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# POPULATION DYNAMICS OF *Clavigralla gibbosa* (Spinola) AND ITS CORRELATION WITH WEATHER PARAMETERS

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**ABSTRACT**

The field experiments of population dynamics of *Clavigralla gibbosa* (Spinola) infesting pigeonpea were carried out at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari in *kharif* season during the year 2024-25 and result revealed that pod bug population was observed during the 21st week after sowing (48th SMW) with 0.98 bugs per plant and continued throughout the crop period, which ranged from 0.98 to 10.67 bugs per plant. The infestation gradually increased and reached its peak (10.67 bugs/plant) in the 27th week after sowing (2nd SMW). Thereafter, a decreasing trend was observed up to the 28th week after sowing (3rd SMW) as the crop reached to maturity. The pod bug population exhibited highly significant negative correlation with minimum temperature (r= -0.697**), evening relative humidity (r= -0.491**) and rainy days (r= -0.481**). Moreover, pod bug population had a significant negative correlation with morning relative humidity (r= -0.353*) and rainfall (r= -0.349*).
***Keywords*:** Pigeonpea, Pod bug, *C. gibbosa*, Population dynamics, Weather parameters *etc*.

## Introduction

Pulses are the second most important field crop after cereals and contain 20 to 30 per cent protein, nearly 2.0 to 2.5 times higher than that found in cereals. In modern societies, pulses are often perceived as “poor people’s diets” or “poor man’s meat,” as many low-income individuals benefit from their rich protein content and low cost to meet their daily protein requirements (Paul *et al.*, 2017).

Pigeonpea, (*Cajanus cajan* (L.) Millsp.) is a member of the genus Cajanus and family Papilionaceae. In India, pigeonpea is known by various names such as Arhar in Uttar Pradesh, Bihar, and Madhya Pradesh; Tur in Maharashtra and Gujarat; Rahat in parts of Bihar; Harad in Haryana and some regions of western Uttar Pradesh; Tuvaraparippu in Kerala; Kokh-lan among the tribes of Tripura; and adhaki and tuvarika in Sanskrit (Gowda *et al*., 2011).

The key pest of pigeonpea are pod borer complex *viz.*, Gram pod borer (*Helicoverpa armigera* Hubner), Spotted pod borer (*Maruca vitrata* Fabricius), Spiny pod borer (*Etiella zinckenella* Treitschke), Eriyophid mite (*Aceria cajani* Channabasavanna), Blister beetle (*Mylabris phalerata* Pallas), Plume moth (*Exelastis atomosa* Walsingham), Pod fly (*Melanagromyza obtusa* Malloch) and Pigeonpea pod bug (*Clavigralla gibbosa* Spinola) which cause considerable losses in grain yield ranging from 30 to 100 per cent (Bijewar *et al.*, 2018; Kumari *et al.*, 2023). Thus, it is necessary to investigate seasonal incidence of pigeon pea pod pog.

## Materials and Methods

The present investigation was carried out at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari during *kharif* season of the year 2024-25. The experimental field was prepared as per the agronomic requirements of pigeonpea crop. The basal dose of fertilizer was applied at the sowing time. The entire plot was sown with good quality seeds of pigeonpea crop (variety Gujarat Tur-104). The remaining agronomical operations *viz.*, interculture, weeding and irrigation *etc.* were done as per the recommendation. However, experimental area was kept free from insecticidal spray throughout the crop season to record the incidence of pigeonpea pod bug. To find out the incidence of pigeonpea pod bug, twenty-five plants were randomly selected from five quadrates each having five plants.

The total number of nymphs and adults of pigeonpea pod bug from the whole plant was recorded one week after sowing till the harvest of crop at weekly interval.

The data on maximum and minimum temperatures (°C), morning and evening relative humidity (%), wind speed (km/hrs) and bright sunshine hours (hr/day), rainfall (mm) and rainy days were recorded at the Meteorological Observatory, College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari during *kharif* season of the year 2024-25 which was used to study the effect of weather parameters on population dynamics of *C. gibbosa*. The simple correlation coefficient was worked out between pest population and various weather parameters.

## Results and Discussion

### Population dynamics of *C. gibbosa* and its correlation with weather parameters

The population of *C. gibbosa* fluctuated throughout the crop season indicating high to low incidence Photograph 1 and Photograph 2. The periodical weekly mean data of pod bug in *kharif* season during the year 2024-25 are presented in Figure 1. The result indicated that pod bug population was commenced from 21$^{st}$ week after sowing (48$^{th}$ SMW) with 0.98 pod bugs per plant. Further, the population of pod bug increased gradually during rest of the months and reached to its first peak (10.67 pod bugs/plant) in 27$^{th}$ week after sowing (2$^{nd}$ SMW). Thereafter, pod bug population gradually declined from 28$^{th}$ week after sowing (3$^{rd}$ SMW) and reached at low level (0.93 pod bugs/plant) during 32$^{nd}$ week after sowing (7$^{th}$ SMW).

The findings of the present investigation are in close conformation with the report of (Pandey *et al*., 2024) who reported that the population decreased slowly up to 7.13 pod bugs from 10$^{th}$ to 13$^{th}$ SMW. Bagri and Keval (2023) who reported that first appearance of *C. gibbosa* on pigeonpea during 2$^{nd}$ SMW when plants were in pod developing stage (0.12 bugs/plant). The population gradually increased and attained to peak level (5.8 bugs/plant) during the 9$^{th}$ SMW. Finally, the pod bug population declined and disappeared during the 14$^{th}$ SMW. Harshita *et al.* (2023), the activity of pod bug, *C. gibbosa* started from the 2$^{nd}$ week of October and reached to its peak (9.20 pod bugs/plant) during the 1$^{st}$ week of January. The initial pod bug population recorded as 0.30 pod bugs from the 48$^{th}$ SMW and reached to peak level of 5.27 to 9.38 pod bugs during the 6$^{th}$ and 9$^{th}$ SMW when the crop was in pod developing stage. Venna (2005) who studied that pod bug population commenced on pigeonpea during the last week of November (2.10 bugs/plant) and reached to its peak level during 4$^{th}$ SMW (8.23 bugs/plant) and declined during the 9$^{th}$ SMW of the year 2004. The present findings are disagreed with the report of Jalondhara and Patel (2018) studied that maximum level of *C. gibbosa* was observed between 43$^{rd}$ SMW to 49$^{th}$ SMW, with population being between 1.12 and 6.54 pod bugs per plant with peak incidence at 47$^{th}$ SMW. Jakhar *et al.* (2017) who reported that incidence of pigeonpea pod bug, *C. gibbosa* started during 2$^{nd}$ week of October (0.12 bugs/plant) and continued up to 3$^{rd}$ week of December (3.73 bugs/plant).

### Correlation studies between abiotic factors with pigeonpea pod bug, *C. gibbosa*

The results revealed that the pod bug population exhibited a highly negative significant correlation with minimum temperature (r= -0.697**), evening relative humidity (r= -0.491**) and rainy days (r= -0.481**). Moreover, pod bug population had a significant negative correlation with morning relative humidity (r= -0.353*) and rainfall (r= -0.349*). However, maximum temperature (r= -0.221) and wind speed (r= -0.122) had non-significant negative association with pod bug population. While, bright sunshine hours (r= 0.089) had a non-significant positive correlation with bug population (Table 1 and Figure 1).

These results are supported by Harshita *et al.* (2022) who revealed that minimum temperature (r= -0.513*) had a significant negative influence on the population of pigeonpea pod. The maximum temperature (r= -0.352) and minimum temperature (r= -0.682) was negatively correlated with pod bug population (Udayababu *et al.* 2021). Bijewar *et al.* (2018) who reported that significant negative correlation between the pod bug, *C. gibbosa* population and minimum temperature (r= -0.520*). Kar (2017) who found that population of *C. gibbosa* on pigeonpea was negatively correlated with maximum temperature and minimum temperature (r= -0.284 and r= -0.468) with pod bug population. The present findings are more or less in confirmation to earlier report.

**Table 1:** Correlation coefficient between activity of pod bug with weather parameters during the year 2024-25

| Parameters | Correlation co-efficient |
|---|---|
| Maximum Temperature, (°C) (Max. T) | -0.221$^{NS}$ |
| Minimum Temperature, (°C) (Min. T) | -0.697** |
| Morning Relative Humidity, (%) (Mor. RH) | -0.353* |
| Evening Relative Humidity, (%) (Eve. RH) | -0.491** |
| Wind Speed, (km/hr) (WS) | -0.122$^{NS}$ |
| Bright Sunshine Hours, (hr/day) (BSSH) | 0.089$^{NS}$ |
| Rainfall (mm) (RF) | -0.349* |
| Rainy days (RD) | -0.481** |

Note: *Significant at 5% (r= ±0.344), **Significant at 1% (r= ±0.442), N=33

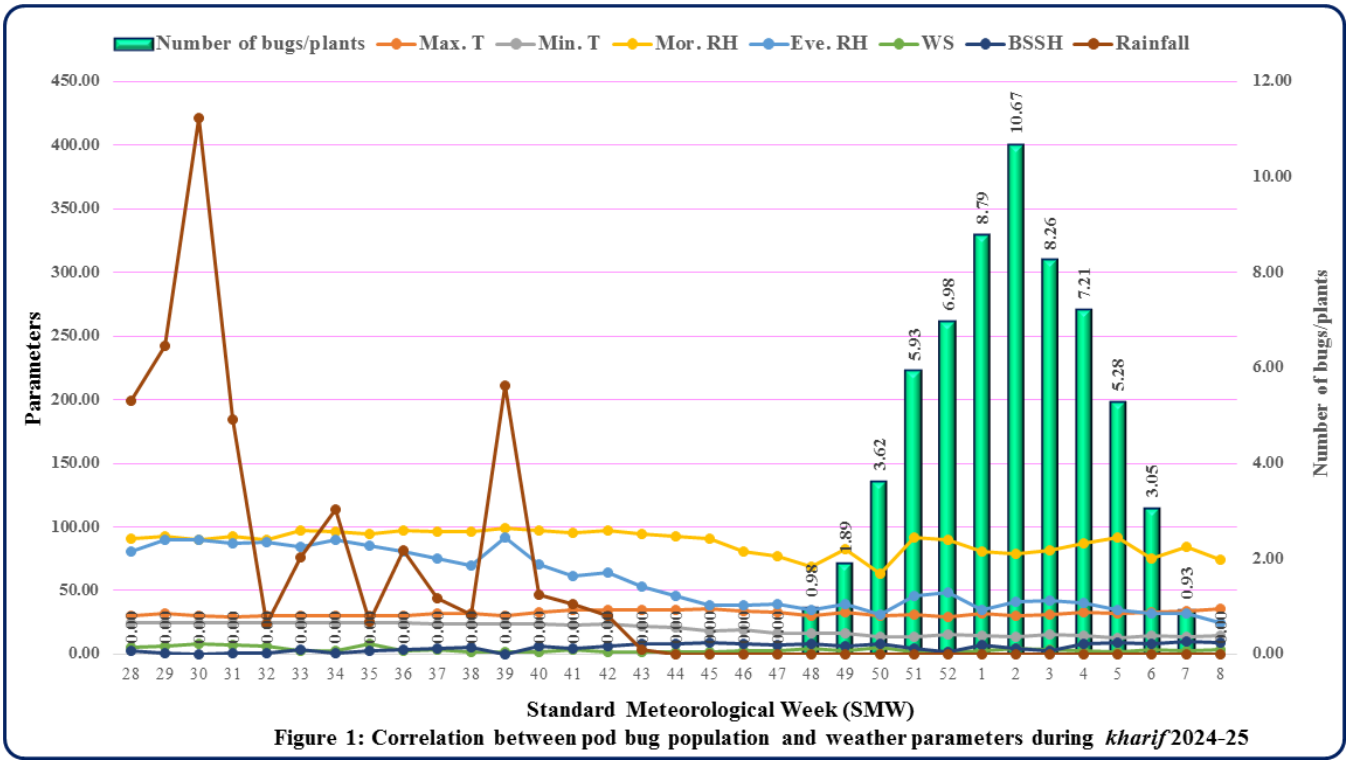


**Figure 1: Correlation between pod bug population and weather parameters during *kharif* 2024-25**

**Photograph 1:** Population of *C. gibbosa* in field condition

**Photograph 2:** Shriveled and drying of pod due to damaged caused by *C. gibbosa*

## Conclusion

The activity of *C. gibbosa* started form first week of December (48th SMW) and reached to its peak level in second week of January (2nd SMW). Thereafter, pod bug population gradually declined from third week of January (3rd SMW) and reached at low level during last week of February (8th SMW). Thus, implementation of

management tactics at proper time when pest activity will maximum, which causes economic loss in accordance with the activity of biological control agents would be the most important factor for the effective management of pigeonpea pod bug.

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