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# Seasonal Incidence of Sucking Insect Pest of Cluster Bean in Gird Region of Madhya Pradesh, India

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**ABSTRACT: The experiment was conducted at a research farm, College of Agriculture, Gwalior (M.P.) during *Kharif* season 2022 and 2023. Cluster bean major-sucking insect pests observed during the study period were aphids and jassids. The infestation of aphids started during the 32$^{th}$ and 31$^{st}$ Standard Meteorological Week (SMW) in both years. The Aphid population reached its peak during the 38$^{th}$ SMW. During 2022-23 and 2023-24, the incidence of jassid was started from the 32$^{nd}$ and 31$^{st}$ SMW respectively. Its population increased steadily and reached its peak during the 38$^{th}$ SMW. After that, the population of Jassid declined gradually until the 43$^{rd}$ SMW. The correlation studies showed that the minimum temperature had a significant positive relationship with the aphid and jassid populations at a 5 % significance level. While Sucking insect pests such as aphids and jassids threaten crop health and productivity by sucking sap from plants.**

**Keywords:** Aphid, cluster bean, Jassid, Pests, Infestation.

## INTRODUCTION

Cluster bean [*Cyamopsis tetragonoloba* (L.) Taub.] is a drought-hardy summer annual legume and a deep-rooted plant of the Leguminosae (Fabaceae) family known for drought and high-temperature tolerance. It is derived from the Sanskrit word Gauaahar/guar, which means cow fodder or fodder of livestock. Guar is a summer annual legume crop based on wild species, the centre of origin in tropical Africa. It is mainly cultivated as a vegetable and green manure crop. Further, cluster bean meal and seeds are used as high-protein cattle feed. The cluster bean is attacked by insect pests such as aphids (*Aphis craccivora* Koch), and jassids (*Empoasca kerri* Pruthi) reported as the major sucking pests of cluster bean. The nymphs and adults both cause damage by sucking the cell sap from the tender portions of the plant and also from the lower portions of the leaves. On the other hand, in severe infestations, these above-mentioned pests attack all parts of the plant, including pods resulting in stunted growth and decreased yield. The aphid's honeydew secretion provides a suitable medium for the development of sooty mould and fungi that ultimately hamper the process of photosynthesis in the plant.

The present study was conducted to check the seasonal incidence of aphid and jassid. The interactions between pest activity with biotic and abiotic factors help in deriving predictive models that in turn forecast the pest incidence (Mrig and Singh 1985; Dalwadi *et al.,* 2007; Godwal, 2010). The major sucking insect pest leafhopper, causes moderate to severe damage right from germination to maturity of the crop and leads to a considerable decrease in yield (Puttaswami *et al.,* 1977). The study aimed to find out the correlation of aphids and jassids, ecosystem with the weather parameters. A suitable understanding of the seasonal abundance of major sucking insect pests is important due to variations in weather conditions and changing sucking insect pest scenarios on the moth bean crop. Aphids and jassids are the most common sucking pests of cluster beans, according to reports. Both the nymphs and adults harm the plant by sucking the cell sap from the tender parts and lowering the surface of the foliage. Conversely, in cases of severe infestation, the aforementioned pests target every part of the plant, including the pods, causing growth reduction and decreased production.

## MATERIAL AND METHODS

The present investigation was conducted at an experimental farm, College of Agriculture, Gwalior (Madhya Pradesh) during *Kharif* 2022 and 2023. Gwalior is situated in the Northern part (Girdregion) of Madhya Pradesh at an elevation of 211.52 meters from mean sea level and lies between latitude and longitude 26°14' North and 78°15' east, respectively. The seeds of variety *i.e.,* HG 2-20 were sown manually on 26$^{th}$July 2022 and 2023 at a row distance of 45 cm and plant to plant of 10 cm. The mean weekly meteorological data

(maximum and minimum temperature, morning and evening relative humidity, and rainfall) were sourced from the Meteorological Observatory, Department of Agronomy, College of Agriculture, Gwalior (M.P.). Observations on the incidence of sucking pests (Aphid and Jassid) will be recorded by counting on three leaves (top, middle and bottom of the plant). The observation of the incidence of pests will be recorded from germination till maturity of the crop at weekly intervals on 10 randomly selected plants during morning hours. The experimental plot will be kept free from any insecticidal spray. The data on meteorological parameters will be utilized to work out a simple correlation coefficient with insect pests. All the data were subjected to statistical analysis and correlation and regression of the weather factors with incidence were worked out using Microsoft Excel.

## RESULTS AND DISCUSSION

**Aphid.** Aphid appeared shortly after the crop emergence. The occurrence of aphids began during the 32$^{th}$ Standard Meteorological Week (SMW), with an average population of 0.87 aphid/plant during 2022-23 and the population of Aphids commenced on the 2$^{nd}$ WAS (0.15 aphid/plant) conflicted with 1$^{st}$ week of August (31$^{st}$ SMW) during 2023-24. In both years aphid population started increasing gradually till 37$^{th}$ SMW and reached its peak during 38$^{th}$ SMW with a mean population of 12.43 aphid/plant in 2022-23 and 14.10 during 2023-24. Thereafter, it started declining gradually and remained associated until the 43rd SMW. During both years Minimum number of aphids (0.43 aphid/plant) and (0.25 aphid/plant) was found at the end of the 43$^{th}$ standard week. The correlation studies showed that the minimum temperature had a significant positive relationship (r = 499 and 0.490) during both years with aphid population at a 5 % level of significance and regression analysis for the effect of different weather parameters on the buildup of pest population of aphid was significantly influenced by weather factors. Maximum temperature, morning relative humidity, evening relative humidity and rainfall were found to be non-significant positive influences on the aphid population (0.057, 0.157, 0.368 and 0.285), respectively during 2022-23. In the years 2023-24 evening, relative humidity and rainfall had a non-significant positive effect on the population of Aphids with 'r' values (r = 0.372 and 0.331, respectively). Maximum temperature and morning relative humidity had a non-significant negative effect on the aphid population with 'r' values (r=-0.105 and -0.087, respectively). The current result is partially in line with the findings of Kumawat (2022) also reported the peak population of aphids was observed during the 38th SMW in the third week of September. The present results are also supported by Jat *et al.* (2017).

**Jassid.** During both years 2022-23 and 2023-24, the occurrence of jassid started from 32th SMW (0.59 jassid/plant) and(0.05 jassid/plant) during 31st SMW, respectively. Its population increased steadily till the 38th SMW, reaching its peak of 11.65 jassid/plant and 12.75 jassid/plant. After that, the population of jassid declined gradually until it reached 0.12 jassid/plant and 0.15 jassid/plant at the end of 43rd SMW. According to the correlation studies, the population of Jassid was significantly positively (r = 0.487 and 0.488) impacted by minimum temperature at a 5 % level of significance during 2022-23 and 2023-24. While maximum temperature, morning relative humidity, evening relative humidity, and Rainfall all had a positive but not statistically significant impact on the population of Jassid (0.057, 0.157, 0.368 and 0.285 respectively) in 2022-23. While the evening relative humidity, and Rainfall were shown that they had non-significantly positive effects on the number of Jassid 0.247 and 0.177, respectively. Maximum temperature and morning relative humidity had a non-significant negative effect on the Jassid population with 'r' values (r=-0.065 and -0.071, respectively).Regression analysis for the effect of different weather parameters on the buildup of the pest population of Jassid was significantly influenced by weather factors. The present studies are also supported by Yadav *et al*. (2016); Pawar *et al*. (2011) ; Pachundkar (2011) who found Jassid infestation increased up to the last week of September and declined gradually till the crop was matured.

**Table 1: Population of sucking pests in cluster bean crop:**

| Sr. No. | SMW | Population of sucking pests (no/plant) | | | |
|---|---|---|---|---|---|
| | | 2022-23 | | 2023-24 | |
| | | Aphid | Jassid | Aphid | Jassid |
| 1. | **30** | 0 | 0 | 0 | 0 |
| 2. | **31** | 0 | 0 | 0.15 | 0.05 |
| 3. | **32** | 0.87 | 0.59 | 2.95 | 2.6 |
| 4. | **33** | 2.76 | 2.56 | 4.45 | 5.35 |
| 5. | **34** | 5.77 | 3.98 | 7.25 | 6.9 |
| 6. | **35** | 6.34 | 5.34 | 7.98 | 7.88 |
| 7. | **36** | 7.87 | 7.56 | 9.15 | 8.9 |
| 8. | **37** | 8.54 | 9.43 | 11.11 | 9.98 |
| 9. | **38** | 12.43 | 11.65 | 14.1 | 12.75 |
| 10. | **39** | 7.43 | 8.45 | 5.2 | 8.05 |
| 11. | **40** | 4.34 | 5.44 | 4.15 | 4.6 |
| 12. | **41** | 2.99 | 2.44 | 2.55 | 2.01 |
| 13. | **42** | 1.22 | 0.77 | 1.05 | 0.45 |
| 14. | **43** | 0.43 | 0.12 | 0.25 | 0.15 |
| 15. | **44** | 0 | 0 | 0 | 0 |
| 16. | **45** | 0 | 0 | 0 | 0 |
| 17. | **46** | 0 | 0 | 0 | 0 |

**Table 2: Correlation coefficients (r) between seasonal population of sucking pests and weather parameters in cluster bean crop 2022-23.**

| Major sucking pests complex | Weather parameters | | | | |
|---|---|---|---|---|---|
| | Maximum Temperature (°C) | Minimum Temperature(°C) | Morning RH(%) | Evening RH(%) | Rainfall(mm) |
| Aphid | 0.057 $^{NS}$ | 0.499* | 0.157 $^{NS}$ | 0.368 $^{NS}$ | 0.285 $^{NS}$ |
| Jassid | 0.076 $^{NS}$ | 0.487* | 0.190 $^{NS}$ | 0.329 $^{NS}$ | 0.199 $^{NS}$ |

**Table 3: Correlation coefficients (r) between seasonal population of sucking pests and weather parameters in cluster bean crop during 2023-24.**

| Major sucking pests complex | Weather parameters | | | | |
|---|---|---|---|---|---|
| | Maximum Temperature (°C) | Minimum Temperature (°C) | Morning RH(%) | Evening RH(%) | Rainfall (mm) |
| Aphid | -0.105 $^{NS}$ | 0.490* | -0.087 $^{NS}$ | 0.372 $^{NS}$ | 0.331 $^{NS}$ |
| Jassid | -0.065 $^{NS}$ | 0.488* | -0.071 $^{NS}$ | 0.358 $^{NS}$ | 0.296 $^{NS}$ |

**Table 4: Regression linear equations and co-efficient of determination($R^2$) of sucking pests in relation to weather parameters in cluster bean crop during 2022-23.**

| Major sucking pests complex | Weather parameters | Regression linear equation | Co-efficient of determination ($R^2$) |
|---|---|---|---|
| Aphid | Minimum Temperature (°C) | y = 0.4043x - 5.2187 | $R^2$ = 0.2491 |
| Jassid | Minimum Temperature (°C) | y = 0.3975x - 5.2283 | $R^2$ = 0.2374 |

**Table 5: Regression linear equations and co-efficient of determination ($R^2$) of sucking pests in relation to weather parameters in cluster bean crop during 2023-24.**

| Major sucking insect pests complex | Weather parameters | Regression linear equation | Co-efficient of determination ($R^2$) |
|---|---|---|---|
| Aphid | Minimum Temperature (°C) | y = 0.4103x - 4.654 | $R^2$ = 0.2403 |
| Jassid | Minimum Temperature(°C) | y = 0.395x - 4.3671 | $R^2$ = 0.2384 |

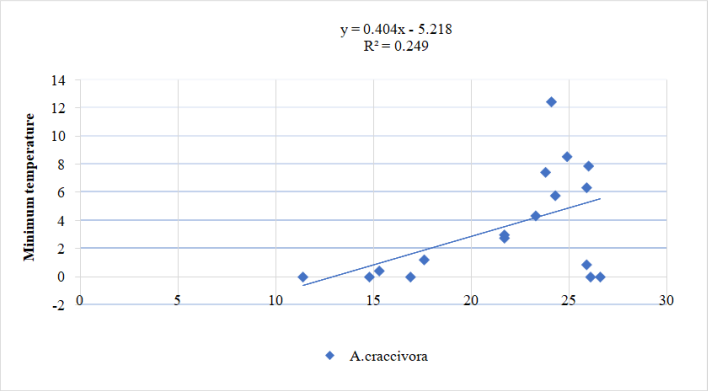


**Fig. 1.** Regression between aphid and minimum temperature during 2022-23.

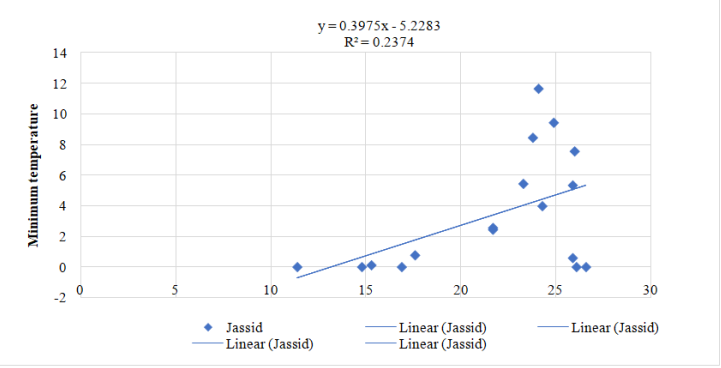


**Fig. 2.** Regression between Jassid and minimum temperature during 2022-23.

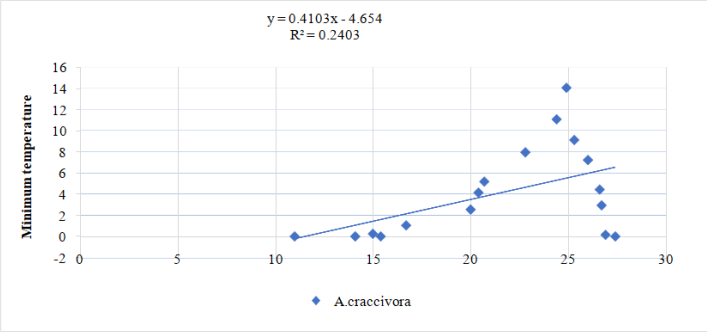


**Fig. 3.** Regression between Aphid and minimum temperature during 2023-24.

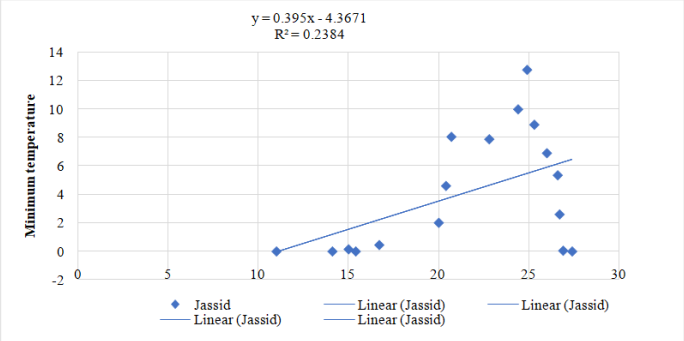


**Fig. 4.** Regression between Jassid and minimum temperature during 2023-24.

## CONCLUSIONS

It was concluded that during 2022-23 and 2023-24, The major sucking insect pests observed during the study period were aphid, jassid. The infestation of aphids started during the 32$^{th}$ and 31$^{st}$ Standard Meteorological Week (SMW) after that, the population of jassids declined gradually until 43$^{rd}$ SMW in both years.

## FUTURE SCOPE

We can examine the life cycle, behaviour, and biology of the major insect pests that affect cluster beans to learn more about how they interact with the crop. By knowing their natural enemies, feeding habits, and reproductive cycles, specialized pest management techniques may be developed.

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**Conflict of Interest.** None.

## REFERENCES

Dalwadi, M. M., Korat, D. M. and Tank, B. D. (2007). Population dynamics of major insect-pests of Indian bean in relation to weather parameters. *Research of Crops*, *8*(3), 672-677.

Jat, S. K., Lekha and Rana, B. S. (2017). Effect of abiotic factors on the Incidence of major Insect pests of black gram [*Vigna mungo* L. Hepper]. *International Journal of Agricultural Science*, *9*(17), 4159-4161.

Godwal, B. (2010). Population dynamics and varietal preference of aphid, *Aphis craccivora* (Koch) on Indian bean. Thesis submitted to S.K. Rajasthan Agricultural University, Bikaner.

Kumawat (2022). Studies on Pest complex of Cluster bean [*Cyamopsis tetragonoloba* (Linn.) Taubert] in Northern M.P. M.Sc. (Ag.) Thesis. RVSKVV, Gwalior, M.P. pp62.

Mrig, K. K. and Singh R. (1985). Incidence of insect-pests on garden bean, Dolichos lablab Linn. *Bulletin of Entomology*, *26*(1), 5-7.

Pachundkar, N. N. (2011). Insect pest succession and management of sucking insect pests of cluster bean at middle Gujarat. Msc thesis submitted to AAU, Anand.

Pawar, S. T., Patel, P. S., Pareek, D., Sushm, A. and Patel, B. C. (2011). Pest succession of important pests and their natural Enemies on Cluster bean, *Cyamopsis tetragonoloba* (L.) Taubert. *AGRES–International e-Journal*, *6*(1), 71-79.

Pawar, S. T., Patel, P. S., Pareek, D., Sushma, A. and Patel, B. C. (2017). Pest succession of important pests and their natural Enemies on Cluster bean, *Cyamopsis tetragonoloba* (L.) Taubert. *AGRES –International e-Journal. 6*(1), 71-79.

Puttaswami, G. B. L. V. and Ali, T. M. M. (1977). Record of pests infesting moth bean, *Phaseolus aconitifolia* (Jacq.) a potential pulse crop. *Current Research*, *6*, 69-71.

Yadav, S. K., Yadav, A. K., Sanp, R. and Deshwal, H. L. (2016). Population dynamics of major Sucking pests of Cluster bean [*Cyamopsis tetragonoloba* (L.) Taub.] and their correlation with abiotic factors. *Annals of Plant Protection Science*, *24*(1), 31-33.

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