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# Seasonal Incidence of Major Insect Pests of Garden Pea (*Pisum sativum* L.)

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## ABSTRACT

The field experiment was conducted during the *rabi* season of 2023-2024 at School of Agricultural Sciences, Medziphema, Nagaland University to study the seasonal incidence of major insect pests of garden pea. The incidence of pea aphid (0.66 aphids/plant), pea leaf miner (0.40 leaf miner/plant), gram pod borer (0.53 larvae/plant) and pea pod borer (0.47 larvae/plant) were first observed on 52nd, 2nd, 3rd and 4th SMW respectively. The population reached its peak on 8th SMW for pea leaf miner (5.62/three leaves), gram pod borer (6.89 larvae/plant), pea pod borer (6.68 larvae/plant) and 9th SMW for pea aphid (43.00/three leaves). Pea aphid and pea leaf miner had a negative correlation with maximum relative humidity and a positive correlation with rainfall, respectively. Both gram pod borer and pea pod borer had a negative correlation with maximum relative humidity and positive correlation with rainfall.

**Keywords** Seasonal incidence, Garden pea, Insect pests.

## INTRODUCTION

In India garden pea (*Pisum sativum*) second position in both area of cultivation and production (Singh *et al.* 2023). It is considered as one of the most important legume crops for its nutritional security for the resource-poor farmers in developing countries. It is highly nutritive and contains high proportion of digestible protein (22.5%), carbohydrates (62.1%) and fats (1.8%) (Khan *et al.* 2024). It is a reliable source of Omega-3 fat in the form of alpha-linolenic acid. It has high levels of minerals like potassium, phosphorus, calcium, iron and vitamins viz., vitamin A and C, riboflavin, thiamine, niacin and folate, as well as their digestible fiber content (5.9–12.7%), have been shown to benefit heart health, digestive health and cancer prevention (Murade *et al.* 2014). As many as 24 insect species have been reported infesting the pea crop at different stages of the crop.

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Estimating a focus framework can offer insights into the peak periods of pest activity and aid in developing management strategies for assessing insect pest populations in the area. However, there is a notable lack of information regarding the major insect pests and their connections to weather conditions in Nagaland, a hilly state in northeastern region of India. Consequently, the current study was conducted to examine the population dynamics of major insect pests of garden pea in relation to these abiotic factors in the Medziphema region of the state.

## MATERIALS AND METHODS

The experiment was carried out in the Experimental Farm, Department of Entomology, School of Agricultural Sciences, Nagaland University, Medziphema Campus, Nagaland during *rabi* season from December 2023 to March 2024. Plots of size 2 m × 1 m were replicated thrice and green pea 'Mucio' was sown at a spacing of 30 cm × 10 cm. Observations was recorded at an interval of 7 days during morning hours on five randomly selected plants from each plot from the time they start appearing in the field up to harvest of crop. For sap-sucking insects, the number of adults and nymphs per plant was recorded by examining three leaves, one from the upper, middle and lower part of the plant. For borers, the number of larvae per plant was counted from five randomly selected plants within each plot. Pearson's correlation was conducted to determine the relationship between the incidence of insect pests and the weather parameters. The meteorological data were obtained from the ICAR Research Complex for NEH Region, Jharnapani, Nagaland.

## RESULTS AND DISCUSSION

From the experiment, four major insect pests were observed viz., pea aphid, pea leaf miner, gram pod borer and pea pod borer.

### Pea aphid, *Acyrthosiphon pisum*

As data presented in Table 1, the infestation started in the 52$^{nd}$ Standard Meteorological Data (SMW) with the mean population of 0.66 pea aphids/three leaves. On the 9$^{th}$ week after sowing (SMW), the highest average pea aphid population observed was 43 per three leaves. During this time, the maximum temperature recorded was 25.4°C, the minimum temperature was 11.7°C, maximum relative humidity was 93%, minimum relative humidity was 45%, and there was 0.7 mm of rainfall which is followed by notable decreased. The observations are similar to the findings of Nishmitha *et al.* (2021) where the peak population of pea aphids was observed during the 2$^{nd}$ week of March (10$^{th}$ SMW) and Patnaik *et al.* (2024) concluded that peak incidence was observed in 7$^{th}$ SMW with 72.40 aphids/plant. As data presented in Table 2. There were a positive but non-significant relationship between pea aphid population and maximum temperature (0.344) as well as with minimum temperature (0.289). Conversely, a negative and significant correlation was found with maximum relative humidity (-0.643) and a negative but non-significant correlation with minimum relative humidity (–0.311). Additionally, there was a positive but non-significant correlation with rainfall (0.306). According to Patel *et al.* (2023), pea aphid populations exhibited a negative correlation with maximum relative humidity (–0.453). Similarly, Hassan and Ammar (2023) demonstrated a significant negative correlation between pea aphid populations and relative humidity.

### Pea leaf miner, *Chromatomyia horticola*

As data presented in Table 1, the pea leaf miner infestation started in the 2$^{nd}$ SMW with the mean population of 0.4 pea leaf miner/three leaves. The highest mean number of population (5.62/three leaves) was observed on 8$^{th}$ SMW with a maximum temperature of 25.1°C, minimum temperature of 12.8°C, maximum relative humidity of 94%, minimum relative humidity of 61% and rainfall of 38.5 mm. The lowest mean population (0.0.4/three leaves) was observed on 2$^{nd}$ SMW with a maximum temperature of 23.1°C, minimum temperature of 9.3°C, maximum relative humidity of 96%, minimum relative humidity of 68% and rainfall of 0.0 mm. Keval *et al.* (2020) reported that the peak population of pea leaf miner was observed on 7$^{th}$ SMW. As data presented in Table 2, it was observed that the correlation of pea leaf miner had a positive and non-significant relationship with maximum temperature (0.067) and minimum temperature (0.076). It had a negative and

**Table 1.** Seasonal incidence of major insect pests of garden pea.

| Standard meteorological week (SMW) | Temperature (°C) Maximum | Minimum | Relative humidity (%) Maximum | Minimum | Rainfall (mm) | Pea aphid | Pea leaf miner | Gram pod borer | Pea pod borer |
|---|---|---|---|---|---|---|---|---|---|
| 50 | 23.6 | 13.0 | 95 | 66 | 0.0 | 0 | 0 | 0 | 0 |
| 51 | 24.4 | 9.4 | 96 | 52 | 0.0 | 0 | 0 | 0 | 0 |
| 52 | 25.2 | 12.0 | 97 | 59 | 3.2 | 0.66 | 0 | 0 | 0 |
| 1 | 24.7 | 10.2 | 96 | 63 | 0.0 | 1.33 | 0 | 0 | 0 |
| 2 | 23.1 | 9.3 | 96 | 68 | 0.0 | 5.12 | 0.40 | 0 | 0 |
| 3 | 23.7 | 8.2 | 95 | 61 | 0.0 | 8.54 | 2.34 | 0.53 | 0 |
| 4 | 22.9 | 8.7 | 95 | 66 | 0.0 | 11.86 | 4.31 | 1.25 | 0.47 |
| 5 | 23.0 | 9.7 | 95 | 68 | 15.7 | 12.60 | 3.76 | 3.41 | 1.36 |
| 6 | 21.2 | 10.4 | 95 | 74 | 17.7 | 26.40 | 4.85 | 5.16 | 2.65 |
| 7 | 26.4 | 11.0 | 93 | 47 | 22.0 | 16.13 | 4.15 | 4.23 | 5.14 |
| 8 | 25.1 | 12.8 | 94 | 61 | 38.5 | 26.47 | 5.62 | 6.89 | 6.68 |
| 9 | 25.4 | 11.7 | 93 | 45 | 0.7 | 43.00 | 4.16 | 5.45 | 5.32 |
| 10 | 29.6 | 11.3 | 91 | 58 | 0.3 | 34.32 | 3.54 | 4.62 | 5.24 |
| 11 | 30.6 | 13.8 | 90 | 44 | 2.1 | 20.14 | 2.88 | 3.64 | 3.12 |

non-significant relationship with maximum relative humidity (–0.485) and minimum relative humidity (–0.485). While it had a positive and significant relationship with rainfall (0.640). Khaliq *et al.* (2022) showed that pea leaf miner had positive correlation with rainfall (0.356). Thakur *et al.* (2024) reported that significant positive correlation was observed between leaf miner infestation with rainfall (r = 0.745).

### Gram pod borer, *Helicoverpa armigera*

As data presented in Table 1, the gram pod borer infestation started in the 3rd SMW with the mean population of 0.53 g pod borer/three plants. The highest mean number of population (6.89/plant) was observed on 8th SMW with a maximum temperature of 25.1°C, minimum temperature of 12.8°C, maximum relative humidity of 94%, minimum relative humidity of 61% and rainfall of 38.5 mm. The lowest mean population (0.53/plant) was observed on 3rd SMW with a maximum temperature of 23.7°C, minimum temperature of 8.2°C, maximum relative humidity of 95%, minimum relative humidity of 61% and rainfall of 0.0 mm. Tare and Khandwe (2023) reported that the peak population of *Helicoverpa armigera* was observed on 8th SMW (7.80 larvae/plant). As reported by Patnaik *et al.* (2024) the peak population of *H. armigera* was observed during the 7th SMW with 5.90 larvae/ plant. As presented in Table 2. It has been observed that the correlation of gram pod borer had a positive and non-significant relationship with maximum temperature (0.282) and minimum temperature (0.399). While it had a negative and significant relationship with maximum relative

**Table 2.** Correlation of insect pests of garden pea with abiotic factors. Note: (df= 14–2) = 12, $r_{0.05}$= 0.532, $r_{0.01}$=0.661, *= Significant at 5% level, **= Significant at 1% level, NS= Non-significant.

| Pests | Pearson's correlation coefficient Temperature Max | Min | Relative humidity Max | Min | Rainfall (mm) |
|---|---|---|---|---|---|
| Pea aphid | $0.344^{NS}$ | $0.289^{NS}$ | -0.643* | $-0.311^{NS}$ | $0.306^{NS}$ |
| Leaf miner | $0.067^{NS}$ | $0.076^{NS}$ | $-0.485^{NS}$ | $-0.064^{NS}$ | 0.640* |
| Gram pod borer | $0.282^{NS}$ | $0.399^{NS}$ | -0.581* | $-0.236^{NS}$ | 0.686** |
| Pea pod borer | $0.483^{NS}$ | $0.487^{NS}$ | -0.665** | $-0.442^{NS}$ | 0.612* |

humidity (–0.581) and a negative and non-significant relationship with minimum relative humidity (–0.236). Rainfall (0.686) had positive and significant relationship with gram pod borer. Kumar *et al.* (2015) showed that gram pod borer had negative correlation with relative humidity (–0.569) and positive correlation with rainfall (0.158). Yadav *et al.* (2024) found out that rainfall had a positively correlation (0.569) in 2021-22 and (0.003) in 2022-23 with gram pod borer.

**Pea pod borer, *Etiella zinckenella***

Table 1 shows that the pea pod borer infestation started in the 4th SMW with the mean population of 0.47 pea pod borer/three plants. The highest mean number of population (6.68/three plants) was observed on 8th SMW with a maximum temperature of 25.1°C, minimum temperature of 12.8°C, maximum relative humidity of 94%, minimum relative humidity of 61% and rainfall of 38.5 mm. The lowest mean population (0.47/three plants) was observed on 4th SMW with a maximum temperature of 22.9°C, minimum temperature of 8.7°C, maximum relative humidity of 95%, minimum relative humidity of 66% and rainfall of 0.0 mm. Vaibhav *et al.* (2018) reported that the peak population of pea pod borer was observed on 8th SMW. As presented in Table 2, pea pod borer had a positive and non-significant correlation with the maximum temperature (0.483) and minimum temperature (0.487). While it had a negative and significant relationship with maximum relative humidity (-0.665) and a negative and non-significant relationship with minimum relative humidity (-0.442). It had a positive and significant relationship with rainfall (0.612). Vaibhav *et al.* (2018) showed that pea pod borer had positive correlation with rainfall (0.348).

## CONCLUSION

The seasonal patterns of major insect pests affecting garden peas are heavily influenced by weather conditions. Taking these factors into consideration is essential for efficiently managing pest populations and ensuring the sustainability of agricultural output and production. The results of the current study will contribute to the existing database on the seasonal occurrences of major insect pests of garden pea.

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