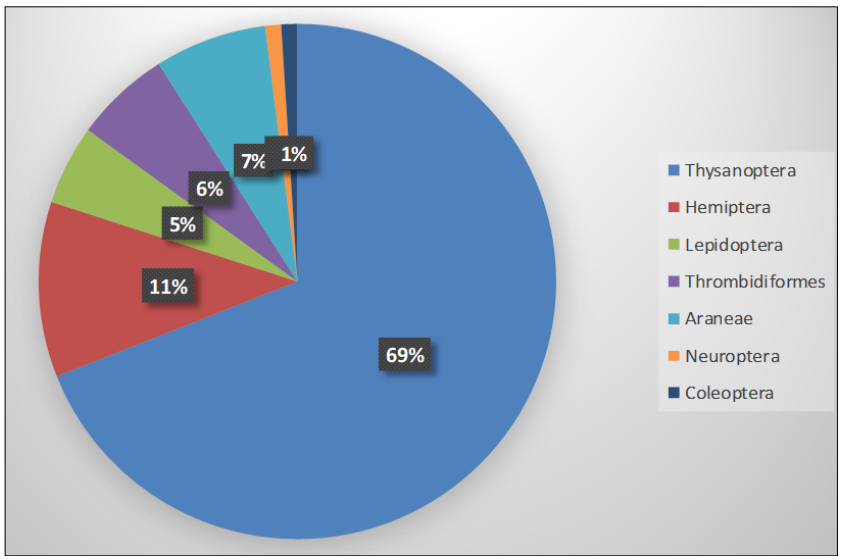


**Fig 1:** Relative Abundance of Major Insect Orders Associated with Rose under Protected Conditions

## Conclusion

The study provides valuable insights into the population dynamics of key insect pests affecting rose cultivation under protected conditions. Thrips, tobacco caterpillars, and green aphids exhibit distinct population trends influenced by environmental factors such as temperature and relative humidity. Thrips populations showed significant responses to temperature variations, with increased numbers during warmer periods and a decline during colder conditions. In contrast, tobacco caterpillars displayed less sensitivity to climatic variables, suggesting other factors might be influencing their population. Green aphids were primarily affected by morning relative humidity, with their populations peaking during periods of moderate humidity. These findings emphasize the complex interplay between environmental conditions and pest populations, suggesting that integrated pest management strategies should consider these dynamics to optimize control measures. Further research is needed to explore additional ecological factors influencing pest populations and to refine pest management practices in rose polyhouses. Floriculture sector, aligning with India's strategic goals for economic growth and export competitiveness in floricultural products.

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The authors declare no conflict of interest.

## References

1. Deshmukh AP, Kharbade SB, Shaikh AA, Kulkarni KV. Incidence of thrips on rose and their correlation with weather parameters under polyhouse condition. Contemporary Research in India. 2017;7(2):235–237.
2. Hegde JN, Chakravarthy AK. Insect pest complex of rose with special reference to bio-ecology and management of thrips, Scirtothrips dorsalis Hood (Thysanoptera: Thripidae) [PhD thesis]. Bengaluru: University of Agricultural Sciences, GKVK; 2010. p.1–168.
3. Hegde JN, Chakravarthy AK, Kumar NG, Ashok Kumar CT, Thyagaraj NE, Jayanthi R, Surendra HS. Bio-ecology and seasonal incidence of thrips Scirtothrips dorsalis Hood in rose. Entomon. 2016;41(3):215–226.
4. Norboo, Ahmad H, Ganai SA, Khaliq N, Chaand D, Landol S, Sharma S. Seasonal incidence and management of thrips, Scirtothrips dorsalis (Hood) infesting rose. International Journal of Current Microbiology and Applied Sciences. 2017;6(8):101–106.
5. Mehrparvar M, Mobli M, Hatami B. Seasonal population fluctuations of the rose aphid, Macrosiphum rosae (L.) (Hemiptera: Aphididae) on different cultivars of roses and nastaran. Journal of Science and Technology of Agriculture Research and Natural Resources. 2016;12(45B):711–719.