

3 MAJOR INSECT PESTS OF CORN CROPS IN WESTERN ROMANIA - IMPACT OF CHANGING CLIMATIC FACTORS ON ABUNDANCE AND POPULATION DYNAMICS

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Abstract: Insects are the most common arthropod pests of corn, with 3 species causing by far the most damage in Europe: *Ostrinia nubilalis*, *Helicoverpa armigera* and *Diabrotica v. virgifera*. In this study, the evolution of population densities of three pest species in corn crops in Western Romania was analyzed. To evaluate population dynamics, experimental plots were established in Clarii Vii (Jimbolia) in 2022. 3 types of Csalomon traps were used: VARL +, RAG, PALz were used. With a maximum density of 359.6 adults per trap, the highest density was recorded for *Diabrotica v. virgifera*, which showed only one generation per year. In addition, the data revealed the existence of two defined generations for the two lepidoptera (*Ostrinia n.*, *Helicoverpa a.*) examined. The actual amount of heat required for the flight of these two moths was reached at different times, on 17 June and 6 August for *Ostrinia n.*, and on 23 June and 6 August for *Helicoverpa a.* The flight diagrams clearly show a clear increase in the number of specimens with increasing temperatures. The changes in the number of individuals of the 3 insect pests that were studied showed a significant correlation with the abiotic factors.

• Introduction

Insect pests are one of the main factors responsible for the decline in the production of agricultural crops, and their incidence and impact are to a large extent determined by weather and climate conditions, which are constantly changing. For example, in the corn crop in the western part of Romania, 3 pests, *Ostrinia nubilalis*, *Helicoverpa armigera* and *Diabrotica virgifera*, play a key role in the potential long-term impacts of climate change on productivity.

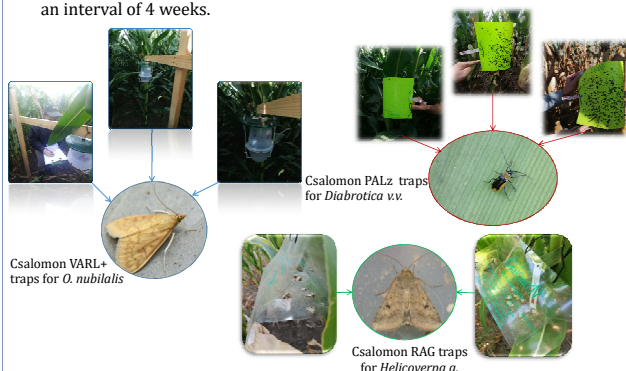
The ecological responses of the 3 pests to recent climate change are already visible and are mainly associated with the increase in temperature and the lack of rainfall from 2022 onwards, causing major imbalances in the corn crop and leading to extremely high populations of these pests with significant production losses. Therefore, as the conditions of their occurrence have changed at a high rate, the aim of this paper was to monitor the 3 target pests through the lens of abundance and population dynamics.

• Material and method

The research was conducted in 2022 and the experimental plots were located in Clarii Vii (Jimbolia) (45°49'44.7"N 20°48'24.6"E), the total experimental fields being of: 64,134 m².

DEKALB DKC 4598 maize hybrid was used.

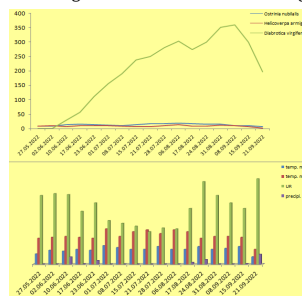
Monitoring was performed between May and September 2022 by placing Csalomon pheromone traps in the experimental plot: -VARL+ - for *O. nubilalis*, RAG - for *H. armigera* and PALz - for *D. virgifera virgifera*. The traps were installed on 23 May 2022 at a rate of 2 traps per hectare, the readings were taken every 7 days and the change of the sexual pheromone was carried out at an interval of 4 weeks.



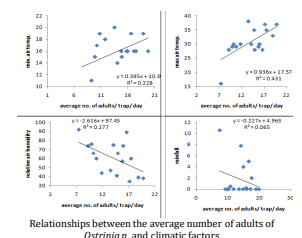
• Results and discussions

The first individuals appeared in the week 23rd - 27th May (BBCH maize 6 - 8 leaves) with an average of 9.2 adults/trap/day for *O. nubilalis*, 8.6 adults/trap/day for *H. armigera*; and the first individuals of *D. virgifera virgifera* appeared on 17th June with an average of 56.3 adults/trap/day.

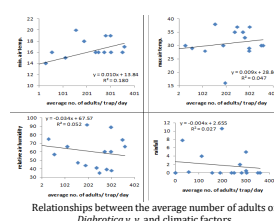
The maximum abundance of the first generation was reached on 17 June for *O. nubilalis* (15.8 adults/trap/day) and on 23 June for *H. armigera* (11.1 adults/trap/day). With an average of 19.8 adults/trap/day for *O. nubilalis* and 13.8 for *H. armigera*, the maximum threshold for the second generation is reached on 6 August 2022.



Population dynamics of major insect pest in corn, Clarii Vii (Jimbolia), 2022



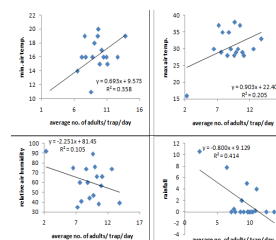
Relationships between the average number of adults of *Ostrinia n.* and climatic factors



Relationships between the average number of adults of *Diabrotica v. v.* and climatic factors

The species *D. virgifera virgifera*, which has only one generation/year, reaches the maximum on 8 September 2022 with an average of 359.6 adults/trap/day.

The results of the present study showed that occurrence had a positive, non-significant correlation with minimum and maximum temperature. Relative humidity was the other most important factor that was closely related to the activity of the pests. In the case of precipitation, a positive, significant correlation was found.



Relationships between the average number of adults of *Helicoverpa a.* and climatic factors

• Conclusions

Compared to the other two monitored pests, *Diabrotica v. virgifera* reaches higher thresholds.

In the three species under study, there is almost perfect synchronisation of the first generation with the optimal temperature threshold, which is specific to the biology of the insect. These mechanisms evolved over time, requiring constant insect adaptation to climate change.

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