Current Trends in Natural Sciences (on-line) ISSN: 2284-953X ISSN-L: 2284-9521 Current Trends in Natural Sciences (CD-Rom) ISSN: 2284-9521 ISSN-L: 2284-9521

## **RESULTS REGARDING THE SEASONAL MONITORING OF** *EPICOMENTIS HIRTA* PODA (COLEOPTERA: SCARABAEIDAE) IN AN ARONIA PLANTATION FROM NORTH-EASTERN AREA OF ROMANIA

Iuliana Elena Golache<sup>1,2</sup>, Iulia Mineață<sup>1,\*</sup>, Ionel Perju<sup>1</sup>, Ionuț Vasile Ungureanu<sup>1</sup>, Mihai Istrate<sup>2</sup>, Mihai Tălmaciu<sup>2</sup>

<sup>1</sup>Research Station for Fruit Growing Iași, 3 Ion Vodă cel Viteaz, Miroslava, Romania <sup>2</sup>'Ion Ionescu de la Brad' Iași University of Life Sciences, 3 Mihail Sadoveanu Alley, Iași, Romania

Current Trends in Natural Sciences

#### Abstract

The potential of colored traps in association with phagoattractants represents a new tool for the detection and seasonal monitoring of Epicometis hirta (Poda) adults found in fruit shrub plantations in the North-Eastern area of Romania. The experiment was carried out during 2022-2023 in a chokeberry plantation where the cultivars 'Nero' and 'Melrom' are grown. During the study period adults emerged every year from the end of March. The first adults were captured before the flowering period, on 31<sup>st</sup> March 2022, respectively on 29th March 2023. The maximum flight was reached when both varieties were in the phenophase of full flowering, at the end of April (27.04.2022), the beginning of May (04.05.2023). The maximum number of adults captured was in the 'Nero' cultivar, in 2023, which produced 36.15% flower damage. The last adults were observed on May 12<sup>th</sup> (2022), respectively May 15<sup>th</sup> (2023). The present work focuses on the results of monitoring the attack on the inflorescences of some cultivars of Aronia melanocarpa L. and on the detection of the presence of the polyphagous pest Epicometis hirta (Poda) in a chokeberry plantation from Iaşi county. The obtained results were processed and statistically interpreted.

Keywords: aronia, attractant traps, Epicometis hirta Poda., management, pest

#### **1. INTRODUCTION**

*Epicometis hirta* (Poda, 1761), is a polyphagous pest within the *Scarabaeidae* family, that have a significant threat to a variety of crops across Europe, Northern Asia, and North Africa, including those the *Aronia* genus (Vîrteiu et al., 2022; Chiorean et al., 2023).

*Epicomentis hirta* has been extensively studied due to its impact on various crops. For instance, studies have highlighted its presence in apple orchards where it is managed using azadirachtinbased treatments (Rădulea et al., 2022; Vuković et al., 2023). The beetle's lifecycle and behavior have been documented across different regions, including Bulgaria and Serbia, emphasizing the importance of floral baited traps for its detection and monitoring (Byk et al., 2023). In Romania, *E. hirta* is known to affect a wide range of horticultural crops. Its prevalence in blueberry orchards has been documented, showcasing the beetle's adaptability and the necessity for targeted pest management approaches (Slav et al., 2018). Hulujan et al. (2022) monitored the presence of the pest in a blackberry and blackcurrant plantation, using blue containers with organic products, and the results obtained indicated a high efficiency of these in capturing the pest. Furthermore, the diversity

## **Current Trends in Natural Sciences** Vol. 13, Issue 25, pp. 21-27, 2024

https://doi.org/10.47068/ctns.2024.v13i25.003

Current Trends in Natural Sciences (on-line) ISSN: 2284-953X ISSN-L: 2284-9521

of scarabaeoid beetles in neighboring regions as Bulgaria, Serbia or Hungary provides a broader context for understanding the ecological dynamics that influence *E. hirta* populations (Vuts et al., 2010; Subchev et al., 2012; Lohonyai et al., 2018).

The importance of monitoring programs is underscored by the need to manage the seasonal abundance of *E. hirta*. Effective monitoring not only aids in understanding the pest's phenology but also in implementing timely interventions to mitigate damage. Studies in other regions, such as Moldova and Russia, have contributed valuable data on the distribution and seasonal activities of scarabaeoid beetles, reinforcing the relevance of continuous surveillance and research (Busmachiu and Toderas, 2014; Egorov et al., 2023).

The monitoring and management of this pest are crucial, particularly in agricultural regions such as North-Eastern Romania, where it can affect the productivity of plantations. The objective of this study is to evaluate the effectiveness of colored traps in combination with phagoattractants for detecting and monitoring the seasonal activity of *Epicometis hirta* in aronia crops located in the North-Eastern region of Romania.

This research aims to understand the seasonal patterns of beetle occurrence and activity, assess the extent of damage caused to chokeberry cultivars with a focus on prospects for improving pest management practices in the region.

## 2. MATERIALS AND METHODS

The study was conducted in an aronia plantation located in the experimental fields of Research Station for Fruit Growing Iaşi, in metropolitan area of Iaşi County. The plantation was established on a relief with slightly inclined plateau with good natural drainage due to the cambic chernozem soil type. The climate of the region is pronounced temperate continental, considered Dfb type according to the Köppen-Geiger classification (Belda et al., 2014). This is characterized by cold winters and warm summers, which influences the phenology of both the *Aronia* plants and the pest species.

The experiment was carried out over two consecutive years, from 2022 to 2023. A randomized block design was used to ensure the reliability and reproducibility of the results. The plantation was divided into several plots, with each plot containing an equal number of 'Nero' and 'Melrom' plants.

The attractive traps consisted of blue containers placed on the ground approximately 20 m apart. Each trap was filled with one of the following liquids: atraHYR attractant, floral attractant and water and the mixtures were changed every 3 days.

Captured beetles were counted and recorded during each weekly inspection. The data collection focused on the following parameters: date of first adult emergence, peak flight periods, number of beetles captured per trap and extent of flower damage on both 'Nero' and 'Melrom' cultivars.

The collected data were recorded, processed and statistically interpreted with the help of the coefficient of variation.

## 3. RESULTS AND DISCUSSIONS

During the study, climatic factors were monitored in the aronia plantation with the help of the Field Climate System. In figures 1 were represented the averages and monthly precipitations recorded each year. In 2022, average temperatures started at -0.4°C in January, gradually increasing to peak at 23.2°C in July, before decreasing to 1.3°C in December. In comparison, 2023 saw similar trends with January temperatures at 2.6°C, peaking slightly higher at 24.2°C in July, and falling back to 1.4°C in December. Rainfall patterns displayed more variances. In 2022, the year began with low

#### Current Trends in Natural Sciences Vol. 13, Issue 25, pp. 21-27, 2024 https://doi.org/10.47068/ctns.2024.v13i25.003

Current Trends in Natural Sciences (on-line) ISSN: 2284-953X ISSN-L: 2284-9521 Current Trends in Natural Sciences (CD-Rom) ISSN: 2284-9521 ISSN-L: 2284-9521

precipitation levels in January (12.1 mm) and February (5.8 mm), peaking significantly in August (136.8 mm). The year 2023 followed a similar trend but with notable differences, particularly in April (88.6 mm compared to 58 mm in 2022) and July (69 mm compared to 29.6 mm in 2022). August rainfall was substantial but less pronounced at 136.8 mm in 2022 compared to 69 mm in 2023. These climatic conditions had significant implications for the presence and activity of *Epicometis hirta*. In 2022, warmer temperatures and increased rainfall in April and May created optimal conditions for *Epicometis hirta* adults, resulting in increased activity and damage during the bloom period. Conversely, in 2023, warmer temperatures and heavy rainfall in the same months led to an increased incidence of pest attacks.



Figure 1. Average monthly temperatures and rainfalls from 2022-2023, RSFG Iași

Figure 2 describes the flight activity of adults monitored in the two consecutive years with the help of phagoattractants traps over the period from late March to mid-May.

In 2022, On March 31, the first adults of *Epicometis hirta* were captured, marking the beginning of the observation period. The maximum flight activity, with a peak of 23 individuals, was reached on April 27, which coincided with the phenophase of full flowering. This period showed a significant increase in average temperatures and relatively stable rainfall, providing optimal conditions for pest activity.

The last adults were observed on May 12, indicating the end of the flight period for the year. In the next year On March 29, the first adults were captured, being an earlier start to the observation period compared to the previous year. The peak activity, reaching 29 individuals, occurred on May 4. This maximum flight period coincided with the phenophase of full flowering, influenced by the higher temperatures and increased rainfall observed in April, creating even more favorable conditions for the pest. The last adults were observed on May 15, indicating a slightly extended flight period compared to 2022.

Correlating climatic factors with the flight activity of *Epicometis hirta* adults, it is observed that warmer temperatures and higher rainfall levels directly impact the emergence and peak activity of beetles. In 2023, the earlier and more pronounced peak in pest activity can be attributed to these climatic factors, which fostered an environment conducive to their biology.

This correlation underscores the importance of monitoring these factors closely to optimize pest management strategies and mitigate the impact on aronia crops during their critical flowering period.

## Current Trends in Natural Sciences Vol. 13, Issue 25, pp. 21-27, 2024

https://doi.org/10.47068/ctns.2024.v13i25.003

Current Trends in Natural Sciences (on-line) ISSN: 2284-953X ISSN-L: 2284-9521 Current Trends in Natural Sciences (CD-Rom) ISSN: 2284-9521 ISSN-L: 2284-9521



Figure 2. The activity of Epicometis hirta (Poda) and the flight season during the study (2022-2023, RSFG Iași)

Table 1 highlights the number of adults of *Epicometis hirta* monitored using blue traps with AtraHIR and floral attractants. The data collected revealed a gradual increase in the number of adults captured, starting with 2 individuals in late March. The first decade of April saw a significant rise to 29 adults, escalating further in the second and third decades to 94 and 163 individuals, respectively. The peak activity was recorded in late April, coinciding with the phenophase of full flowering of aronia cultivars, which suggests a strong correlation between flower availability and pest activity. By early May, the numbers declined sharply, with a total of 59 individuals, and only 2 captured in the second decade, marking the end of the flight period. The average number of adults per trap was 58.50, with high variability (COVAR S% ranging from 92.73 to 124.30), indicating fluctuations in population density and attractant effectiveness throughout the observation period.

Period		AtraHIR attractant			Floral attractant			Total/
Month	Decade	<i>C1</i>	<i>C</i> 2	С3	<i>C1</i>	<i>C</i> 2	С3	decade
March	III	1	1	0	0	0	0	2
April	Ι	7	5	8	4	2	3	29
	II	20	18	23	13	11	9	94
	III	33	41	32	19	18	22	163
May	Ι	13	11	16	5	8	6	59
	II	0	0	2	0	0	0	2
Total/trap		74	76	81	41	39	40	351
	Average	12.33	12.67	13.50	6.83	6.50	6.67	58.50
	STDEV	12.61	15.42	12.52	7.63	7.20	8.29	63.02
CC	OVAR S%	102.26	121.76	92.73	111.61	110.83	124.30	102.26

Table 1.	The numbe	r of adults	of the species	<b>Epicometis</b>	hirta Poda,	collected at t	he blue trap	os in 2022
			1	1			1	

\*Corresponding author, E-mail address: iulia\_mineata@yahoo.com

#### **Current Trends in Natural Sciences** Vol. 13, Issue 25, pp. 21-27, 2024

https://doi.org/10.47068/ctns.2024.v13i25.003

Current Trends in Natural Sciences (on-line) ISSN: 2284-953X ISSN-L: 2284-9521 Current Trends in Natural Sciences (CD-Rom) ISSN: 2284-9521 ISSN-L: 2284-9521

In 2023, the monitoring of *Epicometis hirta* followed a similar pattern, with the first captures occurring slightly earlier, in late March (4 individuals). April showed a consistent increase in captures, with totals of 30, 55, and 122 individuals for the three decades, respectively. The peak activity shifted to early May, with a notable maximum of 165 individuals, reflecting a delayed yet more intense infestation compared to the previous year. This shift may be attributed to slightly higher temperatures and increased rainfall during this period, which likely extended the favorable conditions for the pest. The average number of adults per trap increased to 64.17, with standard deviations indicating moderate variability. The coefficient of variation percentages (COVAR S%) ranged from 92.14 to 115.54, slightly lower than in 2022, suggesting a more consistent population distribution (Table 2).

Table 2. The number of adults of the specie	s Epicometis hirta Poda	, collected at the blue traps in 2023
---	-------------------------	---------------------------------------

Period		AtraHIR attractant			Floral attractant			Total/
Month	Decade	<i>C1</i>	<i>C2</i>	С3	<i>C1</i>	<i>C</i> 2	С3	decade
March	III	2	0	1	0	1	0	4
April	Ι	9	6	8	3	2	2	30
	II	12	10	13	5	8	7	55
	III	28	24	26	16	13	15	122
May	Ι	34	37	33	19	22	20	165
	II	2	2	3	0	2	0	9
Total/trap		87	79	84	43	48	44	385
Average		14.50	13.17	14.00	7.17	8.00	7.33	64.17
STDEV		13.50	14.46	12.90	8.28	8.27	8.43	65.46
C	OVAR S%	93.12	109.79	92.14	115.54	103.83	114.96	102.02



Figure 3. Capturing the adults of Epicometis hirta Poda. during the flowering period of aronia

There was also monitored the degree of flower damage in both 'Nero' and 'Melrom' cultivars (Figure 3). Flower damage was assessed by examining 100 randomly selected inflorescences of each cultivar. Damage was quantified based on the percentage of flowers showing signs of beetle feeding. Figure 4 represents the percentage damage caused by *Epicometis hirta* to two chokeberry

#### Current Trends in Natural Sciences Vol. 13, Issue 25, pp. 21-27, 2024 https://doi.org/10.47068/ctns.2024.v13i25.003

Current Trends in Natural Sciences (on-line) ISSN: 2284-953X ISSN-L: 2284-9521

cultivars, Melrom and Nero, in 2022 and 2023, from the plots where the two types of blue traps with AtraHIR and floral attractant were installed. In 2022, the cultivar 'Melrom' suffered a damage of 30.03% in the plots monitored with the floral attractant, which increased to 32.73% in 2023.

Similarly, in the plots monitored with AtraHIR the dunes produced showed a slight increase from 20.84% in 2022 to 22.19% in 2023. the variety "Nero" showed a higher susceptibility in monitored plots with floral attractants increasing from 31.49% in 2022 to 36.15% in 2023, and in plots with AtraHIR traps from 19.36% to 20.14%.



Figure 4. Damage percentage of Epicometis hirta Poda. attack on aronia inflorescences

The increase in damage percentages in 2023 across both cultivars and attractants indicates a potentially higher pest pressure, influenced by the climatic conditions, such as increased temperatures and rainfall earlier in the season.

## 4. CONCLUSIONS

1. Warmer temperatures and increased rainfall in 2023 led to an earlier and more intense peak in *Epicometis hirta* (Poda) activity compared to 2022. This highlights the significant impact of climatic conditions on pest emergence and biology, emphasizing the need for continuous monitoring to manage pest pressure effectively.

2. There was high variability in pest population and activity, with slightly more consistent population distribution in 2023. This indicates that while climatic conditions are crucial, other factors such as trap placement also play a role, necessitating a comprehensive approach to pest management in aronia crops.

3. AtraHIR with blue traps proved more effective than floral attractant traps in reducing damage to Aronia cultivars. In both years, damage percentages were consistently lower with AtraHIR traps, suggesting they are a more reliable component of integrated pest management strategies.

## 5. ACKNOWLEDGEMENTS

This work was supported by the Implementation of the "ASAS Strategy on Research - Development – Innovation in Fruit Growing" (2021 - 2027) in collaboration with the 'Ion Ionescu de la Brad' University of Life Science Iași within the Doctoral School of Engineering Sciences from IOSUD-IULS.

# Current Trends in Natural Sciences

Vol. 13, Issue 25, pp. 21-27, 2024 https://doi.org/10.47068/ctns.2024.v13i25.003

Current Trends in Natural Sciences (on-line) ISSN: 2284-953X ISSN-L: 2284-9521 Current Trends in Natural Sciences (CD-Rom) ISSN: 2284-9521 ISSN-L: 2284-9521

#### 6. REFERENCES

- Byk A, Bidas M, Gazurek T, Kwiatkowski A, Marczak D, Minkina Ł, Mroczyński R, Pepłowska-Marczak D, Stanković SS, Žikić V, et al. New Data on the Occurrence of Scarabaeoid Beetles (Coleoptera: Scarabaeoidea) in Serbia. *Diversity*. 2023; 15(2):264.
- Buşmachiu, G., & Toderaş, L. (2014). Some observation on Tropinota (Epicometis) hirta (Poda, 1761)(Coleoptera: Scarabaeoidea, Cetoniidae) from the Republic of Moldova. Marisia. *Studii şi Materiale. Ştiinţele Naturii*, (33-34), 123-129.
- Chiorean, A. M., Roşu-Mareş, S., Jakab-Ilyefalvi, Z., Buta, E., & Mitre, V. (2023). Preliminary results regarding the behaviour of two chokeberry (Aronia melanocarpa Michx.) cultivars in environmental conditions of Northern Transylvania. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Horticulture, 80 (1), 26-32
- Egorov LV, Ruchin AB, Alekseev SK, Lukiyanov SV, Lobachev EA, Esin MN, Artaev ON, Semishin GB. Scarabaeoidea (Coleoptera) Fauna of the Republic of Mordovia (Russia). *Diversity*. 2023; 15(6):745.
- Lohonyai, Z., Vuts, J., Fail, J., Tóth, M., & Imrei, Z. (2018). Field response of two cetoniin chafers (Coleoptera, scarabaeidae) to floral compounds in ternary and binary combinations. *Acta phytopathologica et entomologica Hungarica*, 53(2), 259-269.
- Rădulea, M., Iamandei, M., Popa, I. C., Georgescu, R. G., Chiriloaie-Palade, A., & Bolbose, C. (2022). Species of insects harmful to leaves, buds, and flowers in the apple orchards of Southern Romania. *Romanian Journal for Plant Protection*, 15
- Subchev, M., Toshova, T., Andreev, R., Petrova, V., Maneva, V., Spasova, T., ... & Velchev, D. (2012). Using floral baited colour traps for detection and seasonal monitoring of Oxythyrea funesta (Poda)(Coleoptera: Cetoniidae) in Bulgaria. Acta Zool Bulg, 64, 439-443.
- Toth, M., Schmera, D., Imrei, Z. (2004). Optimization of a chemical attractant for Epicometis (Tropinota) hirta Poda. *Zeitschrift für Naturforschung* C, 59(3-4), 288-292.
- Vîrteiu, A. M., Rof, M., & Grozea, I. (2022). Analytical study of the colored traps effectiveness in monitoring Epicometis hirta (Poda, 1761) in rapeseed crops. *Romanian Journal for Plant Protection*, 15.
- Vuković, S., Lazić, S., Gvozdenac, S. and Šunjka, D. (2019). The control of Epicometis hirta Poda in apple orchards with azadirachtin. *Acta Hortic*. 1242, 775-778
- Vuts, J., Szarukán, I., Subchev, M., Toshova, T., & Tóth, M. (2010). Improving the floral attractant to lure Epicometis hirta Poda (Coleoptera: Scarabaeidae, Cetoniinae). *Journal of Pest Science*, 83, 15-20.