

CONTRIBUTIONS TO THE KNOWLEDGE OF THE STRUCTURE, DYNAMICS AND ECOLOGICAL PARAMETERS OF COLLECTED SPECIES OF INVERTEBRATES IN PLUM ORCHARDS

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Abstract

The paper presents the results of the observations made in a plum fruit growing plantation in the years 2013 and 2014, belonging Teaching Station Vasile Adamachi within USAMV, Iasi County, at the Stanley variety. The material gathering it was made using soil traps type Barber, from May until August, at intervals between 10 and 20 days. The collection of 2013 was made on the following dates: 30.05, 15.06, 28.06, 12.07, 26.07, 10.08 and 24.08. In total 2013 were collected 151 species belonging to 19 species (taxa). The species (taxa) with the largest number of species collected were Heteroptera species (bedbugs) with 28 species, *Dermestes lanarius* L. with 27 species, *Coccinella septempunctata* L. with 27 species, *Polydrosus sericeus* Schall. with 15 species and *Harpalus calceatus* Duft. with 11 species. The collection of biological material in 2014 was made on the following dates: 19.05, 10.06, 29.06, 16.07, 06.08. In total in 2014 it was collected 402 species belonging to 29 species (taxa). The species (taxa) with the largest number of species collected were *Pseudophonus rufipes* De Geer with 86 species, *Harpalus distinguendus* Duft. 68 species, *Pseudephonus griseus* Payk. 38 species, Orthoptera (locusts) species with 33 species and Hymenoptera (ants) species with 20 species.

Keywords: plum fruit growing plantations, invertebrate species, Barber traps.

1. INTRODUCTION

Of many tree species which are cultivated in our country, the plum is one of the most valuable. It is a fruit growing species with great economic importance, given the nutritional characteristics, technological and commercial fruits.

Although the plum plantations is present throughout the country, due to weather conditions, there was a concentration of them in Iasi, Botosani, Bacau, Vrancea, Buzau, Prahova, Arges and Valcea, namely Eastern hilly country.

Like all fruit species the plum are affected by many diseases and pests which attack fruit, leaves, shoots, flowers, branches, stems and roots.

Obtaining high yields and fruit quality is correlated with a good health of trees. With our country by neglecting to pests and diseases can harvest loses about 45-100% mid and late maturing varieties.

2. MATERIALS AND METHODS

The research was done in a plum fruit tree growing plantation with Stanley variety, over two years, 2013 and 2014. For this purpose were used soil traps Barber. These consisted in glass of approximately 800 ml capacity. They have been placed in the plum plantations, in number of 6 traps, for the collection and conserving of these was used a solution of formalin in a concentration of 4-5% (Talmaciu, 2011). The material gathering was done from April-May until August and September, the harvests were made at intervals between 10 and 20 days.

From the material collected were selected after they have been removed all the crop residues or other impurities, only the species of beetles that were then determined. Determination was done using the book determination of beetles (Reitter, 1916) (5 volumes), the insect species determinator (Panin, 1970), and the Manual for determinants developed by Rogojanu and Perju 1967, internet etc.

Finally, it has established the biodiversity of species, their structure and a series of indices for collected species such as: abundance (A) dominance (D), constancy (C), the index of ecological significance (W) etc. (Neculiseanu, 2003).

3. RESULTS AND DISCUSSIONS

In 2013, the material gathering it was made in 1-6 traps and were collected 151 specimens belonging to several groups of species (taxa). The most specimens were collected at the fifth harvest (64), followed by harvesting fourth with 25 specimens, at the third harvesting with 23 specimens, the second harvest 17 specimens, which was the sixth harvest amounted to a total 13 specimens, the seventh of the total harvest was 7 specimens. The few specimens were collected from the first crop of 2 species.

At the 6 traps at 7 harvests were collected specimens belonging to a number of 19 species, the species with the highest number of specimens collected are: *Heteroptera* species and *Dermestes laniarius* 28 specimens, *Coccinella septempunctata* L. 27 specimens, *Polydrosus sericeus*, *Harpalus calceatus* 15 specimens, 11 specimens and *Tomoxia biguttata* with 7 specimens. The lowest number of specimens, they had 6 species: *Coccinella hieroglyphica*, *Ontophagus ovatus*, *Polydrosus amoeus* Schall., *Homoptera* (cycads), *Lixus iridis* Ol. and *Eremotes ater* L ..

Other species (taxa) each had 3 and 4 specimens (see tab. 1)

For a deeper analysis of how the results were calculated a number of leading ecological indexes such as abundance (A), constance (C) dominance (D) and ecological significance index (W).

These indicators, in 2013 at the Stanley variety, in the Vasile Adamachi farm are as follows (see tab. 2):

- The *Abundance* was registred for the species: *Dermestes lardarius* (28 specimens), species *Heteroptera* (28 specimens), *Coccinella septempunctata* L (27 specimens), *Polydrosus sericeus* Schall (15 specimens), *Harpalus calceatus* Duft (11 specimens) *Tomoxia biguttata* L.(7 specimens), L. *Halyzia 22punctata* L. (4 specimens) and *Stomodes gyrosicollis* Bohm. (4 specimens). The other species were 2 and 3 specimens;

- The *Constance* of collected species ranged between 5.5 and 33.33. The species with the highest values of constancy were *Heteroptera* (bedbugs) (33.33), *Coccinella septempunctata* and *Polydrosus sericeus* Schal (22.22), *Dermestes laniarius* L., *Harpalus calceatus* Duft.and *Tomoxia biguttata* (11.11) . The lowest values of constancy (5.55) have had a number of 13 species namely *Anisodactylus signatus* F., *Amara eurynota* Panz., *Amara aenea* De Geer., *Anisodactylus binotatus* F., *Calathus melanocephalus* L., *Coccinella hieroglyphica* L., *Ontophagus ovatus* L ., *Polydrosus amoeus* Schall., *Lixus iridis* Ol., *Eremotes ater* L. and *Homoptera* L.

Table 1. Structure, dynamics and abundance of species collected in 2013, from V. Adamachi stationary, of Stanley variety

No.	Name of species	30.05.	15.06.	28.06.	12.07.	16.07.	10.08.	24.08.	Total
1.	<i>Heteroptere</i> Latt.(bedbugs)	-	-	6	-	12+3	2	3+2	28
2.	<i>Coccinella septempunctata</i> L.	-	-	4+5	12	6	-	-	27
3.	<i>Anisodactylus signatus</i> F.	-	-	-	3	-	-	-	3
4.	<i>Amara eurynota</i> Panz.	-	-	-	3	-	-	-	3
5.	<i>Coccinella hieroglyphica</i> L.	-	-	-	3	-	-	-	2
6.	<i>Amara aenea</i> De Geer.	-	-	3	-	-	-	-	3
7.	<i>Anisodactylus binotatus</i> F.	-	-	3	-	-	-	-	3
8.	<i>Polydrosus sericeus</i> Schall	-	-	2	3	3+7	-	-	15
9.	<i>Calathus melanocephalus</i> L.	-	3	-	-	-	-	-	3
10.	<i>Ontophagus ovatus</i> L .	-	-	-	-	-	-	2	2
11.	<i>Harpalus calceatus</i> Duft.	-	2	-	-	-	9	-	11
12.	<i>Tomoxia biguttata</i> Gyll.	-	3	-	-	4	-	-	7
13.	<i>Halyzia 22 punctata</i> L.	-	3	-	-	4	-	-	4
14.	<i>Polydrosus amoeus</i> Schall	-	-	-	2	-	-	-	2
15.	<i>Dermestes lanarius</i> L.	-	5	-	-	23	-	-	28
16.	<i>Stomodes gyrosicollis</i> Bohm.	-	4	-	-	-	-	-	4
17.	<i>Homoptere</i> L.(cycads)	-	-	-	-	-	2	-	2
18.	<i>Lixus iridis</i> Ol.	-	-	-	-	2	-	-	2
19.	<i>Eremotes ater</i> L.	2	-	-	-	-	-	-	2
Total 19 species		2	17	23	25	64	13	7	151

- The *Dominance* (D) had the highest values species: *Dermestes lanarius* Illig. and *Heteroptera* L.(18.54), followed by species *Coccinella septempunctata* L.(17.88), *Polydrosus sericeus* Schall. (9.93) and *Harpalus calceatus* Duft.(7.28) . The other species wich have the values less than 5.00 dominance.

Table 2. Values of ecological indices of species in 2013, of V. Adamachi stationary, at the Stanley variety

No.	Name of species (taxa)	Ecological indexes			
		A	C	D	W
1.	<i>Heteroptere</i> L.	28	33.33	18.54	6.79
2.	<i>Coccinella septempunctata</i> L.	27	22.22	17.88	3.97
3.	<i>Dermestes lanarius</i> L	28	11.11	18.54	2.05
4.	<i>Polydrosus sericeus</i> Schall	15	22.22	9.93	2.20
5.	<i>Harpalus calceatus</i> Duft	11	11.11	7.28	0.80
6.	<i>Tomoxia biguttata</i> L.	7	11.11	4.63	0.51
7.	<i>Halyzia 22 punctata</i> L.	4	5.55	2.65	0.15
8.	<i>Stomodes gyrosicollis</i> Boheman	4	5.55	2.65	0.15
9.	<i>Anisodactylus signatus</i> F.	3	5.5	1.99	0.11
10.	<i>Amara eurynota</i> Panz.	3	5.55	1.99	0.11
11.	<i>Amara aenea</i> De Geer	3	5.55	1.99	0.11
12.	<i>Anisodactylus binotatus</i> F.	3	5.55	1.99	0.11
13.	<i>Calathus melanocephalus</i> L.	3	5.55	1.99	0.11
14.	<i>Coccinella hieroglyphica</i> L	2	5.55	1.32	0.07
15.	<i>Ontophagus ovatus</i> L .	2	5.55	1.32	0.07
16.	<i>Polydrosus amoeus</i> Schall	2	5.55	1.32	0.07
17.	<i>Homoptera</i> Latt.(cycads)	2	5.55	1.32	0.07
18.	<i>Lixus iridis</i> Ol.	2	5.55	1.32	0.07
19.	<i>Eremotes ater</i> L.	2	5.55	1.32	0.07
Total 19 species		151 specimens			

- The *Ecological significance index* (W) had the values greater than 1.00 at a 4 species. These were: *Heteroptera* L.(bugs) (6.9) *Coccinella septempunctata* L.(3.97) *Dermestes lanarius* L. (2.05) and *Polydrosus sericeus* Schall. (2.20).

The large groups of taxa species collected present the situation as follows (tab. 3 fig. 1): Beetles (*Coleoptera*) are the most numerous, accounting for 80.00% of the total followed by *Heteroptera* with 19.00% and *Homoptera* (cycads) 1.00%.

Table 3. The structure entomofauna collected of plum plantations, of V.Adamachi farm the Stanley variety early in 2013, of taxons groups

No.	Taxa	No. of specimens	% total (151)
1.	Coleoptera	121	80
2.	Heteroptera	28	19
3.	Homoptera (cycads)	2	1

In 2014 the material gatering at the 6 traps at to 5 harvesting were collected specimens belonging to a number of 29 species, the species with the highest number of specimens collected are: *Pseudophonus rufipes* 86 specimens, *Harpalus distinguendus* 68 specimens *Pseudophonus griseus* with 38 specimens, *Orthoptera* (grasshoppers) with 33 specimens and *Hymenoptera* (ants) 20 specimens, 18 specimens at *Anisodactylus binotatus*, *Hymenoptera* (bees) and *Lepidoptera* (larvae) with 14 specimens, *Amara aenea* 13 specimens and 12 specimens at *Araneida*. The other species showed values of less than 8 specimens (see tab. 4).

Referring to the number of traps that each species was collected in 2014 from Stanley variety at Vasile Adamachi farm shows the following in table no. 4.

- The species most frequently collected were: *Orthoptera* and species *Harpalus distinguendus* Duft in 11 traps, followed by species, *Pseudophonus rufipes*, collected in 10 traps, *Lepidoptera* larvae collected in seven traps, *Pseudophonus griseus* collected in 6 traps, *Araneida* and *Hymenoptera* (wasps) and (bees) collected in 5 traps, *Hymenoptera* (ants), *Anisocactylus binotatus* *Diptera* collected by 4 traps, *Amara aenea* collected 3 traps, *Orthoptera* (*Gryllus*), *Lepidoptera* (adults), *Coccinella conglobata*, *Adalia bipunctata*, *Calathus fuscipes*, *Carabus scabriusculus*, *Galeruca tanacetii*, *Harpalus calceatus* collected in 2 traps. The other species were collected in one trap.

Table 4. Structure, dynamics and abundance of collected species in 2014, from V.Adamachi stationary, of Stanley variety

No.	Name of species (taxa)	07.05.	21.05.	29.07.	12.09.	27.09.	Total
1.	<i>Orthoptera (Gryllus)</i>	2+1	-	-	-	-	3
2.	<i>Hymenoptera</i> (ants)	6+10	-	1	-	3	20
3.	<i>Harpalus distinguendus</i>	8+3+5+5+4	9	-	-	6+9+5+9+5	68
4.	<i>Araneida</i>	-	1	4+1	-	1+2	9
5.	<i>Hymenoptera</i> (wasp)	1+1	6+1+3	-	-	-	12
6.	<i>Anisodactylus binotatus</i>	4	4	-	-	6+4	18
7.	<i>Orthoptera</i> (locusts)	1+3	1	1+1	2+2+3	1+17	33
8.	<i>Pseudophonus griseus</i>	-	-	5+4	1	10+9+9	38
9.	<i>Hymenoptera</i> (bees)	-	3	5+1	3+2	-	14
10.	<i>Diptera</i>	2+3	-	2	1	-	8
11.	<i>Amarae aenea</i>	-	-	-	5	-	5
12.	<i>Pseudophonus rufipes</i>	-	-	8+4+6+12+8+12	12+6	12+6	86
13.	<i>Lepidoptera</i> (adults)	-	-	2	-	1	3
14.	<i>Gastropoda</i>	1	1	-	-	1+1	4

15.	Carabus coriaceus	-	2	-	-	-	2
16.	Coccinella conglobata	4	3	-	-	-	7
17.	Adalia biguttata	2	2	-	-	-	4
18.	Calathus fuscipes	2	-	-	2	-	4
19.	Lepidoptera (larva)	5+1	1+2	-	1,2	2	14
20.	Carabus scabriusculus	-	2	-	3	-	5
21.	Galeruca tanaceti	-	-	-	3+2	-	5
22.	Harpalus calceatus	-	-	-	-	4+3	7
23.	Coccinella 7 punctata	-	-	-	-	5	5
24.	Amarae aenea	-	-	5	-	8	13
25.	Homoptera (ciyads)	5	-	-	-	-	5
26.	Staphylinidae	2	-	-	-	-	2
27.	Coleoptere (larva)	-	2	-	-	-	2
28.	Podagrira fuscicornis	-	-	3	-	-	3
29.	Ptinus rufipes	-	-	3	-	-	3
Total 29 species		82	43	70	72	135	402

Table 5

The values of the ecological indices of swpecies in 2014, of V.Adamachi stationary, at the Stanley variety

No.	Name of species (taxa)	Ecological indexes			
		A	C	D	W
1.	Orthoptera (<i>Gryllus</i>)	3	6.89	0.74	0.05
2.	Hymenoptera (ants)	20	13.79	4.97	0.68
3.	Harpalus distinguendus	68	37.93	16.91	6.41
4.	Araneida	9	17.24	2.23	0.38
5.	Hymenoptera (wasp)	12	17.24	2.98	0.51
6.	Anisodactylus binotatus	18	13.79	4.47	0.61
7.	Orthoptera (locust)	33	37.93	8.20	3.11
8.	Pseudophonus griseus	38	20.68	9.45	1.95
9.	Hymenoptera (bees)	14	17.24	3.48	0.59
10.	Diptera	18	44.82	4.47	2.00
11.	Amara aenea	18	44.82	4.47	2.00
12.	Pseoduphonus rufipes	86	34.48	21.39	7.37
13.	Lepidoptera (adults)	3	6.89	0.74	0.05
14.	Gastropoda	4	13.79	0.99	0.13
15.	Carabus coriaceus	2	3.44	0.49	0.16
16.	Coccinella conglobata	7	6.89	1.74	0.11
17.	Adalia bipunctata	4	6.89	0.99	0.06
18.	Calathus fuscipes	4	6.89	0.99	0.06
19.	Lepidoptera (larva)	14	24.13	3.48	0.83
20.	Carabus scabriusculus	5	6.89	1.24	0.08
21.	Galeruca tanaceti	5	6.89	1.24	0.08
22.	Harpalus calceatus	7	6.89	1.74	0.11
23.	Coccinella 7 punctata	5	3.44	1.24	0.04
24.	Homoptera (cycads)	5	3.44	1.24	0.04
25.	Chilocorus longitarsis	2	3.44	0.49	0.016
26.	Coleoptere (larva)	2	3.44	0.49	0.016
27.	Podagrira fuscicornis	3	3.44	0.49	0.016
28.	Staphylinidae	2	3.44	0.74	0.025
29.	Ptinus rufipes	3	3.44	0.74	0.025
Total: 29 species		402 specimens			

- The highest percentage in terms of the number of specimens of the species to the total number of specimens they had species: *Pseudophonus rufipes* (21.39%), *Harpalus distinguendus* (16.91%). The other species had a percentage between 0.49% and 9.45

For a deeper analysis of how the results were calculated a number of leading ecological indexes such as abundance (A), consistency (C) dominance (D) and ecological significance index (W). These indicators, in 2014 the Stanley variety, at the Vasile Adamachi farm as follows as (tab. 5):

- The *Abundance* most had a species: *Pseudophonus rufipes* (86 specimens), *Harpalus distinguendus* (68 specimens), *Pseudophonus griseus* (38 specimens), *Orthoptera* (locusts) (33 specimens), *Hymenoptera* (ants) (20 specimens) *Anisodactylus binotatus*, *Amara aenea* and *Diptera* (18 specimens), *Hymenoptera* (bees), *Lepidoptera* (larvae) (14 specimens), *Hymenoptera* (wasps) (12 specimens), *Araneide* (9 specimens), *Harpalus calceatus* and *Coccinella conglubata* (7 specimens), *Coccinella septempunctata*, *Galeruca tanacetii* and *Homoptera* (cycads) (5 specimens). Another species had between 2 and 4 specimens;

- The *Constance* collected species ranged between 3.44 and 44.82. The species with the highest values of constancy were: *Diptera* and *Amara aenea* (44.82), *Othoptera* (locusts) (37.93) *Pseudophonus rufipes* (34.48), *Lepidoptera* (larvae) (24.13) *Pseudophonus griseus* (20.68), *Hymenoptera* (bees), *Anraneida* and *Hymenoptera* (17.24), *Hymenoptera* (ants), *Anisodactylus binotatus*, *Gastropoda* (13.79). The lowest values of constancy under 10 have had a number of 16 species of which: *Ptinus rufipes*, *Homoptera* (cycads), *Coleoptera* (larvae), *Adalia bipunctata*, *Carabus coriaceus*.

- The *Dominance* (D) had the highest values species: *Pseudophonus rufipes* (2.39), *Harpalus distinguendus* (16.91), *Pseudophonus griseus* (9.45) and *Orthoptera* (locusts) (8.20). The other species had values less than 5.00 dominance;

- The *Index of ecological significance* (W) had higher values of 1,00 to a total of 6 species. These were: *Pseudophonus rufipes* (7.37) *Harpalus distinguendus*, *Amara aenea*, *Diptera*, *Orthoptera* (locusts) (3.11) *Pseudophonus griseus* (1.95).

Table 6. The structure of the collected entomofauna of plum plantations, of V.Adamachi farm at the Stanley variety in 2014, of taxons groups

No.	Taxa	No. of specimens	% total (151)
1.	Orthoptera	36	8.95
2.	Hymenoptera	46	11.44
3.	Araneida	9	2.23
4.	Diptera	8	1.99
5.	Lepidoptera	17	4.22
6.	Homoptera	5	1.24
7.	Gastropoda	4	0.99
8.	Coleoptera	286	7.14

The large groups of taxa and species collected the situation is as follows (tab. 6, fig. 2):

- The Beetles (*Coleoptera*) are the most numerous, accounting for 70.14% of the total followed by species of the order *Hymenoptera* with 11.44% of the total;

- The lowest share, 5% have had species of *Lepidoptera* (4.22%), *Class Araneida* (2.23%), species of the order *Diptera* (1.99%), species of the order *Homoptera* and class *Gastropoda* (0.99%).

4. CONCLUSIONS

In 2013

-The numerous species (taxa) represented were: *Heteroptera* and *Dermestes lanarius* 28 copies, *Coccinella septempunctata* L. 27 copies *Polydrosus sericeus*, *Harpalus calceatus* 15 copies, 11 copies and *Tomoxia biguttata* 7 copies. The lowest number of copies, they had two species: *Coccinella hieroglyphica*, *Ontophagus ovatus*, *Polydrosus amoeus* Schall., *Homoptera* (cycads), *Lixus iridis* Ol. and *Eremotes ater* L.

- Large groups of taxa species collected the situation is as follows:

- Beetles are the most numerous, accounting for 80.00% of the total followed by *Heteroptera* with 19.00% and *Homoptera* (cycads) 1.00%.

In 2014

- The highest percentage in terms of the number of specimens of the species to the total number of copies they had species: *Pseudophonus rufipes* (21.39 %), *Harpalus distinguendus* (16.91%). The other species had a percentage between 0.49 % and 0.95 %. Large groups of taxa species collected the situation is as follows:

- Beetles are the most numerous, accounting for 70.14 % of the total followed by *Hymenoptera* with 11.44 % of the total;

- The lowest share, 5 % have had species of *Lepidoptera* (4.22 %), Class *Araneida* (2.23%), species *Diptera* (1.99 %), species of the order *Homoptera* and Class *Gastropoda* (0.99 %).

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