

OBSERVATIONS ON EPIGEIC ARTHROPOD SPECIES PRESENT IN CERTAIN ORCHARD AND FOREST PLANTATIONS

OBSERVAȚII PRIVIND SPECIILE DE ARTROPODE EPIGEE EXISTENTE ÎN UNELE PLANTAȚII POMICOLE ȘI SILVICE

Bârdan VASILE¹, Herea MONICA^{1}, Tâlmăciu NELA¹, Hagiu OTILIA¹,
Prisecariu LIVIU-ADRIAN¹, Bădeanu MARINELA¹, Pănuță SERGIU²,
Tâlmăciu MIHAI¹*

*Corresponding author e-mail: monica.herea@iuls.ro

Abstract.

*The observations were carried out over a single year, 2025, in an apple orchard and a forest plantation containing both coniferous and deciduous species. Several types of traps were used to collect arthropods: soil traps of the Barber type, Decis Traps, yellow sticky traps, etc. Direct observations of the trees were also performed. Collection of material and trap readings were conducted throughout the vegetation period at intervals generally ranging between 14–17 days. The exact dates of collection and readings were: 16.05.2025, 06.06.2025, 26.06.2025, 16.07.2025, 01.08.2025, 22.08.2025, 10.09.2025, and 24.09.2025. The species with the highest abundance and most frequently collected were: *Pterostichus (Poecilus) cupreus*, *Silpha carinata*, *Gryllotalpa gryllotalpa*, *Armadillidium vulgare*, *Carabus coriaceus*, *Geotrupes vernalis*, *Necrophorus vespillo*, *Staphylinus caesareus*, *Agriotes ustulatus*, *Oiceoptoma thoracicum*, *Harpalus tardus*, *Aptinus bombardia*, *Dermestes lanarius*, *Carabus intricatus*.*

Key words: entomofauna, forest, apple.

Rezumat.

Observațiile au fost făcute pe durata unui singur an, 2025, într-o plantație pomicolă de măr și într-o plantație silvică cu specii de rășinoase și foioase. Pentru colectarea artropodelor au fost utilizate mai multe tipuri de capcane: capcane de sol tip Barber, capcane Decis Trap, capcane galbene lipicioase etc. De asemenea au fost făcute observații directe asupra pomilor și a arborilor. Colectarea materialului și citirile la capcane au fost făcute pe durata perioadei de vegetație la intervale cuprinse în general între 14-17 zile. Datele exacte ale colectărilor și citirilor au fost următoarele: 16.05.2025, 06.06.2025, 26.06.2025, 16.07.2025, 01.08.2025, 22.08.2025, 10.09.2025, 24.09.2025.

¹ “Ion Ionescu de la Brad” Iasi University of Life Sciences, Romania

² Technical University of Moldova, Chișinău, Republic of Moldova

Speciile cu abundența cea mai mare și cel mai frecvent colectate au fost: Ptreostichus (Poecelus) cupreus, Silpha carinata, Gryllotalpa gryllotalpa, Armadillidium vulgare, Carabus coriaceus, Geotrupes vernalis, Necrophorus vespillo, Staphylinus caesareus, Agriotes ustulatus, Oiceoptoma thoracicum, Harpalus tardus, Aptinus bombardia, Dermestes lanarius, Carabus intricatus
Cuvinte cheie: entomofauna, pădure, măr.

INTRODUCTION

Entomofauna represents a key component of both forest ecosystems and apple orchards, where it contributes fundamentally to insect population dynamics, pollination processes, trophic interactions, and overall plant health. Investigating the diversity and structure of arthropod communities in these habitats provides essential insights into ecological balance and the influence of agricultural practices on biodiversity [Bacal and Mihailov, 2020].

In natural forests, insect assemblages are shaped by factors such as tree species composition, microclimate conditions, humidity, temperature fluctuations, and the presence of invasive species. By contrast, apple orchards function as anthropogenically managed agroecosystems, where phytosanitary treatments, monoculture practices, and soil management can significantly modify entomofaunal structure and abundance [Petrescu, 2008].

The forest ecosystems of the studied region are organized into two major altitudinal layers: coniferous and broadleaf forests. The coniferous belt, situated between 1300 and 1700 m, is more extensively developed on northern slopes and is dominated by pure Norway spruce (*Picea abies*) stands. Toward river sources, the coniferous belt narrows into a thin band near the upper treeline, where silver fir (*Abies alba*) and, more rarely, Swiss pine (*Pinus cembra*) may occur. The broadleaf forest belt includes mixed stands of beech, spruce, fir, and sessile oak. Mixed beech-conifer formations are typically found between 900 and 1400 m and are composed of European beech (*Fagus sylvatica*), Norway spruce (*Picea abies*), silver fir (*Abies alba*), mountain maple (*Acer pseudoplatanus*), mountain elm (*Ulmus glabra*), and rowan (*Sorbus aucuparia*). Beech forests largely surround the mountain ranges on the northern and western slopes, occupying areas between 500 and 1050 m, and locally extending up to 1500 m along valley systems. At the lower altitudinal limit, beech frequently occurs in association with sessile oak (*Quercus petraea*) [Bârdan, 2023].

Apple (*Malus domestica*) is among the most widely cultivated fruit species globally, valued for its high nutritional content—rich in vitamins, antioxidants, and fiber. Beyond its economic relevance for fruit production and the food industry, apple cultivation holds ecological importance by supporting pollinators and sustaining beneficial entomofauna within orchard ecosystems [Malschi, 2006].

MATERIAL AND METHOD

The study was conducted in two distinct ecosystems—a natural mixed forest and an intensive apple orchard—both located on the property of the Nechit Monastery in Neamț County, which ensured comparable climatic and soil conditions while allowing clear differentiation between the two habitats.

Epigeic arthropods were collected using Barber-type pitfall traps (Figure 1), following the method described by Andron [2019]. Each trap consisted of an 800 ml plastic container inserted flush with the soil surface to allow unrestricted access to ground-dwelling species. The traps were filled with a 2.5% NaCl solution, serving simultaneously as a preservative and a deterrent for scavengers. To prevent the entry of rainwater and debris, each trap was covered with a metal lid supported by two small stands, which ensured adequate protection without obstructing arthropod movement.

Between six and twelve traps were installed in each ecosystem, in accordance with the recommendations of Talmaciu [2019], who demonstrated that at least five traps are sufficient for capturing dominant and rare species, while installing more than twelve may significantly alter abundance ratios.



Fig. 1. Installation of traps in the experimental plots

The traps were arranged either linearly, at equal distances, or uniformly distributed across the study area, in order to account for habitat heterogeneity and to capture a representative sample of the epigeic fauna. Sampling took place at intervals of seven to ten days from April to September, corresponding to the main period of activity for most ground-dwelling arthropods.

During each sampling session, the trap contents were transferred into lidded plastic containers, gently cleaned of soil particles, and preserved in diluted medicinal alcohol. Each container was labeled with the date, trap number, and habitat type. In the laboratory, the samples were washed under a gentle water stream to remove plant debris and fine particles. Specimens were sorted under a stereomicroscope and subsequently identified to species level using standard entomological keys and specialized reference literature.

RESULTS AND DISCUSSIONS

The epigeic fauna collected in the Nechit station differs between the forest and the apple orchard, reflecting the characteristics of each ecosystem. In the forest, species diversity is greater, including beetles, millipedes, and other arthropods adapted to the forest environment. In contrast, the orchard is dominated by ants, spiders, and other invertebrates influenced by agricultural practices and soil structure. These differences highlight the impact of the habitat on the composition of the epigeic fauna.

Throughout the year 2024, from May to September, data collected from six sampling events of epigeic arthropod fauna in both the forest plot and the apple orchard provided the basis for determining the structure, dynamics, and ecological impact of the fauna.

In Table 1 are presents the ecological characteristics of each arthropod species recorded during the sampling period, including abundance, constancy, dominance, and ecological weight (W). A total of 412 individuals from 37 species were analyzed.

Table 1

The situation regarding the calculation of ecological factors for each species during the period in forest area from Nechit

| No. | Name of species | No. of traps | Abundance | Constancy | | Dominance | | W | |
|-----|---------------------------------|--------------|-----------|-----------|-----|-----------|-----|--------|-----|
| | | | | % | *** | % | *** | % | *** |
| 1. | <i>Geotrupes vernalis</i> | 31 | 98 | 64,6 | C3 | 23,8 | D3 | 15,375 | W5 |
| 2. | <i>Phalangium opilo</i> | 32 | 96 | 66,7 | C3 | 23,3 | D5 | 15,541 | W5 |
| 3. | <i>Armadilidium vulgare</i> | 9 | 36 | 18,7 | C1 | 8,7 | D4 | 1,627 | W3 |
| 4. | <i>Cychrus caraeoides</i> | 1 | 30 | 2,1 | C1 | 7,3 | D1 | 0,153 | W2 |
| 5. | <i>Necrophorus vespillo</i> | 10 | 30 | 20,8 | C1 | 7,3 | D4 | 1,518 | W3 |
| 6. | <i>Panorpa comunnis</i> | 9 | 16 | 18,7 | C1 | 3,9 | D3 | 0,729 | W2 |
| 7. | <i>Chromatoulus unilineatus</i> | 12 | 15 | 25,0 | C1 | 3,6 | D3 | 0,900 | W2 |
| 8. | <i>Messor structor</i> | 9 | 14 | 18,7 | C1 | 3,4 | D1 | 0,636 | W2 |
| 9. | <i>Aptinus bombardia</i> | 8 | 13 | 16,7 | C1 | 3,1 | D3 | 0,518 | W2 |
| 10. | <i>Atomaria turgida</i> | 1 | 9 | 2,1 | C1 | 2,2 | D3 | 0,046 | W1 |
| 11. | <i>Staphilinus olens</i> | 5 | 7 | 10,4 | C1 | 1,7 | D2 | 0,176 | W2 |
| 12. | <i>Dolycoris baccarum</i> | 5 | 7 | 10,4 | C1 | 1,7 | D2 | 0,176 | W2 |
| 13. | <i>Carabus coriaceus</i> | 4 | 6 | 8,3 | C1 | 1,5 | D2 | 0,124 | W2 |
| 14. | <i>Dadobia immersa</i> | 1 | 5 | 2,1 | C1 | 1,2 | D2 | 0,025 | W1 |
| 15. | <i>Poecilus cupreus</i> | 2 | 4 | 4,2 | C1 | 1,0 | D1 | 0,042 | W1 |
| 16. | <i>Pterostichus niger</i> | 4 | 4 | 8,3 | C1 | 1,0 | D1 | 0,083 | W1 |
| 17. | <i>Carabus convexus</i> | 1 | 3 | 2,1 | C1 | 0,7 | D1 | 0,015 | W1 |
| 18. | <i>Ectobius lapponicus</i> | 2 | 3 | 4,2 | C1 | 0,7 | D4 | 0,029 | W1 |
| 19. | <i>Doclostaurus maroccanus</i> | 3 | 3 | 6,2 | C1 | 0,7 | D1 | 0,043 | W1 |
| 20. | <i>Cychrus attenuatus</i> | 3 | 3 | 6,2 | C1 | 0,7 | D1 | 0,043 | W1 |
| 21. | <i>Quedius unicolor</i> | 2 | 3 | 4,2 | C1 | 0,7 | D1 | 0,029 | W1 |
| 22. | <i>Carabus hungaricus</i> | 2 | 2 | 4,2 | C1 | 0,5 | D1 | 0,021 | W1 |
| 23. | <i>Petrobius brevistylis</i> | 2 | 2 | 4,2 | C1 | 0,5 | D1 | 0,021 | W1 |
| 24. | <i>Oiceoptoma thoracica</i> | 1 | 2 | 2,1 | C1 | 0,5 | D1 | 0,010 | W1 |
| 25. | <i>Silpha carinata</i> | 2 | 2 | 4,2 | C1 | 0,5 | D1 | 0,021 | W1 |
| 26. | <i>Pterostichus vulgaris</i> | 1 | 2 | 2,1 | C1 | 0,5 | D1 | 0,010 | W1 |
| 27. | <i>Ceruchus chrysomelinus</i> | 1 | 1 | 2,1 | C1 | 0,2 | D1 | 0,004 | W1 |
| 28. | <i>Hister sinuatus</i> | 1 | 1 | 2,1 | C1 | 0,2 | D5 | 0,004 | W1 |

| | | | | | | | | | |
|------------------|--------------------------------------|----|-----|-----|----|-----|----|-------|----|
| 29. | <i>Poecilus cupreus</i> | 1 | 1 | 2,1 | C1 | 0,2 | D1 | 0,004 | W1 |
| 30. | <i>Brachynus crepitans</i> | 1 | 1 | 2,1 | C1 | 0,2 | D1 | 0,004 | W1 |
| 31. | <i>Cychnus semigranosus</i> | 1 | 1 | 2,1 | C1 | 0,2 | D1 | 0,004 | W1 |
| 32. | <i>Pterostichus cylindricus</i> | 1 | 1 | 2,1 | C1 | 0,2 | D1 | 0,004 | W1 |
| 33. | <i>Staphylinus caesareus</i> | 1 | 1 | 2,1 | C1 | 0,2 | D1 | 0,004 | W1 |
| 34. | <i>Meligethes aeneus</i> | 1 | 1 | 2,1 | C1 | 0,2 | D1 | 0,004 | W1 |
| 35. | <i>Psyllobora vigintiduopunctata</i> | 1 | 1 | 2,1 | C1 | 0,2 | D1 | 0,004 | W1 |
| 36. | <i>Carabus intricatus</i> | 1 | 1 | 2,1 | C1 | 0,2 | D1 | 0,004 | W1 |
| 37. | <i>Leistus rufomarginatus</i> | 1 | 1 | 2,1 | C1 | 0,2 | D1 | 0,004 | W1 |
| Total 37 species | | 48 | 412 | | | | | | |

The most abundant and ecologically significant species were *Geotrupes vernalis* and *Phalangium opilo*, both exhibiting high constancy (C3), high dominance (D3–D5), and the maximum ecological weight (W5), indicating their major role in the soil arthropod community. Species such as *Armadilidium vulgare* and *Necrophorus vespillo* were moderately abundant, with intermediate constancy (C1) and dominance values (D4), reflecting their secondary contribution to community structure.

The majority of species (e.g., *Carabus convexus*, *Leistus rufomarginatus*, *Meligethes aeneus*) were rare, with low abundance (<5 individuals), low constancy (C1), and low ecological weight (W1), suggesting sporadic or specialized occurrences within the habitat. Dominance values varied across species, reflecting their relative influence in the community, with only a few species achieving high dominance (D4–D5).

A total of 3,247 individuals representing 82 arthropod species were collected from soil traps in apple orchards in Nechit. The abundance and distribution of species were highly uneven, with a few taxa dominating the community (Table 2).

The ecological characteristics of arthropod species in apple orchards from Nechit were evaluated using abundance, constancy, dominance, and ecological weight (W). A total of 3,247 individuals from 82 species were analyzed (table 4).

The community was strongly dominated by *Armadilidium vulgare* (1,762 individuals, 84.4% constancy, D5 dominance, W5) and *Phalangium opilio* (520 individuals, 90.6% constancy, D5 dominance, W5), indicating their major ecological influence in the orchard habitat. *Pterostichus cupreus* (485 individuals, C3, D5, W4) was also highly abundant and contributed significantly to ecosystem processes. Several moderately abundant species, including *Messor structor*, *Lygaeus aequestrus*, and *Onthophagus ovatus*, exhibited lower ecological weights (W1–W2), reflecting a secondary role in the community.

The majority of species (over 60%) were represented by only 1–2 individuals, with minimal constancy and dominance (C1, D1, W1), highlighting the presence of rare or sporadic taxa. These rare species contribute to overall biodiversity but have limited impact on ecological functions.

Overall, the data reveal a highly skewed community structure, with a few dominant species shaping the functional dynamics of the orchard soil ecosystem,

while a long tail of rare species maintains species richness and potential ecological resilience.

Table 2

The situation regarding the calculation of ecological factors for each species during the period in apple orchards from Nechit

| No. | Name of species | No. of traps | Abundance | Constancy | | Dominance | | W | |
|-----|---------------------------------|--------------|-----------|-----------|-----|-----------|-----|--------|-----|
| | | | | % | *** | % | *** | % | *** |
| 1. | <i>Armadilidium vulgare</i> | 81 | 1762 | 84,4 | C4 | 54,3 | D5 | 45,829 | W5 |
| 2. | <i>Phalangium opilio</i> | 87 | 520 | 90,6 | C4 | 16,0 | D5 | 14,496 | W5 |
| 3. | <i>Pterostichus cupreus</i> | 53 | 485 | 55,2 | C3 | 14,9 | D5 | 8,224 | W4 |
| 4. | <i>Messor structor</i> | 9 | 131 | 9,3 | C1 | 4,0 | D3 | 0,372 | W2 |
| 5. | <i>Lygaeus aequestrus</i> | 12 | 57 | 12,5 | C1 | 1,7 | D2 | 0,212 | W2 |
| 6. | <i>Onthophagus ovatus</i> | 11 | 29 | 11,5 | C1 | 0,9 | D1 | 0,103 | W2 |
| 7. | <i>Dermestes lanarius</i> | 12 | 25 | 12,5 | C1 | 0,8 | D1 | 0,100 | W1 |
| 8. | <i>Pyrrhocoris apterus</i> | 15 | 20 | 15,6 | C1 | 0,6 | D1 | 0,094 | W1 |
| 9. | <i>Agriotes ustulatus</i> | 10 | 16 | 10,4 | C1 | 0,5 | D1 | 0,052 | W1 |
| 10. | <i>Chromatiulus unilineatus</i> | 14 | 15 | 14,6 | C1 | 0,5 | D1 | 0,073 | W1 |
| 11. | <i>Staphylinus caesareus</i> | 7 | 15 | 7,2 | C1 | 0,5 | D1 | 0,036 | W1 |
| 12. | <i>Panorpa communis</i> | 10 | 14 | 10,4 | C1 | 0,4 | D1 | 0,042 | W1 |
| 13. | <i>Pseudophonus pubescens</i> | 9 | 10 | 9,3 | C1 | 0,3 | D1 | 0,028 | W1 |
| 14. | <i>Necrophorus vespillo</i> | 7 | 9 | 7,2 | C1 | 0,3 | D1 | 0,022 | W1 |
| 15. | <i>Acylophorus glaberimus</i> | 5 | 8 | 5,2 | C1 | 0,2 | D1 | 0,010 | W1 |
| 16. | <i>Agriotes aterrimus</i> | 4 | 7 | 4,2 | C1 | 0,2 | D1 | 0,008 | W1 |
| 17. | <i>Anisodactylus signatus</i> | 2 | 7 | 2,1 | C1 | 0,2 | D1 | 0,004 | W1 |
| 18. | <i>Silpha obscura</i> | 5 | 7 | 5,2 | C1 | 0,2 | D1 | 0,010 | W1 |
| 19. | <i>Amara aenea</i> | 4 | 6 | 4,2 | C1 | 0,2 | D1 | 0,008 | W1 |
| 20. | <i>Pterostichus lepidus</i> | 3 | 6 | 3,1 | C1 | 0,2 | D1 | 0,006 | W1 |
| 21. | <i>Staphylinus olens</i> | 4 | 6 | 4,2 | C1 | 0,2 | D1 | 0,008 | W1 |
| 22. | <i>Onthophagus vacca</i> | 2 | 5 | 2,1 | C1 | 0,1 | D1 | 0,002 | W1 |
| 23. | <i>Quedius cruentus</i> | 2 | 5 | 2,1 | C1 | 0,1 | D1 | 0,002 | W1 |
| 24. | <i>Brachinus crepitans</i> | 3 | 4 | 3,1 | C1 | 0,1 | D1 | 0,003 | W1 |
| 25. | <i>Aclypea alpicola</i> | 3 | 3 | 3,1 | C1 | 0,1 | D1 | 0,003 | W1 |
| 26. | <i>Hister neglectus</i> | 2 | 3 | 2,1 | C1 | 0,1 | D1 | 0,002 | W1 |
| 27. | <i>Quedius unicolor</i> | 3 | 3 | 3,1 | C1 | 0,1 | D1 | 0,003 | W1 |
| 28. | <i>Anisodactylus binotatus</i> | 2 | 2 | 2,1 | C1 | 0,1 | D1 | 0,002 | W1 |
| 29. | <i>Athous haemorrhoidalis</i> | 1 | 2 | 1,0 | C1 | 0,1 | D1 | 0,001 | W1 |
| 30. | <i>Carabus coriaceus</i> | 2 | 2 | 2,1 | C1 | 0,1 | D1 | 0,002 | W1 |
| 31. | <i>Chrysomela geminata</i> | 2 | 2 | 2,1 | C1 | 0,1 | D1 | 0,002 | W1 |
| 32. | <i>Forficula auricularia</i> | 3 | 2 | 3,1 | C1 | 0,1 | D1 | 0,003 | W1 |
| 33. | <i>Galeruca pomonae</i> | 2 | 2 | 2,1 | C1 | 0,1 | D1 | 0,002 | W1 |
| 34. | <i>Gryllotalpa gryllotalpa</i> | 1 | 2 | 1,0 | C1 | 0,1 | D1 | 0,001 | W1 |
| 35. | <i>Harpalus calceatus</i> | 1 | 2 | 1,0 | C1 | 0,1 | D1 | 0,001 | W1 |
| 36. | <i>Harpalus tardus</i> | 2 | 2 | 2,1 | C1 | 0,1 | D1 | 0,002 | W1 |
| 37. | <i>Hister ruficornis</i> | 1 | 2 | 1,0 | C1 | 0,1 | D1 | 0,001 | W1 |
| 38. | <i>Nebria brevicollis</i> | 1 | 2 | 1,0 | C1 | 0,1 | D1 | 0,001 | W1 |
| 39. | <i>Pterostichus niger</i> | 1 | 2 | 1,0 | C1 | 0,1 | D1 | 0,001 | W1 |
| 40. | <i>Silpha carinata</i> | 2 | 2 | 2,1 | C1 | 0,1 | D1 | 0,002 | W1 |

LUCRĂRI ȘTIINȚIFICE SERIA HORTICULTURĂ, 68 (1) / 2025, USV IAȘI

| | | | | | | | | | |
|------------------------|----------------------------------|---|-------------|-----|----|------|----|--------|----|
| 41. | <i>Sitona lineatus</i> | 2 | 2 | 2,1 | C1 | 0,1 | D1 | 0,002 | W1 |
| 42. | <i>Absidia pilosa</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 43. | <i>Acylophorus glaberrimus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 44. | <i>Agriotes lineatus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 45. | <i>Aleochara moerens</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 46. | <i>Aphanisticus pusillus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 47. | <i>Aptinus bombardia</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 48. | <i>Barynotus obscurus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 49. | <i>Bembidion varium</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 50. | <i>Byrrhus pustulatus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 51. | <i>Calathus fuscipes</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 52. | <i>Chrysomela rufa</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 53. | <i>Cicindela campestris</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 54. | <i>Cicindela germanica</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 55. | <i>Cleonis punctiger</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 56. | <i>Clivina fossor</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 57. | <i>Clytra humeralis</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 58. | <i>Coccinella septempunctata</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 59. | <i>Drypta dentata</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 60. | <i>Elatер nigrinus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 61. | <i>Galeruca tanacetii</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 62. | <i>Harpalus distinguendus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 63. | <i>Harpalus marginella</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 64. | <i>Hister funestus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 65. | <i>Hister vernalis</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 66. | <i>Hypera nigriostri</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 67. | <i>Licinus granulatus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 68. | <i>Liophloeus tessulatus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 69. | <i>Lixus cardui</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 70. | <i>Mordellistena parvula</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 71. | <i>Notaris bimaculatus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 72. | <i>Oiceoptoma thoracium</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 73. | <i>Doclostaurus maroccanus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 74. | <i>Philonthus coruscus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 75. | <i>Plagioder a versicolora</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 76. | <i>Platynus glacialis</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 77. | <i>Pseudophonus griseus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 78. | <i>Pterostichus nigrita</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 79. | <i>Pterostichus vulgaris</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 80. | <i>Sphenophorus piceus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 81. | <i>Tachinus elongatus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| 82. | <i>Typocerus attenuatus</i> | 1 | 1 | 1,0 | C1 | 0,03 | D1 | <0,001 | W1 |
| Total 82 specii | | | 3247 | | | | | | |

During the observation period, 14 arthropod species were common to both the forest and apple orchard ecosystems (Table 3). A total of 2,721 individuals were recorded across both habitats, with the vast majority (2,482 individuals) collected .

Among the shared species, *Armadilidium vulgare* was overwhelmingly dominant, accounting for 1,798 individuals (36 in the forest and 1,762 in the orchards), highlighting its strong adaptability and ecological importance as a detritivore (I). Other abundant shared species included *Phalangium opilio* (616 individuals) and *Messor structor* (145), both primarily predators (P). Several species, such as *Chromatiulus unilineatus* and *Panorpa communis*, were moderately abundant and functioned as fungivores (F) or predators (P).

Table 3

Centralization of common species collected in both ecosystems during the observation period

| No. | Name of species | Forest area | | Apple orchards | | Total samples | Type of food |
|--------------|---------------------------------|--------------|-----------|----------------|-----------|---------------|--------------|
| | | No. of traps | Abundance | No. of traps | Abundance | | |
| 1. | <i>Aptinus bombardia</i> | 8 | 13 | 1 | 1 | 14 | P |
| 2. | <i>Armadilidium vulgare</i> | 9 | 36 | 81 | 1762 | 1798 | I |
| 3. | <i>Brachinus crepitans</i> | 1 | 1 | 4 | 5 | 6 | P |
| 4. | <i>Carabus coriaceus</i> | 4 | 6 | 2 | 2 | 8 | P |
| 5. | <i>Chromatiulus unilineatus</i> | 12 | 15 | 14 | 15 | 30 | F |
| 6. | <i>Messor structor</i> | 9 | 14 | 9 | 131 | 145 | P |
| 7. | <i>Necrophorus vespillo</i> | 10 | 30 | 7 | 9 | 39 | I |
| 8. | <i>Oiceoptoma thoracium</i> | 1 | 2 | 1 | 1 | 3 | I |
| 9. | <i>Panorpa communis</i> | 9 | 16 | 10 | 14 | 30 | P |
| 10. | <i>Phalangium opilio</i> | 32 | 96 | 87 | 520 | 616 | P |
| 11. | <i>Pterostichus niger</i> | 4 | 4 | 1 | 2 | 6 | P |
| 12. | <i>Quedius unicolor</i> | 2 | 3 | 3 | 3 | 6 | P |
| 13. | <i>Silpha carinata</i> | 2 | 2 | 2 | 2 | 4 | P |
| 14. | <i>Staphylinus caesareus</i> | 1 | 1 | 7 | 15 | 16 | P |
| Total | | | 239 | | 2482 | 2721 | |

The comparative analysis of the 14 arthropod species recorded simultaneously in the forest ecosystem and the apple orchards of Nechit reveals pronounced differences in population structure, largely driven by ecological and anthropogenic contrasts between the two habitats (Figure 2).

Overall, the data indicate that apple orchards support significantly higher population densities for most shared species, suggesting increased availability of trophic resources and favorable microhabitats. The most notable disparity occurs in *Armadilidium vulgare*, which reaches an abundance of 1762 individuals in orchards compared to only 36 in the forest, making it the dominant species in both habitats but with a clear preference for the agroecosystem. This pattern may be explained by the fragmented litter layer, moderate moisture levels, and enhanced detrital resources commonly associated with managed agricultural soils.

Similarly, *Phalangium opilio* exhibits markedly higher abundance in the orchards (520 individuals) than in the forest (96 individuals), indicating strong adaptability to open habitats and tolerance of anthropogenic influences typical of orchard environments (soil disturbance, abundant herbaceous vegetation, microclimatic fluctuations).

In contrast, species characteristic of more natural habitats—such as *Carabus coriaceus*, *Pterostichus niger*, and *Silpha carinata*—show low and relatively similar abundances across the two ecosystems. This suggests limited ecological plasticity and a preference for structurally complex forest environments.

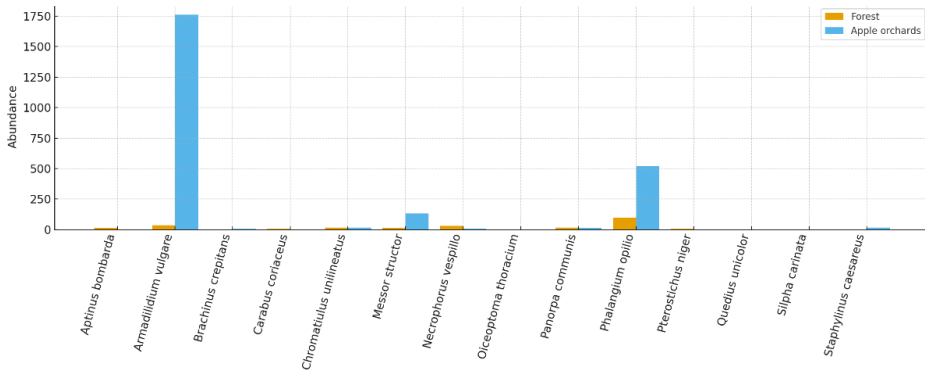


Fig. 2. Comparison of species abundance in forest vs. apple orchards

Overall, the composition and relative abundances suggest that the forest ecosystem supports more evenly distributed and balanced communities, whereas the orchard ecosystem promotes the numerical expansion of a few opportunistic species, resulting in a strongly skewed community structure. These differences highlight the potential of agroecosystems to favor detritivorous and omnivorous taxa, whereas forests maintain a more stable equilibrium among ecological strategies.

CONCLUSIONS

The comparative analysis of arthropod communities from the forest ecosystem and the apple orchards at Nechit highlights clear differences in species abundance and ecological structure. Although several species were shared between the two habitats, their population sizes varied markedly, reflecting differences in environmental conditions and resource availability.

Apple orchards supported substantially higher abundances for opportunistic and detritivorous species, such as *Armadilidium vulgare* and *Phalangium opilio*. This pattern suggests that agroecosystems provide favorable microhabitats—characterized by increased organic debris, soil disturbance, and open vegetation layers—that promote population growth in tolerant and generalist species.

Forest habitats maintained a more balanced and ecologically stable arthropod community, with less pronounced dominance by individual species. Species such as *Carabus coriaceus* or *Pterostichus niger* displayed low but consistent abundances, indicating a preference for structurally complex, less disturbed environments.

The differences between the two ecosystems indicate that habitat management strongly influences community composition. Agricultural practices in orchards create conditions that favor a limited number of highly adaptable species, whereas natural forest conditions support a more heterogeneous assemblage with multiple ecological strategies.

The presence of shared species across ecosystems demonstrates notable ecological plasticity, but their contrasting densities highlight the importance of microhabitat structure in shaping arthropod populations. These findings underscore the value of maintaining habitat heterogeneity to preserve biodiversity across landscape mosaics.

The study emphasizes the ecological significance of both environments: forests as reservoirs of stable biodiversity, and orchards as dynamic systems where species composition is strongly shaped by human management.

REFERENCES

1. **Andron G., Tălmăciu M., Herea M., Manole L., Tălmăciu N., 2019** – *Observations on the epigeous coleopters fauna in some fruit apple orchards*. Annals of the University of Craiova - Agriculture, Montanology, Cadastre Series, XLIX, 329-336.
2. **Bacal S., Mihailov I., 2020** – *Contribuții la cunoașterea coleopternelor epigee din unele ecosisteme forestiere din regiunea de nord a Republicii Moldova, Provocări și tendințe actuale în cercetarea componentelor naturale și socio-economice ale ecosistemelor urbane și rurale*, Chișinău, ISBN 978-9975-89-160-8.
3. **Bârdan M.V., Tălmăciu M., 2023** – *Integrated pest management in deciduous and resinous forests in Neamț Country*, Natural sciences in the dialogue of generations, Moldova State University, Chisinau, 24-29.
4. **Malschi D., Stan G., 2006** – *Reconstrucția ecologică – principii, noi orientări, perspective*. In Environment & Progress, 7, 257-266
5. **Petrescu I., Rusu T., Oroian I., 2008** – *Educație și cercetare în protecția mediului*. Univ. Babeș-Bolyai, Facultatea de știința mediului, ED. Fundația pentru Studii Europene, Cluj-Napoca, p. 49-56.
6. **Tălmăciu Mihai, Georgeta Andron, Monica Herea, Ionela Mocanu, Nela Tălmăciu, 2019**- *Observations Regarding The Structure, Dynamics And Some Ecological Indices Of The Existing Epigeus Entomofauna In The Apple Fruit Tree Plantations*, International Congress on Agriculture and Forestry Research (AGRIFOR) Marmaris, / Turkey, proceeding book, p. 1047-1053.
6. **Tălmăciu M., Tălmăciu N., Mocanu I., Herea M., 2020** – *Research on the entomofauna structure of coleopters from apple tree plantations according to the growing area and in the climate change context*, Scientific Papers. Series B, Horticulture. LXIV, No. 2, 417-423.