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ECOLOGICAL MANAGEMENT OF APHID POPULATIONS IN WHEAT CROPS

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Abstract: The present study aimed to evaluate the population levels and interactions between cereal aphids (*Schizaphis graminum* and *Sitobion avenae*) and their natural coccinellid predators in a winter wheat crop. Population densities (individuals/m²) and the rate of aphid decline between successive sampling dates were calculated, together with the estimated predation potential of coccinellids based on a feeding rate of 400 aphids per adult per week. The study demonstrates the importance of natural predation in the biological control of cereal aphids and highlights the potential of coccinellids as effective biocontrol agents in wheat agroecosystems. .

• Introduction

Aphids (Aphididae: Hemiptera) are among the most important pest groups affecting cereal crops, due to their direct impact on both yield and quality of wheat (*Triticum aestivum* L.). In the current context of sustainable agriculture, reducing dependence on chemical insecticides is a major objective, and biological control is becoming a key component of modern integrated pest management (IPM) strategies (SINGH AND SINGH, 2016). Among the most efficient natural enemies of aphids are coccinellids (Coleoptera: Coccinellidae), generalist predators that feed on aphids in all developmental stages (CANEPARI, 2005; HULLÉ ET ALL., 2020).

• Material and method

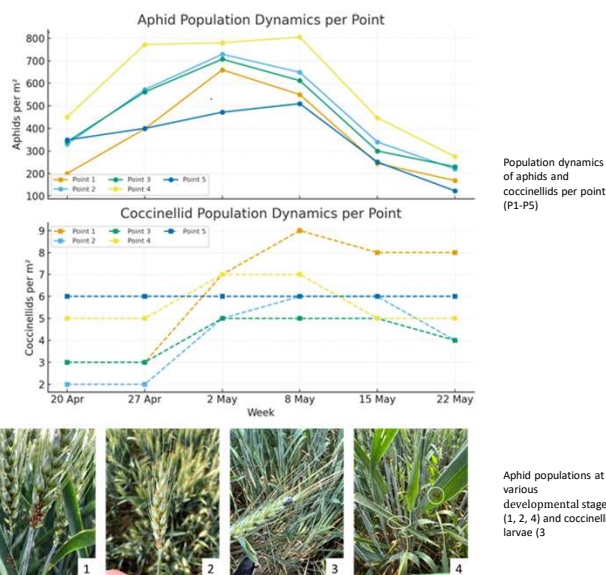
The study was conducted in a wheat crop (*Triticum aestivum* L.) from Ghilad (Timis County) with the objective of evaluating the population levels of aphids and their coccinellid predators in order to assess the natural control potential of the latter. The experimental field (45.457623, 21.161537) was divided into six observation points: three located near the outer edge of the field and three towards the interior, to capture potential spatial differences in insect population density.



The experimental plot with designated observation points and the Entomology Laboratory where the aphid samples were analyzed

$$Rd = \frac{Dt - Dt+1}{Dt} \times 100$$

Observation Point	Mean aphids (ind./m ²)	Mean Coccinellids (ind./m ²)	Aphids per Coccinellid (mean ratio*)	Estimated aphids consumed/week
1	370.3	6.3	58.8	2,520
2	473.3	4.8	98.6	1,920
3	458.7	4.2	109.2	1,680
4	588.3	5.7	103.2	2,280
5	350.8	6.0	58.5	2,400



Coccinellids densities varied between 4.2 and 6.3 individuals/m². The corresponding mean ratios ranged between 58.5 and 109.2 aphids per one coccinellid, reflecting spatial differences in the predator-prey balance. Lower ratios (about of 59 aphids per coccinellid) were recorded at Points 1 and 5, suggesting higher relative predator presence and potential for effective natural control.

The estimated weekly aphid consumption, calculated from the mean coccinellid densities and an average feeding rate of 400 aphids per predator per week, ranged between 1,680 and 2,520 aphids/m², supporting the role of coccinellids in reducing aphid populations during May.

• Results and discussions

Throughout the monitoring period (20 April - 22 May), both aphid and coccinellid populations exhibited clear temporal fluctuations across all observation points. Aphid density increased steadily from mid-April, reaching its peak during the first half of May (2-8 May), followed by a pronounced decline towards the end of the observation period (15- 22 May). Conversely, coccinellid populations showed a delayed increase, with the highest densities recorded between 8 and 15 May, coinciding with the peak abundance of aphids. The population dynamics observed suggest a strong trophic relationship between the two groups, where predator abundance responds to prey availability.

This synchrony indicates that coccinellids played an active role in reducing aphid numbers in the later stages of wheat vegetation.

• Conclusions

The results demonstrated a clear temporal overlap between the peaks of aphid and coccinellid populations, suggesting a predator response closely linked to prey abundance. These findings confirm the key role of coccinellids as effective biological control agents in cereal agroecosystems. To enhance their regulatory potential, agricultural practices that conserve or promote coccinellid populations, such as reduced pesticide use, maintenance of refuge habitats, and diversified crop margins, should be encouraged.

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• References (selective)

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