

FAUNA SPECTRUM AND SPREADING OF INSECTS FROM *ELATERIDAE* (*COLEOPTERA*) IN ROMANIA

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ABSTRACT

The damages produced by the *Elateridae* larvae in Romania are important, especially in maize, wheat, potato, alfalfa and sugarbeet crops. The researches carried out beginning with 1965 have not given any pertinent information on taxonomical and ecological aspects of these species. These studies have constantly ignored the aspects of *Elateridae* biology and ecology because of the lack of knowledge in this field of agricultural practices. The present report reviews all information available in Romanian papers concerning the subject and brings new data able to complete the situation of the structure of *Elateridae* pests. The analysed material was collected using four important methods classified into two groups: methods for collecting adults and methods for collecting larvae. The study offers new information about the number of species identified in the agricultural and natural ecosystems. It was established that the number of species found up to now is 59, belonging to 12 subfamilies and 20 genera. *Agriotes ustulatus* v. *flavicornis* Panz. is considered to be a variety of *A. ustulatus* Schall. species and not a melanic form. The subfamily *Agriotinae* shows by the index of relative abundance that it is dominant in the structure of the subfamilies and here the most common and dangerous species are included. In the main crops the species *Agriotes obscurus* L. has been dominant and *A. ustulatus* including v. *flavicornis* are the most spread.

Key words: *Elateridae*, taxonomy.

INTRODUCTION

The investigations carried out in Romania beginning with 1965 (Radu and Grecea-Tarta, 1965; Manolache et al., 1969; Perju et al., 1971) have had in view the clarification of aspects concerning the biology, ecology, density and control of these pests in various crops.

In Romania, where the damages produced by the wireworms, are considerable in the case of maize, wheat, potato, alfalfa and sugarbeet it is not completely clarified in what concerns the structure of the species involved. In many of the papers regarding the control of these species, the aspects of taxonomy are completely ignored, either by putting forward that these aspects are less important or by lack of the biological knowledge necessary to get deeper into this field.

Our researches (Mărgărit et al., 1988, 1990; Teleman et al., 1991; Manole et al., 1993,

1998) are the first ones in Romania which answer the necessity of solving the aspects of taxonomy and spreading of these species.

The present paper approaches these issues at the general level, providing new scientific data which can make complete the picture of the wireworms structure and spreading in the larvae and adult stage, indicating the habitat to which they belong.

MATERIALS AND METHODS

The research covers a period of 15 years but for some species the duration of researches exceeds 20 years, as for example the first specimens of *Agriotes ustulatus* Schall. are from 1906. A part of the material analysed belongs to Boguleanu collection, one of the promoters of this study.

The material comprises 18,559 specimens (adults, larvae and pupae) collected with specific methods for this group of insects. The collection methods could be classified in two categories, depending on the insect developmental stage:

- A. Methods for adults collection;
- B. Methods for collecting larvae and pupae.

In the first category, the following methods could be mentioned:

1. Belt method

The netting is performed in all crops during the entire period of vegetation with an entomological net of 0.30 m diameter and 1 m long. One sample taken by this method consists in all insects collected on a surface of 100 m long and 1 m wide. The number of samples (walks) is dependent on the size of a given association and ranges from 1 to 5.

2. Biocenometer method

The biocenometer used in our researches is composed of two essential elements: the vac-

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uum cleaner and the cage of aspiration. This cage is a pyramid trunk with the volume precisely determined and the unity of sample is expressed at this volume.

3. UV light traps method

Many species of wireworms (click beetles) show a marked positive phototropism towards the emission of UV light, the method of collection being based on this general behaviour. The UV light traps were installed in different Plant Protection Inspection Services from the Romanian districts. The UV light source was composed of a fluorescent light bulb of 250 W placed at 3.5-6 m above the surface of the ground. A sample consisted of insects collected in a period of 24 hours

4. Direct collection method

This method shows up the advantage of the qualitative methods that could exhibit the host plant-insect relationships.

5. Barber traps method

This is at present the classic method for collecting soil fauna and it serves for capturing the coleopterans with general activity at the soil surface. The trap is manufactured of one recipient of 450 cm³, which is installed at the soil level and which is $\frac{3}{4}$ filled with 4% formaldehyde solution. A sample is formed of the insects collected over a period of 48 hours.

6. The pheromone traps method

The method has the advantage of gathering some rare species which show unspecified attraction to some synthetic pheromones but the binding of adults in glue destroys them and makes the taxonomic identification very difficult. One sample is collected at an interval of 12 hours.

B. Methods for collecting larvae and pupae

The method requires the analysis of the soil from a square surface of 25 x 25 cm and 30 cm depth. All material of wireworms found in this volume of soil (larvae and pupae) is collected and preserved in alcohol 70%.

RESULTS AND DISCUSSIONS

The investigations were carried out in 36 districts, including practically all the territory of

the country, and the results have allowed to be collected 18,559 individuals belonging to 12 subfamilies, 20 genera, 59 species and one variety (Table 1).

One of the first remarks is that some species have a restricted area, e.g. *Elater nigerrimus* Lac., *E. ochropterus* Germ., *E. pomorum* Herbs., *Agriotes brevis* Cand., *A. ponticus* Step., *A. starcki* Schw., Schrk., *Ctenicera aenea* L., *C. cuprea* v. *aeruginosa* F., *C. pectinicornis* L., *Selatosomus aeneus* L., *S. impressus* F., *S. rugosus* Germ., *Athous lomnicki* Reitt., *A. mollis* Reitt., *Lacon punctatus* Herbst., *Heteroderes crucifer* Rossi., *Porthmidius austriacus* Schrt., *A. subfuscus* Müll., *Limonius minutus* L., *Hypnoidus tenuicornis* Germ., *Cardiophorus rufipes* Goeze. were present in only one district, while others, like *Agriotes ustulatus* Schall., were placed in the opposite extreme being present in 33 out of 36 investigated districts. This species shows a record in number of individuals, being collected 6,194 specimens. In this preliminary study about wireworm spreading we refer to 50 species which show a restricted distribution. They are present in 24 agricultural crops and in natural habitats (spontaneous flora) (see Table 2 and Table 3). The species *Agriotes ponticus* Step. and *Elater nigerrimus* Lac. are very rare, the highest in abundance being *Agriotes pilosus* Panz. (Table 2).

In the case of infested crops, the highest abundance was noted in the maize crops and in natural habitats the highest abundance of species was present in spontaneous flora and in common oak plantations. Table 3 indicates many species which are very rare and the highest index of abundance is reached by *Selatosomus latus* F.

As it concerns the structure and the relative abundance of click beetle subfamilies in the agricultural and natural biocenoses in Romania, the highest abundance is the one of the subfam. *Agriotinae* (78%) which includes the most spread species. Subfam. *Melanotinae* and *Athoinae* with 9% and respectively 7% are

Table 1. The spreading of click beetles species in the districts and localities of Romania in 1998

Species	Number of districts	Number of localities	Number of specimens
Subfam. Ampedinae			
1. <i>Ampedus sinuatus</i> Germ.	4	5	25
Sufam. Elaterinae			
2. <i>Elater aethiops</i> Lac.	2	2	14
3. <i>E. elongatulus</i> F.	3	3	8
4. <i>E. nigerrimus</i> Lac.	1	1	1
5. <i>E. ochropterus</i> Germ.	1	1	4
6. <i>E. pomorum</i> Herbst.	1	1	6
7. <i>E. praeustus</i> F.	2	2	6
8. <i>E. sanguineus</i> L.	3	5	15
9. <i>E. sanguinolentus</i> Schk.	2	3	5
Subfam. Agriotinae			
10. <i>Agriotes brevis</i> Cand.	1	1	2
11. <i>A. gurgistanus</i> L.	12	18	134
12. <i>A. lineatus</i> L.	15	74	520
13. <i>A. obscurus</i> L.	27	232	2762
14. <i>A. pilosus</i> Panz.	13	22	998
15. <i>A. ponticus</i> Step.	1	1	1
16. <i>A. sputator</i> L.	20	120	1603
17. <i>A. starcki</i> Schw.	1	1	6
18. <i>A. ustulatus</i> Schall.	33	266	6194
19. <i>A. ustulatus v. flavicornis</i> Pam.	26	102	2363
Subfam. Pomachilinae			
20. <i>Betarmon ferugineus</i> Scop.	2	2	2
Subfam. Adrastinae			
21. <i>Adrastus limbatus</i> F.	7	7	12
22. <i>A. rachifer</i> Geoffr.	2	3	4
23. <i>Synaptus filiformis</i> F.	8	20	196
Subfam. Melanotinae			
24. <i>Melanotus brunnipes</i> Germ.	2	3	15
25. <i>M. crassicollis</i> Erw.	21	48	1460
26. <i>M. fuscipes</i> Gyll.	10	17	49
27. <i>M. punctolineatus</i> Pel.	9	16	45
28. <i>M. rufipes</i> Herbst.	12	16	121
Subfam. Conoderinae			
29. <i>Drasterius bimaculatus</i> Rossi	8	17	302
Subfam. Agrypininae			
30. <i>Adelocera murina</i> L.	12	22	68
31. <i>Aeloides griseus</i> Germ.	2	3	3
32. <i>Lacon punctatus</i> Herbst.	1	1	1
33. <i>Heteroderes crucifer</i> Rossi.	1	1	1
34. <i>Porthmidius austriacus</i> Schrk.	1	1	1
Subfam. Ctenicerinae			
35. <i>Ctenicera aenea</i> L.	1	1	1
36. <i>C. cuprea v. aeruginosa</i> F.	1	1	126
37. <i>C. lata</i> F.	5	8	15
38. <i>C. pectinicornis</i> L.	1	1	6
39. <i>Prosternon holosericeus</i> Ol.	2	5	15
40. <i>Selatosomus aeneus</i> L.	1	2	5
41. <i>S. impressus</i> F.	1	1	1
42. <i>S. latus</i> F.	17	30	164
43. <i>S. rugosus</i> Germ.	1	1	2
Subfam. Athoinae			
44. <i>Athous haemorrhoidalis</i> F.	14	35	99
45. <i>A. hirtus</i> Herbst.	8	15	73
46. <i>A. lomnicki</i> Reitt.	1	1	5
47. <i>A. mollis</i> Reitt.	1	1	1
48. <i>A. niger</i> L.	11	30	81
49. <i>A. oblongus</i> Solsky.	2	2	2
50. <i>A. rufus</i> Deg.	2	2	2
51. <i>A. sacheri</i> Kiesw.	18	58	721
52. <i>A. subfuscus</i> Mull.	1	1	1
53. <i>A. villosus</i> Faurer.	2	2	2
54. <i>A. vittatus</i> F.	2	3	3
55. <i>Limonius aeruginosus</i> Ol.	3	3	18
56. <i>L. minutus</i> L.	1	1	1
57. <i>L. parvulus</i> Panz.	2	3	3
58. <i>L. pilosus</i> Leske.	13	43	262
Subfam. Hypnoidinae			
59. <i>Hypnoidus tenuicornis</i> Germ.	1	1	1
Subfam. Cardiophorinae			
60. <i>Cardiophorus rufipes</i> Goeze.	1	1	2

Table 2. The spreading of some species of click beetle in the agricultural crops from Romania in 1988 (I)

Species	Crops																Total							
	Maize	Common oak	Spontaneous flora	Maple tree	Rape	Ash tree	Potato	Barley	Wheat	Sugar beet	Sunflower	Alfalfa	Bean	Grassland	Rye	Sorghum		Clover	Water melon	Vegetables	Tobacco	Grape vine	Fruit trees	
<i>Ampedus sinuatus</i>	30	2	8																					40
<i>Elater aetiops</i>		11	3																					14
<i>E. elongatulus</i>		8																						8
<i>E. nigerrimus</i>			1																					1
<i>E. ochropterus</i>				4																				4
<i>E. pomorum</i>			6																					6
<i>E. praeustus</i>					1	5																		6
<i>E. sanguineus</i>		5	10																					15
<i>E. sanguinolentus</i>		4	1																					5
<i>Agriotes brevis</i>	2																							2
<i>A. gurgistanus</i>	62					13	19	21	17	1	1													134
<i>A. pilosus</i>	107		801				6	20	9	4	38	8	1	4										998
<i>A. ponticus</i>							1																	1
<i>A. starcki</i>		6																						6
<i>Betarmon ferugi neus</i>			2																					2
<i>Adrastus limbatus</i>	5		3									1		1	1	1								12
<i>A. rachifer</i>									1	2							1							4
<i>Synaptus filiformis</i>	10		127			12	7	9			13	16					1	1						196
<i>Melanotus brunni pes</i>			9																	6				15
<i>M. fuscipes</i>	8		31			2		2	1	2									1	1	1			49
<i>M. punctolineatus</i>	2		13					11	1	1				1					7			9		45
<i>M. rufipes</i>	2	9	106									3		1										121
<i>Limonius pilosus</i>	28	76	51			1	4	15		1	22		38		1				2			24		262
<i>Adelocera murina</i>		4	38			1		1	1				2	19			1					1		68
<i>Aeloides griseescens</i>	2							1																3
Total	168	125	1210	4	1	18	42	52	66	10	56	50	1	46	21	1	2	1	11	7	1	34		2017

Table 3. The spreading of some very rare species of click beetle in the agricultural crops from Romania in 1988 (II)

Species	Crops														Total	
	Maize	Common oak	Spontaneous flora	Ash tree	Potato	Barley	Wheat	Sugar beet	Sunflower	Alfalfa	Grassland	Vegetables	Fruit trees	Poppy		Mulberry tree
<i>Lacon punctatus</i>											1					1
<i>Heteroderes crucifer</i>								1								1
<i>Porthmidius austriacus</i>			1													1
<i>Ctenicera aenea</i>			1													1
<i>C. cuprea</i>			126													126
<i>C. lata</i>	1		12			1	1				6					15
<i>C. pectinicornis</i>											2					6
<i>Prosternon holosericeus</i>		3	10													15
<i>Selatosomus aeneus</i>	5										1					5
<i>S. impressus</i>												1	16			1
<i>S. latus</i>	68	2	1		5	34	23	9		5						164
<i>S. rugosus</i>	2										2	1	1	31		2
<i>Athous hirtus</i>			11	12	4		4	1		6			5			73
<i>A. lomnicki</i>																5
<i>A. mollis</i>		1														2
<i>A. oblongus</i>		1						1								2
<i>A. rufus</i>										1					1	2
<i>A. subfuscus</i>									1							1
<i>A. villosus</i>			2													2
<i>A. vittatus</i>			2													2
<i>Limonius aeruginosus</i>					13			4					1			18
<i>L. minutus</i>			1													1
<i>L. parvulus</i>	1						1	1								3
<i>Hypnoidus tenuicornis</i>									1							1
<i>Cadiophorus rufipes</i>			2													2
Total	77	7	169	12	22	36	30	15	2	12	12	2	23	31	1	451

placed in the second and third position. The subfam. *Hypnoidinae*, *Pomachilinae* and *Cardiophorinae* (under 1%) (see Figure 1) show a very low abundance and very rare species.

Among the most common and harmful species we have noted the prevalence of *Agriotes obscurus* L. in 5 of the most important crops, although it is overtaken in areal abundance and size by *Agriotes ustulatus* Schall. In the alfalfa crops the values of relative abundance are very close between these two species which could show the possibility of ω -dominance but in sugarbeet and sunflower crops the dominant species was *A. ustulatus*.

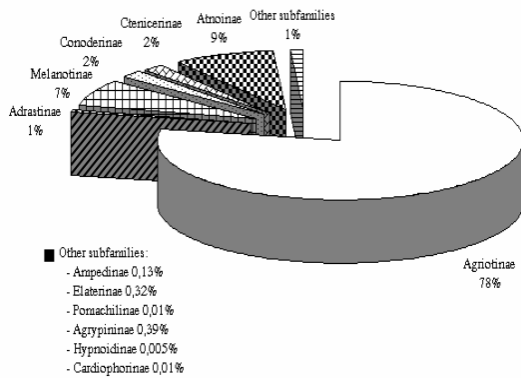


Figure 1. The structure and relative abundance of click beetle subfamilies in Romania

In the same way in sunflower crop the species *Drasterius bimaculatus* Rossi reached the highest relative abundance which is the clearest indication of its preference for this host plant (Figure 2).

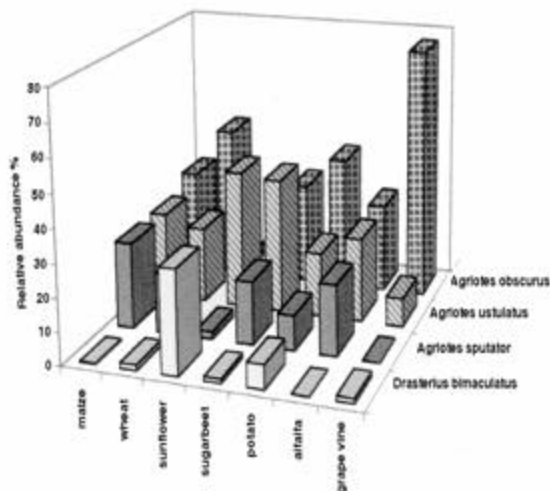


Figure 2. Relative abundance of the main species of click beetle in the most important crops

CONCLUSIONS

A list of the click beetle species was the first important result of the investigations. The study of qualitative and quantitative samples of the collected material point out the structure and the abundance of the subfamilies for the first time in Romania. We have reported 59 species belonging to 20 genera and rallied into 12 subfamilies.

The subfamily *Agriotinae* was dominant and here the most common and the most economically important species *A. obscurus* was included (see also the map of spreading).

In the case of main crops (maize, wheat, alfalfa, potato and grape vine) the species *Agriotes obscurus* L. was the most dangerous species found at high densities in all these crops. The most spread species was *Agriotes ustulatus* Schall. (see the maps, Figures 3 and 4).

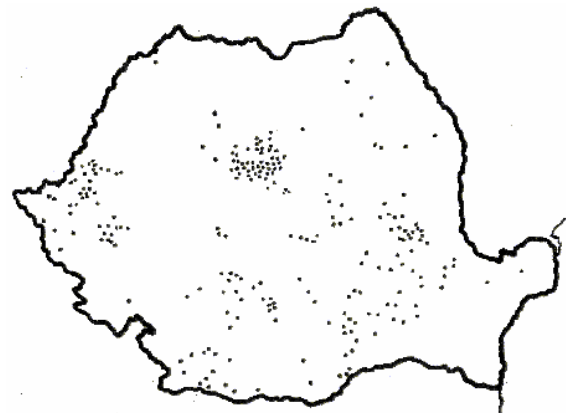


Figure 3. The spreading of species *Agriotes ustulatus* Schall. in Romania



Figure 4. The spreading of species *Agriotes obscurus* Schall. in Romania

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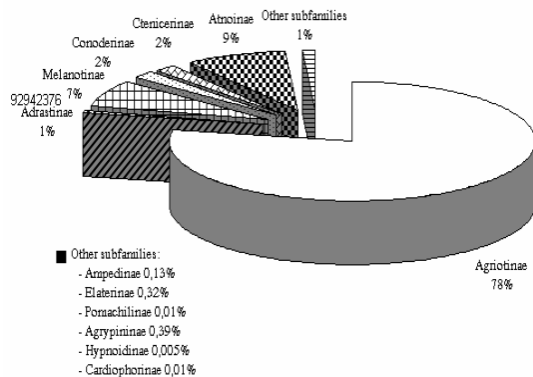


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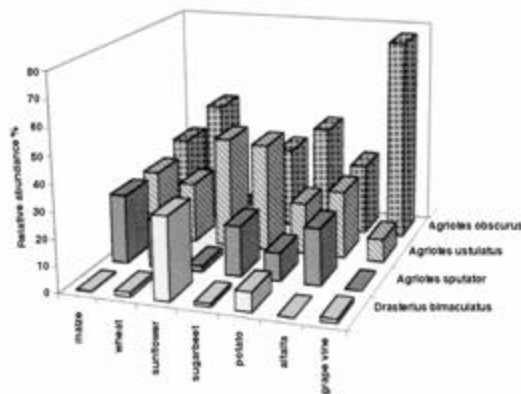


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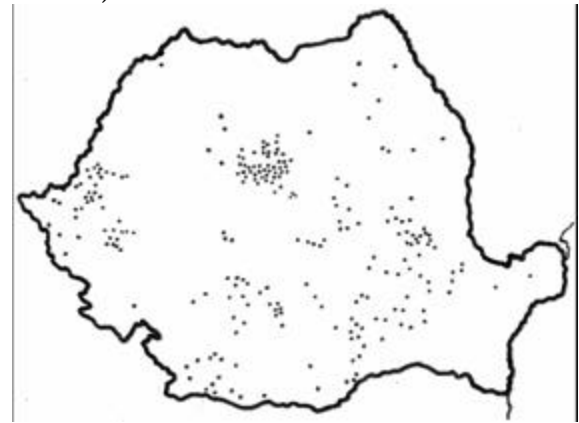


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16. <i>A. sputator</i> L.	20	120	1603
17. <i>A. starcki</i> Schw.	1	1	6
18. <i>A. ustulatus</i> Schall.	33	266	6194
19. <i>A. ustulatus</i> v. <i>flavicornis</i> Pam.	26	102	2363
Subfam. <i>Pomachilinae</i>			
20. <i>Betarmon ferugineus</i> Scop.	2	2	2
Subfam. <i>Adrastinae</i>			
21. <i>Adrastus limbatus</i> F.	7	7	12
22. <i>A. rachiifer</i> Geoffr.	2	3	4
23. <i>Synaptus filiformis</i> F.	8	20	196
Subfam. <i>Melanotinae</i>			
24. <i>Melanotus brunnipes</i> Germ.	2	3	15
25. <i>M. crassicolis</i> Erw.	21	48	1460
26. <i>M. fuscipes</i>	10	17	49
27. <i>M. punctolineatus</i> Pel.	9	16	45
28. <i>M. rufipes</i> Herbst.	12	16	121
Subfam. <i>Conoderinae</i>			
29. <i>Drasterius bimaculatus</i> Rossi	8	17	302
Subfam. <i>Agrypininae</i>			
30. <i>Adelocera murina</i> L.	12	22	68
31. <i>Aelodies grisescens</i> Germ.	2	3	3
32. <i>Lacon punctatus</i> Herbst.	1	1	1
33. <i>Heteroderes crucifer</i> Rossi.	1	1	1
34. <i>Portmidius austriacus</i> Schrk.	1	1	1
Subfam. <i>Ctenicerinae</i>			
35. <i>Ctenicera aenea</i> L.	1	1	1
36. <i>C. cuprea</i> v. <i>aeruginosa</i> F.	1	1	126
37. <i>C. lata</i> F.	5	8	15
38. <i>C. pectinicornis</i> L.	1	1	6
39. <i>Prostemon holosericeus</i> Ol.	2	5	15
40. <i>Selatosomus aeneus</i> L.	1	2	5
41. <i>S. impressus</i> F.	1	1	1
42. <i>S. latus</i> F.	17	30	164
43. <i>S. rugosus</i> Germ.	1	1	2
Subfam. <i>Athoinae</i>			
44. <i>Athous haemorrhoidalis</i> F.	14	35	99
45. <i>A. hirtus</i> Herbst.	8	15	73
46. <i>A. lomnicki</i> Reitt.	1	1	5
47. <i>A. mollis</i> Reitt.	1	1	1
48. <i>A. niger</i> L.	11	30	81
49. <i>A. oblongus</i> Solsky.	2	2	2
50. <i>A. rufus</i> Deg.	2	2	2
51. <i>A. sacheri</i> Kiesw.	18	58	721
52. <i>A. subfuscus</i> mull.	1	1	1
53. <i>A. villosus</i> Faurer.	2	2	2
54. <i>A. vittatus</i> F.	2	3	3
55. <i>Limonius aeruginosus</i> Ol.	3	3	18
56. <i>L. minutus</i> L.	1	1	1
57. <i>L. parvus</i> Panz.	2	3	3
58. <i>L. pilosus</i> Leske.	13	43	262
Subfam. <i>Hypnoidinae</i>			
59. <i>Hypnoidus tenuicornis</i> Germ.	1	1	1
Subfam. <i>Cardiophorinae</i>			
	1	1	2

60. *Cadiophorus rufipes* Goeze.

Crops																		Total					
	Maize	Common oak	Spontaneous floral	Maple tree	Rape	Ash tree	Potato	Barley	Wheat	Sugar beet	Sunflower	Alfalfa	Bean	Grassland	Rye	Sorghum	Clower		Water melon	Vegetables	Tobacco	Grape Vine	Fruit trees
Species																							
<i>Ampedus sinatus</i>	30	2	8																				40
<i>Elater aethiops</i>		11	3																				14
<i>E. elegantulus</i>		8																					8
<i>E. nigerrimus</i>			1																				1
<i>E. ochropterus</i>				4																			4
<i>E. pomorum</i>			6																				6
<i>E. praeustus</i>					1	5																	6
<i>E. sanguineus</i>		5	10																				15
<i>E. sanguinolentus</i>		4	1																				5
<i>Agriotes brevis</i>	2																						2
<i>A. gurgistanus</i>	62				13	19	21	17	1	1													134
<i>A. pilosus</i>	107		801			6	20	9	4	38	8	1	4										998
<i>A. ponticus</i>						1																	1
<i>A. starcki</i>		6																					6
<i>Betarmon ferugineus</i>			2																				2
<i>Adrastus limbatus</i>	5		3								1		1	1	1								12
<i>A. rachifer</i>								1	2							1							4
<i>Synaptus filiformis</i>	10		127			12	7	9		13	16						1	1					196
<i>Melanotus brunnipes</i>			9																	6			15
<i>M. fuscipes</i>	8		31			2		2	1	2									1	1	1		49
<i>M. punctolineatus</i>	2		13					11	1	1									7			9	45
<i>M. rufipes</i>	2	9	106								3			1									121
<i>Limonius pilosus</i>	28	76	51			1	4	15		1	22		38						2			24	262
<i>Adelocera murina</i>		4	38			1		1	1				2	19		1						1	68
<i>Aeloides griscensces</i>	2							1															3
Total	168	125	1210	4	1	18	42	52	66	10	56	50	1	46	21	1	2	1	11	7	1	34	2017

ROMANIAN AGRICULTURAL RESEARCH

Table 1. The spreading of click beetles species in the districts and localities of Romania in 1998

Species	Number of districts	Number of localities	Number of specimens
Subfam. Ampedinae			
1. <i>Ampedus sinuatus</i> Germ.	4	5	25
Sufam. Elaterinae			
2. <i>Elater aetiops</i> Lac.	2	2	14
3. <i>E. elegantulus</i> F.	3	3	8
4. <i>E. nigerrimus</i> Lac.	1	1	1
5. <i>E. chropterus</i> Germ.	1	1	4
6. <i>E. pomorum</i> Herbst.	1	1	6
7. <i>E. praeustus</i> F.	2	2	6
8. <i>E. sanguineus</i> L.	3	5	15
9. <i>E. sanguinolentus</i> Schk.	2	3	5
Subfam. Agriotinae			
10. <i>Agriotes brevis</i> Cand.	1	1	2
11. <i>A. gurgistanus</i> L.	12	18	134
12. <i>A. lineatus</i> L.	15	74	520
13. <i>A. obscurus</i> L.	27	232	2762
14. <i>A. pilosus</i> Panz.	13	22	998
15. <i>A. ponticus</i> Step.	1	1	1
16. <i>A. sputator</i> L.	20	120	1603
17. <i>A. starcki</i> Schw.	1	1	6
18. <i>A. ustulatus</i> Schall.	33	266	6194
19. <i>A. ustulatus</i> v. <i>flavicornis</i> Pam.	26	102	2363
Subfam. Pomachilinae			
20. <i>Betarmon ferugineus</i> Scop.	2	2	2
Subfam. Adrastinae			
21. <i>Adrastus limbatus</i> F.	7	7	12
22. <i>A. rachiifer</i> Geoffr.	2	3	4
23. <i>Synaptus filiformis</i> F.	8	20	196
Subfam. Melanotinae			
24. <i>Melanotus brunnipes</i> Germ.	2	3	15
25. <i>M. crassicornis</i> Erw.	21	48	1460
26. <i>M. fuscipes</i>	10	17	49
27. <i>M. punctolineatus</i> Pel.	9	16	45
28. <i>M. rufipes</i> Herbst.	12	16	121
Subfam. Conoderinae			
29. <i>Drasterius bimaculatus</i> Rossi	8	17	302
Subfam. Agrypininae			
30. <i>Adelocera murina</i> L.	12	22	68
31. <i>Aelodies grisescens</i> Germ.	2	3	3
32. <i>Lacon punctatus</i> Herbst.	1	1	1
33. <i>Heteroderes crucifer</i> Rossi.	1	1	1
34. <i>Portmidius austriacus</i> Schrk.	1	1	1
Subfam. Ctenicerinae			
35. <i>Ctenicera aenea</i> L.	1	1	1
36. <i>C. cuprea</i> v. <i>aeruginosa</i> F.	1	1	126
37. <i>C. lata</i> F.	5	8	15
38. <i>C. pectinicornis</i> L.	1	1	6
39. <i>Prosternon holosericeus</i> Ol.	2	5	15
40. <i>Selatosomus aeneus</i> L.	1	2	5
41. <i>S. impressus</i> F.	1	1	1
42. <i>S. latus</i> F.	17	30	164
43. <i>S. rugosus</i> Germ.	1	1	2
Subfam. Athoinae			
44. <i>Athous haemorrhoidalis</i> F.	14	35	99
45. <i>A. hirtus</i> Herbst.	8	15	73
46. <i>A. lomnicki</i> Reitt.	1	1	5
47. <i>A. mollis</i> Reitt.	1	1	1
48. <i>A. niger</i> L.	11	30	81
49. <i>A. oblongus</i> Solsky.	2	2	2
50. <i>A. rufus</i> Deg.	2	2	2
51. <i>A. sacheri</i> Kiesw.	18	58	721
52. <i>A. subfuscus</i> Mull.	1	1	1
53. <i>A. villosus</i> Faurer.	2	2	2
54. <i>A. vittatus</i> F.	2	3	3
55. <i>Limoniis aeruginosus</i> Ol.	3	3	18
56. <i>L. minutus</i> L.	1	1	1
57. <i>L. parvulus</i> Panz.	2	3	3
58. <i>L. pilosus</i> Leske.	13	43	262
Subfam. Hypnoidinae			
59. <i>Hypnoidus tenuicornis</i> Germ.	1	1	1
Subfam. Cardiophorinae			
60. <i>Cardiophorus rufipes</i> Goeze.	1	1	2

Table 2. The spreading of some species of click beetles in the agricultural crops from Romania in 1988 (I)

Species	Crops																	Total						
	Maize	Common oak	Spontaneous flora	Maple tree	Rape	Ash tree	Potato	Barley	Wheat	Sugar beet	Sunflower	Alfalfa	Bean	Grassland	Rye	Sorghum	Clover		Water melon	Vegetables	Tobacco	Grape vine	Fruit trees	
Ampedus sinuatus	30	2	8																					40
Elater aetiops		11	3																					14
E. elongatus		8																						8
E. nigerrimus			1																					1
E. ochropterus				4																				4
E. pomorum			6																					6
E. praustus					1	5																		6
E. sanguineus		5	10																					15
E. sanguinolentus		4	1																					5
Agriotes brevis	2																							2
A. gurgistanus	62				13	19	21	17	1	1														134
A. pilosus	107		801			6	20	9	4	38	8	1	4											998
A. ponticus						1																		1
A. starcki		6																						6
Betarmon ferrugineus			2																					2
Adrastus limbatus	5		3									1	1	1	1									12
A. rachifer								1	2							1								4
Synaptus filiformis	10		127			12	7	9		13	16						1	1						196
Melanotus brunnipes			9																		6			15
M. fuscipes	8		31			2		2	1	2									1		1	1		49
M. punctolineatus	2		13					11	1	1				1					7				9	45
M. rufipes	2	9	106								3			1										121
Limonius pilosus	28	76	51			1	4	15		1	22		38						2			24	262	
Adelocera murina		4	38			1		1	1				2	19		1						1	68	
Aeloides grisescens	2							1																3
Total	168	125	1210	4	1	18	42	52	66	10	56	50	1	46	21	1	2	1	11	7	1	34	2017	

Table 3. The spreading of some very rare species of click beetles in the agricultural crops from Romania in 1988 (II)

Species	Crops													TOTAL		
	Maize	Common oak	Spontaneous flora	Ash tree	Potato	Barley	Wheat	Sugar beet	Sunflower	Alfalfa	Grassland	Vegetables	Fruit trees		Poppy	Mulberry tree
Lacon punctatus											1					1
Heteroderes crucifer								1								1
Porthmidius austriacus			1													1
Ctenicera aenea			1													1
C. cuprea			126													126
C. lata	1		12			1	1				6				15	
C. pectinicornis											2				6	
Prosternon helosericeus		3	10												15	
Selatosomus aeneus	5									1					5	
S. impressus												1	16		1	
S. latus	68	2	1		5	34	23	9		5					164	
S. rugosus	2										2	1	1	31	2	
Athous hirtus			11	12	4		4	1		6			5		73	
A. lomnicki															5	
A. mollis		1													2	
A. oblongus		1					1								2	
A. rufus										1					2	
A. subfuscus									1					1	1	
A. villosus			2												2	
A. vittatus			2												2	
Limonius aeruginosus					13			4					1		18	
L. minutus			1												1	
L. parvulus	1					1		1							3	
Hypnoidus tenuicornis									1						1	
Cadiophorus rufipes			2												2	
TOTAL	77	7	169	12	22	36	30	15	2	12	12	2	23	31	1	451