



Seasonal Incidence of Natural Enemies Associated with Major Insect Pests in Pearl Millet

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Abstract— A field investigation was conducted during Kharif 2025 at the Research Farm of the National Agricultural Research Project (NARP), Chhatrapati Sambhajnagar, Maharashtra, to record the seasonal occurrence of natural enemies in pearl millet. Ladybird beetles (LBB) and chrysopids were observed at weekly intervals from the 29th to the 38th standard meteorological week (SMW), alongside major insect pests. Ladybird beetle abundance ranged from 0.0 to 1.5 per observation, with the maximum value of 1.5 recorded during the 36th SMW. Chrysopid abundance ranged from 0.0 to 1.2, reaching its maximum during the 38th SMW. Ladybird beetles were not recorded during the 32nd SMW, while chrysopids were absent during the 31st SMW. Both groups were recorded during several crop-growth stages, indicating that natural enemies were present in the pearl millet ecosystem during the observation period. The findings highlight the importance of regular field monitoring and conservation of beneficial arthropods as components of integrated pest management. The study records seasonal occurrence only; further replicated studies are required to establish the role of these natural enemies in suppressing particular pests.



Keywords— Pearl millet, natural enemies, ladybird beetles, chrysopids, seasonal incidence, Kharif 2025

I. INTRODUCTION

Pearl millet is an important cereal crop grown under rainfed and semi-arid conditions, and its crop ecosystem supports both insect pests and beneficial arthropods. Conservation of natural enemies is recognised as one component of integrated pest management in millet crops (Gahukar and Reddy, 2019). Ladybird beetles (*coccinellids*), green lacewings and spiders have been recorded as natural enemies associated with insect pests in pearl millet fields (Savithri and Prakash, 2023).

Information on the seasonal presence of beneficial insects can help describe their occurrence during crop growth and support decisions about conserving natural enemies in the field. Savithri and Prakash (2023) reported seasonal activity of *coccinellids* and green lacewings in a pearl millet ecosystem at Vijayapura. Patange et al. (2024) also recorded ladybird beetles and chrysopids while studying biotic factors associated with seasonal pest incidence in pearl millet. Therefore, the present study documented the weekly incidence of ladybird beetles and chrysopids associated

with pearl millet during Kharif 2025 at Chhatrapati Sambhajnagar, Maharashtra.

II. MATERIALS AND METHODS

The field observations were recorded during Kharif 2025 at the Research Farm of the National Agricultural Research Project (NARP), Chhatrapati Sambhajnagar, Maharashtra, on pearl millet hybrid ABH 1200. Weekly observations were made from the 29th to the 38th standard meteorological week (SMW). Ladybird beetles (LBB) and *chrysopids* were recorded as associated natural enemies along with observations on major insect pests. The values presented here are reproduced from the seasonal-incidence dataset in the supplied Chapter 4. The original table does not specify the unit or sampling denominator for the natural-enemy values; therefore, the values are reported as recorded and are not re-labelled as insects per plant.

III. RESULTS AND DISCUSSION

3.1 Seasonal occurrence of ladybird beetles

The recorded data showed that ladybird beetles were observed during most of the monitoring period. The recorded values were 0.8 during the 29th SMW, 0.6 during the 30th SMW, and 0.5 during the 31st SMW. No ladybird beetles were recorded in the 32nd SMW. Their occurrence was again recorded during the 33rd and 34th SMW at 0.6 and 1.0, respectively. The value decreased to 0.5 during the 35th SMW, then increased to the maximum recorded value of 1.5 during the 36th SMW. Values of 1.0 and 0.8 were recorded during the 37th and 38th SMW, respectively. This pattern indicates variation in ladybird beetle occurrence across the crop season.

3.2 Seasonal occurrence of chrysopids

Chrysopids were recorded at 1.0 during the 29th SMW and 0.6 during the 30th SMW, but were not recorded during the 31st SMW. Their recorded value was 0.4 during the 32nd SMW and 0.6 during the 33rd SMW. A value of 1.0 was recorded during the 34th SMW, followed by 0.4 during the 35th SMW. Chrysopid values were 1.0 during both the 36th and 37th SMW and reached the maximum recorded value of 1.2 during the 38th SMW. Thus, chrysopids remained detectable during most of the observation period, with their highest recorded occurrence at the final observation.

3.3 Implications for integrated pest management

The seasonal records confirm the presence of ladybird beetles and chrysopids in the pearl millet field during *Kharif* 2025, although their recorded values fluctuated among weeks. Similar seasonal occurrence of coccinellids and green lacewings in pearl millet was reported by Savithri and Prakash (2023). These observations support including beneficial insects in routine crop monitoring. However, the present dataset describes occurrence and does not by itself demonstrate the amount of pest suppression provided by either group. Future studies should record sampling units consistently, use replicated plots, and examine relationships between natural-enemy abundance and pest populations before drawing conclusions about biological-control effectiveness.

Table 1. Weekly occurrence of natural enemies in pearl millet during *Kharif* 2025

SMW	Ladybird beetles (LBB)	Chrysopids
29	0.8	1.0
30	0.6	0.6
31	0.5	0.0
32	0.0	0.4
33	0.6	0.6

34	1.0	1.0
35	0.5	0.4
36	1.5	1.0
37	1.0	1.0
38	0.8	1.2

IV. CONCLUSION

Ladybird beetles and chrysopids were recorded during the *Kharif* 2025 pearl millet season, with fluctuations in their weekly occurrence. The highest recorded LBB value was 1.5 during the 36th SMW, while chrysopids reached 1.2 during the 38th SMW. These observations indicate that beneficial insects were present in the crop ecosystem and should be included in field surveillance and conservation-oriented pest management. Since the available data do not quantify their direct effect on pest populations, additional studies are needed to evaluate their biological control contribution.

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