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RESEARCH ON THE SPECIES OF HEXAPODES EXISTING IN POTATO CROPS

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Abstract

To collect the material, were used Barber soil traps of the wet type, in which a 20% sodium chloride (NaCl) solution was placed. There were used 3 variants, each with 6 repetitions, as follows:V1, in which treatments were applied against pests, with products approved for organic agriculture; V2, in which treatments were applied against pathogens and pests in conventional agriculture; V3, in which no pest control treatment was applied. Collections of the captured material were made during the months of June, July and the first decade of August. The insect species collected belong to the following orders: Coleoptera, Hymenoptera, Diptera, Homoptera, Heteroptera, etc.

Key words*: Barber traps, variants, treatments, species, Coleoptera.*

INTRODUCTION

Insects, also called hexapods, constitute a class (according to some authors a super-class) of invertebrate animals. More than 1 million species are known. Entomologists believe that there are actually 3-4 million species in nature (Lonsdale, & Locke, 2018).

Insects live everywhere: in forests, in steppes, in rivers, lakes, in arid deserts and air - on the tops of the highest mountains. Many of them (flies, cockroaches, etc.) live near the human dwelling, and that is why they are called synanthropic insects.

The most varied in size and colour are the insects of tropical regions. Insects have a body from 0.2 mm (trichogrammes) to 33 cm (tropical phasmodes). They represent, according to estimates, 80% of animal species and are present in all climates and all environments. (Bitsch & Bitsch, 2000).

Biological control is one of the methods of protecting agricultural crops and involves the conscious intervention of specialists by introducing entomopathogenic or entomophagous organisms into agrobiocenoses, to regulate the density of pest populations when they exceed the PED.

Although introduced quite late as a cultivated plant in our country, the potato has a rich spectrum of pests, which can reduce the production of tubers/ha by 25-40%, sometimes they can even compromise it if the control measures are not applied according to the recommended technologies .

MATERIALS AND METHODS

The research was carried out in 2022 in a potato crop in the Rădăuți area, Marginea-Suceava commune, at the Varieties Testing Center, under the State Institute for Varieties Testing and Registration, Bucharest.

3 variants were used, as follows:

- V1, in which treatments against pests were applied, with products approved in organic agriculture;
- V2, in which treatments were applied against pathogens and pests in conventional agriculture;
- V3, in which no treatment against pests was applied.

The taxonomic study, distribution and ecological requirements were carried out on material collected from the field with the help of Barber traps. Different species of hexapods are captured by this method.

With the help of Barber traps, individuals of different species can be continuously collected, regardless of the biotope. After collecting and identifying the species, it is possible to assess the specific composition of the biocenosis, the seasonal variation and their cenotic preferences. Barber traps are 500 ml plastic boxes that are buried at ground level. The pits are made with

the help of a small pickaxe or pickaxe. The boxes were buried carefully, so that the edge of the trap was at ground level, and the insects could easily enter. When the trap is installed for a longer time, a protective cover will be used to allow the access of insects and to prevent rainwater from entering the trap (Buburuz et al., 2013).The presence of the liquid excludes cannibalism between individuals captured in the trap and reduces the probability of their escape. The fixing liquid must have good preservative qualities to prevent maceration of the collected individuals. A 20% sodium chloride (NaCl) solution was used as a fixing liquid. (Tălmaciu et al., 2020).

Figure 1. Aspects from the field of experience

The number of traps that must be placed in a culture is a minimum of 6 and a maximum of 12, because with 5 traps the dominant, subdominant, recessive and subrecessive species are captured, and by using a number greater than 12 traps, the percentage ratios do not change significantly .
By placing 10-12 traps, all categories of species can be collected to establish dominance in a biotope, because in the case of a temperate climate we have two groups, one of species with large numbers (dominant, constant) and one of species with small numbers, sporadic. Therefore, the dominant species will always be collected. Through a small number of collections, only the abundant species (eudominant and dominant) will be captured. Through a larger number of samples, both the number of individuals and the collected species will be closer to the real number of herds in nature (Manole et al., 2009).
The contents of each box were placed on a cheesecloth sieve to separate the insects from the fixative. The gauze with each individual sample was placed in labeled bags. The label contains the following information: resident, culture, collection date and trap number. To preserve the elasticity of the insects and to anesthetize the live ones, acetic ether was used. After each collection, the trap was reinserted into the soil and the fixative fluid replaced. The collected material was brought to the laboratory, and the insects were determined and inventoried.
Collections of the captured material were made during the months of June, July and the first decade of August.

RESULTS AND DISCUSSIONS

In the year 2022, at the potato crop in the Rădăuți area, Marginea -Suceava commune, at the Variety Testing Center, subordinate to the State Institute for Testing and Registration of Varieties, at the V1 variant, in which treatments against pests were applied, with approved products in ecological agriculture, 431 hexapod specimens included in 5 orders were identified.
The product used in ecological pest control was Laser 240 SC with a dose of 100 ml/ha. Laser 240 SC has the efficacy of chemically synthesized insecticide (it has similar efficacy to pyrethroids and superior to organophosphorus and other chemically synthesized insecticides), but it is harmless to the environment and humans

as it is a biological product (fermentation product of a soil bacterium: *Saccharopolyspora spinosae*). It belongs to a new family of biological insecticides: Naturalyte (comprises insecticides derived from metabolites of living organisms). Laser 240 SC is applied by spraying at warning, during the vegetation period. It has a residual effect of more than 3 weeks, depending on the climatic conditions. It is not washed off by rain two hours after application. The 433 specimens of hexapods were recorded, distributed as follows: *Coleoptera*, with 251 specimens, followed by the orders *Diptera* - 9 specimens, *Heteroptera* - 29 specimens, *Homoptera* - 52 specimens, *Hymenoptera*- 90 specimens and *Orthoptera* - 2 specimens (Table1, Figure 2).

Table 1. The hexapods collected in the V1

Ordinul	Specia	Total
Coleoptera	*Harpalus pubescens* Müller	53
	Anthicus antherinus L.	43
	Phyllotreta atra Fabricius	25
	Phyllotreta vittata Fabricius	21
	Silpha carinata Herbst	25
	Leptinotarsa decemlineata Say	14
	Longitarsus absinthii Kutschera	10
	Longitarsus luridus Scopoli	10
	Coccinella septempunctata L.	9
	Silpha obscura L.	8
	Aphthona euphorbiae Schrank	6
	Pleurophorus caesus Panzer	5
	Amara aenea De Geer	3
	Harpalus calceatus Duftschmid	3
	Longitarsus tabidus Fabricius	3
	Staphylinus caesareus Cederhjelm	3
	Harpalus tardus Panzer	2
	Hippodamia variegata Goeze	2
	Amara similata Gyllenhal	1
	Brachinus crepitans L.	1
	Harpalus aeneus Fabricius	1
	Harpalus azureus Fabricius	1
	Longitarsus ballotae Marsham	1
	Opatrum sabulosum L.	1
Diptera	*Anthomyiidae*	5
	Chloropidae	3
	Stratiomyidae	1
Heteroptera	*Pyrrhocoris apterus* L.	24
	Miridae	5
Homoptera	*Cicadellidae*	52
Hymenoptera	*Formicidae*	63
	Braconidae	13
	Ichneumonidae	12
	Apidae	2

In the V2 variant, 330 hexapod specimens included in 4 orders were identified. The order with the most specimens collected was *Coleoptera* (245 specimens), followed by *Homoptera* (colony); *Hymenoptera* (68 specimens); *Heteroptera* (9 specimens); *Diptera* (8 specimens) (Table 2, Figure 2).

The chemical products used in pest control were - Karate Zeon (50 g/l lambda-cyhalothrin) - 200 ml/ha, Mospilan 20 SG (acetamiprid 200 g/kg) - 100 g/ha, Coragen (Chlorantraniliprole 200 g/l) - 50 ml/ha, Faster 10 CE (Cypermethrin 100 g/l) - 200 ml/ha.

Table 2. The hexapods collected in the V2

Ordinul	Specia	Total
Coleoptera	*Harpalus pubescens* Müller	72
	Anthicus antherinus L.	38
	Coccinella septempunctata L.	31
	Aphthona euphorbiae Schrank	16
	Leptinotarsa decemlineata Say	12
	Silpha carinata Herbst	12
	Harpalus azureus Fabricius	10
	Phyllotreta atra Fabricius	9
	Harpalus calceatus Duft.	8
	Longitarsus tabidus Fabricius	7
	Harpalus aeneus Fabricius	6
	Opatrum sabulosum L.	6
	Amara aenea De Geer	5
	Athous mutilatus Rosenhauer	4
	Pseudophonus rufipes De Geer	3
	Dermestes bicolor Fabricius	2
	Longitarsus ballotae Marsham	2
	Pleurophorus caesus Panzer	2
Diptera	*Anthomyiidae*	8
Heteroptera	*Miridae*	6
	Dolycoris baccarum L.	2
	Eurydema oleracea L.	1
Hymenoptera	*Formicidae*	58
	Ichneumonidae	6
	Chalcididae	3
	Tiphiidae	1

In the V3 variant, in which no pest treatment was applied, 481 hexapod specimens were identified in 6 orders. The 481 specimens were recorded, distributed as follows: *Coleoptera*, with 255 specimens, followed by the orders *Diptera*, *Heteroptera*, *Homoptera*, *Hymenoptera* and *Orthoptera* (Table 3, Figure 2).

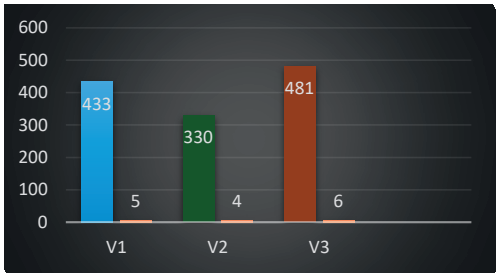

Figure 2. The situation of the collections on the three experimental variants

Table 3. The hexapods collected in the V3

Ordinul	Specia	**Total**
Coleoptera	*Leptinotarsa decemlineata* Say	106
	Harpalus pubescens Müller	41
	Anthicus antherinus L.	22
	Aphthona euphorbiae Schr.	20
	Coccinella septempunctata L.	20
	Drasterius fenestratus Küst	6
	Longitarsus tabidus Fabricius	6
	Pseudophonus rufipes De Geer	5
	Silpha carinata Herbst	4
	Staphylinus caesareus Cederh.	4
	Amara aenea De Geer	3
	Athous mutilatus Rosenhauer	3
	Phyllotreta atra Fabricius	3
	Formicomus pedestris Rossi	2
	Harpalus aeneus Fabricius	2
	Longitarsus ballotae Marsham	2
	Melanotus rufipes Herbst	2
	Adrastus limbatus Fabricius	1
	Harpalus calceatus Duftschmid	1
	Harpalus griseus Panzer	1
	Opatrum sabulosum L.	1
Diptera	*Anthomyiidae*	3
	Chloropidae	2
Heteroptera	*Miridae*	10
Homoptera	*Cicadellidae*	40
Hymenoptera	*Formicidae*	colony
	Torymidae	4
	Chalcididae	2
	Ichneumonidae	2
	Apidae	1
Orthoptera	*Gryllus campestris* L.	1

CONCLUSIONS

Potato crops are attacked by numerous pests and diseases, so there is a great potential to cause small to large yield losses in farmers' fields.

The application of chemical control must be done with great care to avoid pollution and effect on beneficial insects that would otherwise cause ecological imbalance. Again, most farm chemicals are toxic to farmers and should be applied with maximum protection.

In the V1 variant, in which treatments against pests were applied, with products approved in organic agriculture, 433 hexapod specimens were identified in 6 orders.

In the V2 variant, in which treatments were applied against pathogens and pests in conventional agriculture, 330 hexapod specimens were identified in 6 orders.

In the V3 variant, in which no pest treatment was applied, 481 hexapod specimens were identified in 6 orders.

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