RESEARCH ON THE ARTHROPOD SPECIES EXISTING IN POTATO CROPS

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Abstract

The research was carried out in 2022 in a potato crop in the Radauti-Suceava area, at the Varieties Testing Center, subordinate to the State Institute for Varieties Testing and Registration, Bucharest.To collect the material, were used Barber soil traps of the wet type, in which a 20% sodium chloride (NaCl) solution was placed.

We 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.

The harvest of the captured material were made during the months of June, July and the first decade of August. The collected arthropods belong to the following groups:Insects: wasps, ants, flies, bedbugs, plant lice, cicadas, etc., mites, millipedes, isopods, etc.

Key words**: **potato, pests, arthropods, variants, traps.

INTRODUCTION

The potato is a plant with many plant and animal parasites. 20 types of non-parasitic disorders are described (most frequently recorded in the form of spots of different colors, caverns and tuber deformations), over 30 species of bacteria and fungi, 24 viruses and 2 microplasmas, to which are added more than 30 species of nematodes that can parasitize the potato in the temperate zone. To these stains we must add insects that can cause considerable damage (Gurr GM et al, 2004).

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 . (Rotari et al, 2011)

Worldwide, potato crop losses due to pathogens are 32.3%, pests cause an average of 9.7% damage, and weeds about 6%.

In our country, against the Colorado cockroach (*Leptinotarsa decemlineata* Say) 2-3 treatments are carried out.

The main damage agents, against which chemical treatments are carried out in potato crops, are: downy mildew (*Phytophthora infestans*), alternariosis (*Alternaria* sp.), wet rot and blackening of the base of the stems (*Erwinia* sp.), the Colorado beetle (*Leptinotarsa decemlineata* Say) , cyst nematodes (*Globodera* sp.), wireworms (*Agriotes* sp.) (Anuj, 2009).

MATERIALS AND METHODS

The research was carried out in 2022 in a potato crop in the Radauti-Suceava area, at the Varieties Testing Center, subordinate to

the State Institute for Varieties Testing and Registration, Bucharest.

Collecting the material with the help of Barber-type soil traps (fig. 1). The method is used to collect harmful and useful epigean fauna from potato crops. (Rotari et al, 2011) For this, were installed 20 traps between the bins on a distance of 60 m, each trap having 3,4 m^2. Also, for the control variant without chemical treatments, a total of 20 traps were installed for the comparative analysis of useful and harmful fauna.

In all 3 variants of observation were used according to the method of protection applied against diseases, pests and weeds.

- 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.

To collect the material, the soil traps type Barber of the wet type were used, in which was placed a solution of sodium chloride (NaCl) at a concentration of 20%.

At each harvest, the biological material from the traps was placed in containers with alcohol, it was labeled, specifying on the labels: the stationary, the date of harvest, the number of the variant and the method of exploitation of the culture (chemical or ecological). The material collected was brought to the laboratory for analyzes and determinations.

A number of nine harvests of the captured material were carried out during the months of June, July and the first decade of August, as follows: 7.06; 11.06; 24.06; 04.07; 09.07; 17.07; 23.07; 03.08: 12.08.

Figure 1. Experimental field - Barber soil trap method

RESULTS AND DISCUSSIONS

In the present paper, a study was made, regarding the harmful and useful fauna of the potato culture, depending on the chemical treatments applied to combat the pests.

The natural conditions for growing vegetables (climate and soil), their specificity (juicy and appetizing plants), to which are added the technical-organizational measures (concentration, profiling and specialization) constitute a favorable framework for the installation and multiplication of a complex of animal pests that they can cause significant damage in the absence of judicious countermeasures.

In variant V1, to which treatments against pests were applied, with products approved in ecological agriculture, a total number of 483 specimens, belonging to 46 species,

were collected in the Barber-type soil traps (tab.1) . The product used in ecological pest control was Laser 240 SC with a dose of 100 ml/ha.

Table 1. The collected species in potato culture at V1

No.	Species/Taxon	Total	No.	Species/Taxon	Total
1.	Formicidae	147	24.	Braconidae	3
24.	Pyrrhocoris apterus L.	49	25.	Coccinella septempunctata L.	2
25.	Anthicus antherinus L.	45	26.	Elater nigerrimus Lacordaire	2
26.	Cicadellidae	38	27.	Longitarsus ballotae Marsham	2
27.	Harpalus pubescens Müller	30	28.	Otiorrhynchus fuscipes Gyllenhal	2
28.	Silpha carinata Herbst	24	29.	Phyllotreta atra Fabricius	2
29.	Harpalus calceatus Duftschmid	16	30.	Torymidae	2
30.	Aphthona euphorbiae Schrank	12	31.	Gryllotalpa gryllotalpa L.	2
31.	Gryllus campestris L.	12	32.	Athous niger L.	1
32.	Opatrum sabulosum L.	10	33.	Bothynoderes punctiventris Germ.	1
33.	Macrosiphum solani Kittel	9	34.	Dermestes bicolor Fabricius	1
34.	Ichneumonidae	9	35.	Formicomus pedestris Rossi	1
35.	Longitarsus tabidus Fabricius	6	36.	Gonocephalus pusillum F.	1
36.	Pseudophonus rufipes De Geer	6	37.	Idiochroma dorsalis Pontoppidan	1
37.	Anthomyiidae	6	38.	Onthophagus verticornis Laicharting	1
38.	Amara aenea De Geer	5	39.	Propylaea quatordecimpunctata L.	1
39.	Longitarsus absinthii Kutschera	5	40.	Tanymecus dilaticollis Gyllenhal	1
40.	Pleurophorus caesus Creutzer	4	41.	Trechus quadristiatus Schrank	1
41.	Miridae	4	42.	Agromyzidae	1
42.	Apidae	4	43.	Chloropidae	1
43.	Harpalus azureus Fabricius	3	44.	Eurydema oleracea L.	1
44.	Staphylinus caesareus Cederh.	3	45.	Chalcididae	1
45.	Dolycoris baccarum L.	3	46.	Tiphiidae	1

In variant V1, the most abundant species collected were: *Formicidae* (147 exp.), *Pyrrhocoris apterus* L. (49 exp.), *Anthicus antherinus* L. (45 exp.), Cicadellidae (38 exp.), *Harpalus pubescens* Müller (30 exp.), *Silpha carinata* Herbst (24 exp.), the other species having values between 16 and 1 specimen (15 species).

Table 2. The collected species in potato culture at V2

No.	Species/Taxon	Total	No.	Species/Taxon	Total
1.	Formicidae	95	20.	Longitarsus luridus Scopoli	4
2.	Anthicus antherinus L.	57	21.	Anthomyiidae	3
3.	Harpalus pubescens Müller	46	22.	Dolycoris baccarum L.	3
4.	Cicadellidae	40	23.	Longitarsus ballotae Marsham	3
5.	Silpha carinata Herbst	28	24.	Pyrrhocoris apterus L.	3
6.	Aphthona euphorbiae Schr	19	25.	Apidae	2
7.	Harpalus calceatus Duft	19	26.	Caliptamus italicus L.	2
8.	Phyllotreta atra Fabricius	16	27.	Dermestes bicolor Fabricius	2
9.	Coccinella septempunctata L.	15	28.	Eurydema oleracea L.	2
10.	Phyllotreta vittata Fabricius	11	29.	Harpalus aeneus Fabricius	2
11.	Opatrum sabulosum L.	10	30.	Melanotus rufipes Herbst	2
12.	Pseudophonus rufipes De Geer	10	31.	Onthophagus verticornis Laicharting	2
13.	Ichneumonidae	9	32.	Pleurophorus caesus Panzer	2
14.	Macrosiphum solani Kittel	9	33.	Silpha obscura L.	2
15.	Miridae	9	34.	Staphylinus caesareus Cederhjelm	2
16.	Amara aenea De Geer	8	35.	Adrastus limbatus Fabricius	1
17.	Longitarsus tabidus Fabricius	7	36.	Agromyzidae	1
18.	Otiorrhynchus fuscipes Gyll	5	37.	Amara similata Gyllenhal	1
19.	Leptinotarsa decemlineata Say	4	38.	Bothynoderes punctiventris Germ.	1

In variant V2, in which chemical treatments were applied against pathogens and pests in conventional agriculture, a number of 460 specimens belonging to 38 species species were collected in the Barber-type soil traps (tab. 2) .

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

In the V2 variant, the most abundant species collected were: *Formicidae* (95 exp.), *Anthicus antherinus* L. (57 exp.), *Harpalus pubescens* Müller (46 exp.), *Cicadellidae* (40 exp.), *Silpha carinata* Herbst (28 exp.), the other species having values between 19 and 1 specimen.

In the V3 variant, in which no treatments against pests were applied, a number of 749 specimens belonging to 39 species species were collected in the Barber-type soil traps (tab.3).

Table 3. The collected species in potato culture at V3

Nr. crt.	Specia	**T**	Nr. crt.	Specia	**T**
1.	Leptinotarsa decemlineata Say	119	20.	Harpalus calceatus Duftschmid	6
2.	Harpalus pubescens Müller	76	21.	Gryllotalpa gryllotalpa L.	6
3.	Formicidae	67	22.	Chloropidae	5
4.	Cicadellidae	56	23.	Leptinotarsa decemlineata Say	4
5.	Silpha carinata Herbst	46	24.	Pseudophonus rufipes De Geer	4
6.	Pyrrhocoris apterus L.	45	25.	Athous mutilatus Rosenhauer	3
7.	Anthicus antherinus L.	44	26.	Longitarsus ballotae Marsham	3
8.	Phyllotreta atra Fabricius	43	27.	Longitarsus luridus Scopoli	3
9.	Macrosiphum solani Kittel	42	28.	Longitarsus tabidus Fabricius	3
10.	Coccinella septempunctata L.	36	29.	Otiorrhynchus orbicularis Stierlin	3
11.	Phyllotreta vittata Fabricius	32	30.	Ichneumonidae	3
12.	Longitarsus absinthii Kutschera	27	31.	Amara similata Gyllenhal	2
13.	Miridae	12	32.	Brachinus crepitans L.	2
14.	Pleurophorus caesus Panzer	10	33.	Formicomus pedestris Rossi	2
15.	Braconidae	10	34.	Harpalus azureus Fabricius	2
16.	Amara aenea De Geer	9	35.	Melanotus rufipes Herbst	2
17.	Harpalus aeneus Fabricius	8	36.	Stratiomyidae	2
18.	Anthomyiidae	8	37.	Apidae	1
19.	Silpha obscura L.	7	38.		

In the V3 variant, the most abundant species collected were: *Leptinotarsa decemlineata* Say (119 samples), *Harpalus pubescens* Müller (78 samples), *Formicidae* (67 samples), *Cicadellidae* (56 samples), *Silpha carinata* Herbst (46 samples .), *Pyrrhocoris apterus* L. (45 samples), *Anthicus antherinus* L. (44 samples.), *Phyllotreta atra* Fabricius (43 samples.), *Macrosiphum solani* Kittel (42 samples), the other species having values between 36 and 1 samples.

The total entomofauna collected on the three variants with the help of Barber ground traps, totaled a number of 1692 specimens, of which 784 pests (46.33%), 614 predators (36.29%) and 33 parasitic specimens (1.95%)), while the number of pollinators and decomposers was 3 (0.18%), respectively 258 (15.25%).

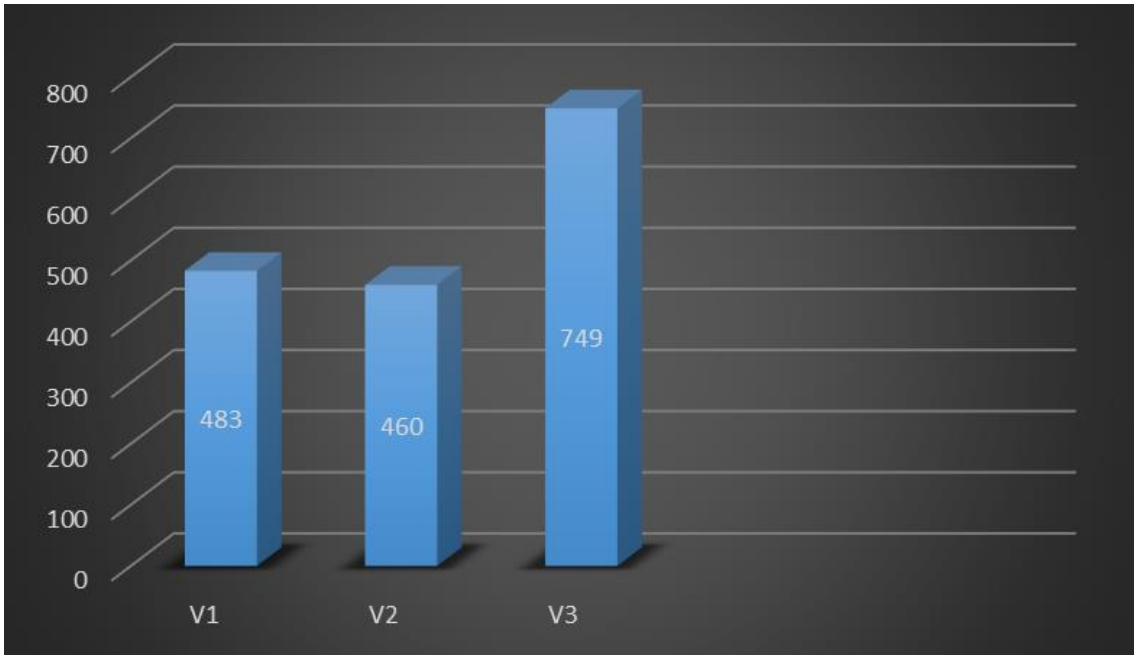

Figure 2. The situation of the collections in the three experimental variants

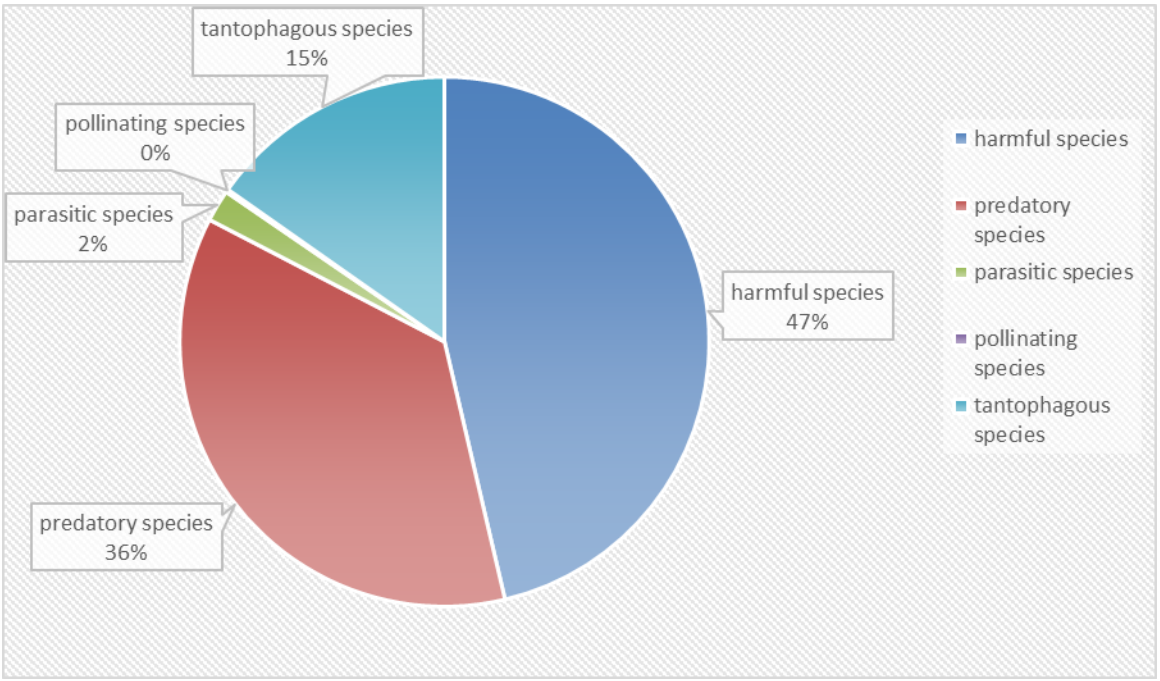

Figure 3. The statistical situation by taxon groups

CONCLUSIONS

In the potato crops, the species with the highest abundance values were *Formicidae, Anthicus antherinus* L., *Harpalus pubescens* Müller, *Leptinotarsa decemlineata* Say, *Harpalus pubescens Müller, Cicadellidae, Silpha carinata* Herbst, *Pyrrhocoris apterus* L., *Anthicus antherinus* L.

Among the pests belonging to the Coleoptera order, identified in the two stations, we can mention: *Leptinotarsa decemlineata* Say, *Phyllotreta atra* Fabr., *Aphthona euphorbiae* Shrank, *Phyllotreta*

vittata Fabr, *Phyllotreta nemorum* L., *Longitarsus ballotae* Marsham, *Longitarsus absinthii* Kutschera, *Longitarsus tabidus* Fabricius, *Opatrum sabulosum* L., *Athous mutilatus* Rosenhauer, *Hypnoidus pulchellus* L., *Adrastus limbatus* Fabr.

The pests from the other orders were: *Macrosiphum solani* Kittel, *Pyrrhocoris apterus* L., *Gryllotalpa gryllotalpa* L., *Gryllus campestris* L., *Thrips tabaci* Lindeman and the *Anthomyiidae*, *Chloropidae*, *Miridae* and *Cicadellidae* families.

As more important predators, the beetles *Amara aenea* De Geer, *Coccinella septempunctata* L., *Harpalus pubescens* Müller, *Harpalus aeneus* Fabricius, *Harpalus azureus* Fabricius, *Harpalus distinguendus* Duftschmid, *Harpalus tardus* Panzer, *Pterostichus cupreus* L., *Pseudophonus rufipes* De Geer, *Staphylinus caesareus* were identified. Predatory Hymenoptera belong to the *Formicidae* family.

The most important parasites are hymenoptera from the following families: *Braconidae, Chalcididae, Ichneumonidae, Proctotrupidae, Torymidae* and *Scelionidae*.

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