

**TAXONOMIC DIVERSITY, VARIATION OF RELATIVE ABUNDANCE
AND DOMINANCE OF THE FAMILIES OF EPIGEIC COLEOPTERA
(ORD. COLEOPTERA), FROM 13 SUN FLOWER CROPS, 1981-2010, 10 SEASONS,
BRĂILA, MOLDOVA (ROMANIA)**

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Abstract. The content of the paper is a relevant synthesis of the original collecting data of epigeic coleopterans from 13 sunflower crops, effectively, 10 seasons, 1981-2010, from Muntenia (one county) and Moldova (3 counties). The coleopterological material was collected using the ecological and statistical method of Barber pit-falls with preservative liquid and protected against atmospheric precipitations. In total, there were collected 12,293 specimens of epigeic coleopterans, belonging to 15 families.

Keywords: Coleopterans, families, variation, abundance, dominance, sun flower crops, Brăila, Moldova.

Rezumat. Diversitatea taxonomică, variația abundenței și dominanței relative a familiilor de coleoptere epigeice (Ord. Coleoptera) din 13 culturi de floarea soarelui, 1981-2010, 10 sezoane, Brăila și Moldova (România). Conținutul lucrării este o sinteză relevantă a datelor de colectare originale asupra coleopterelor epigeice din 13 culturi de floarea soarelui, 10 sezoane, 1981-2010, 4 județe, Brăila, Vaslui, Iași, Botoșani. Materialul s-a colectat, folosind metoda statistică a capcanelor Barber, cu lichid conservant și protejate împotriva precipitațiilor atmosferice. În total, s-au colectat 12.293 exemplare de coleoptere epigeice, aparținând la 15 familii.

Cuvinte cheie: Coleoptere, familii, variație, abundență, dominanță, cultura de floarea soarelui, Brăila, Moldova.

INTRODUCTION

A significant amount of coleopterological material was collected from Moldova. Moldova is the region in northern – eastern Romania, covering 36,850 square kilometers. The relief is marked by two main forms that influence the climate components: 1. The Eastern Carpathians, with temperate-continental climate, 8.5 °C, 600-700 mm annual rainfalls and 2. The Moldavian Plateau, subdivided into three subunits: 1. Suceava Plateau; 2. The Plain of Moldavia (Jijia Plain) and 3. Bârlad Plateau, 9.5 °C, 450-550 mm annual rainfalls.

In Moldova, sunflower culture is geographically delimited within the Moldavian Plateau in two areas: The fifth Zone (Jijia Plain, Bârlad Plateau), with multiannual average precipitation of 450-550 mm) and the sixth area, Suceava Plateau (ION, 2010).

Sunflower is an oleaginous plant, resistant to drought. For the drafting of this paper I have used the necessary data from the following papers: HARDE & SEVERA, 1984; VARVARA, 2008, 2015, 2016; VARVARA & APOSTOL, 2008; VARVARA & ZAMFIRESCU, 2008.

MATERIAL AND METHODS

The coleopterological material of this paper is original.

For the collecting of the material, there was used the ecological, statistical method of the Barber soil pit-falls, with continuous operation, preservative liquid and protected against atmospheric precipitation.

In crops, during the seasons of collecting, 6 or 12 Barber pit-falls were used to collect all those five classes of dominance of the coleopteran families (subprecedent - eudominant) (Table 1).

The pit-falls were arranged on three rows, each row having two or four pit-falls. The distances between rows and pit-falls were five meters. The collecting surfaces were of 75 square meters (6 pit-falls) and 150 squares (12 pitfalls).

Each pit-fall had a capacity of 700 centimeters, 7 centimeters diameter, namely 10 centimeters height. The pit-falls contained a 4% aldehyde solution for the preservation of the coleopterological material until collecting. The pit-falls were protected against atmospheric precipitations.

Objectives of the paper:

Documentation on the paper;

Collecting and the preservation of the coleopterological material;

Taxonomic determination of the individuals and their placement in families;

In particular, there was used the illustrated volume, *Der Kosmos* Kafaer, the drawing up of tables and figures. (Histograms) (Each family is concretized through a general collecting table (locality, year, abundance and family dominance, synthetic table with the presence and absence of families in localities and the distribution of dominance classes of the family in localities);

Data synthesis, the establishment of the hierarchy of families on the basis of the total number of collected individuals and drafting of the text.

RESULTS

In this fundamental chapter, the paper materializes, in data, the effort and the perseverance of collecting of the coleopterological material for 10 seasons, 1981-2010, its conservation, the taxonomic determination of the families, the counting of individuals and their classification in families, the synthesis of the paper writing.

The material was collected from two geographical regions of Romania and four counties: Muntenia (Brăila County); Moldova, (3 counties, Vaslui, Iași, Botoșani).

The data are synthesized and rendered in two general tables, one with localities, years, collecting parameters and the second one with the order of families, 13 tables with the collecting data of those 15 families of coleopterans, 13 tables in which it is shown the variation of the dominant structure for those 15 coleopteran families, 13 histograms that visualize these variations.

In total, there functioned 150 pit-falls in crops, with an effective time of 1,635 days, with limits between 92 and 154 days.

There were realized 122 collectings, with limits between 6 and 10 collectings.

There were analyzed 1,320 of samples (i.e. the material from each collecting pit-fall), between 36 and 120 per stationary (Tables 1, 2).

Table 1. Counties, localities, years and parameters of collecting of the epigeic Coleoptera in sunflower crops, Brăila and Moldova, 1981-2010, 9 years effectively.

No	County	Locality,	Years	Exposition of traps	Days	Traps	Coll.	Samples.
I	Brăila	Brăila, Terasă	1981	May 26-August 31	97	12	9	108
	Brăila	Brăila, Terasă	1982	May 28-August 30	95	12	9	108
	Brăila	Brăila, Terasă	1983	May 28-August 30	95	12	9	108
	Brăila	Brăila, Terasă	1985	May 6- Sept.3	119	12	10	120
	Brăila	Brăila, Trăian	1985	June 5- Sept.20	107	12	9	108
	Brăila	Brăila, Lacul Sărat	1981	May September 3	102	12	9	108
	Brăila	Brăila, Lacul Sărat	1982	May 28-August 31	96	12	9	108
	Brăila	Brăila, Lacul Sărat	1983	May 27-August 29	95	12	9	108
II	Iași	Osoi,	1986	April 20-Sept.23	136	6	10	60
	Iași	Osoi	1988	April 22- Sept. 20	131	6	10	60
	Iasi	Osoi	1989	April 25- Sept. 23	154	6	10	60
III	Vaslui	Negrești	1992	April 20-August 15	117	12	7	84
IV	Botoșani	Broscauți	1999	May 1- Sept. 15	107	12	9	108
	Botoșani	Broscauți, Stationary A.	2010	June 1- August 31	92	6	6	36
	Botoșani	Broscauți, Stationary B.	2010	June 1- August 31	92	6	6	36
				Total	1,635			1,320

Table 2. Numerical and percentage variation of the individuals of Coleoptera families in sunflower crops, from Brăila and Moldova, 1978-2010.

No.	Families	Present			Absent		
		1	2	3	4	5	6
1	Carabidae	7,778	63.27	13	100	-	-
2	Tenebrionidae	1,232	10.02	10	76.92	3	23.08
3	Anthicidae	1,167	9.49	8	61.54	5	38.46
4	Curculionidae	461	3.75	12	92.31	1	7.69
5	Elateridae	379	3.23	9	69.23	4	30.77
6	Staphylinidae	368	2.99	12	92.31	1	7.69
7	Dermestidae	353	2.87	11	84.62	2	15.38
8	Chrysomelidae	224	1.82	12	92.31	1	7.69
9	Silphidae	135	1.10	3	23.08	10	76.92
10	Cantharidae	58	0.47	9	69.23	4	30.77
11	Coccinellidae	48	0.39	12	92.31	1	7.69
12	Chryptophagidae	33	0.27	8	61.54	5	38.46
13	Scarabaeidae	24	0.20	9	69.23	4	30.77
14	Histeridae	19	0.15	4	30.77	9	69.23
15	Cerambycidae	14	0.11	2	15.38	11	84.62
	Total	12,293	99.98				

Legend. 1. Name of families, 2. No. of individuals, 3. %, 4. No. of localities, 5. %, 6. No. of localities, 7. %.

Coleoptera families are presented in order of their total relative abundance as follows: The first place belongs to the Carabidae family, with a total number of individuals of 7,778 (63.27%) (Table 3).

Table 3. Distribution, variation of activity abundance (A) and dominance (D) of the **Carabidae** family in the investigated sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D %	No.	Locality and Year	A	D (%)
1	Brăila, Terasă, 1981	260	43.26	7	Osoi, 1986	724	73.13
2	Brăila, Terasă, 1982	573	74.71	8	Osoi, 1988	63	90.0
3	Brăila, Terasă, 1983	89	10.95	9	Osoi, 1989	336	93.07

4	Brăila, Lacul Sărat, 1981	260	43.26	10	Negrești. 1992	384	25.53
5	Brăila, Lacul Sărat, 1982	677	84.31	11	Broscăuți, 1999	3,208	87.41
6	Brăila, Lacul Sărat, 1983	289	33.37	12	Broscăuți, 2010, A	213	43.47
Total localities				13	Broscăuți, 2010, B	702	86.67
Total individuals						7,778	

The individuals of the Carabidae family were collected from all stationaries (Table 3), the family being eudominant in each sunflower crop (Table 4; Fig. 1).

Table 4. Numerical and percentage variation of the presence and absence of the **Carabidae** family and their dominance classes in sunflower crops, Brăila and Moldova, 1978-2010. (The numerical and percentage explanations in the histograms are in the adjacent tables, respectively).

No.	Specification	No.	%
1	Presence in localities	13	100
2	Absence	0	0
1	Subrecedent below 1%	0	0
2	Recedent 1.1 - 2%	0	0
3	Subdominant 2.1 - 5%	0	0
4	Dominant 5.1 - 10%	0	0
5	Eudominant over 10.1%	13	100
Total		13	100

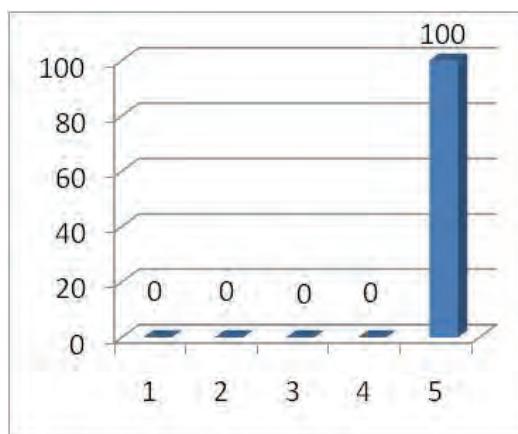


Figure 1. Numerical and percentage variation of the presence and absence of the **Carabidae** family and their dominance classes in sunflower crops, Brăila and Moldova, 1978- 2010. (The numerical and percentage explanations in the histograms are in the adjacent tables, respectively).

The Tenebrionidae family occupies the second place, with a total number of individuals of 1,232 (10.02%). The individuals of the Tenebrionidae family were collected from 10 crops (76.92%) (Table 5; Table 6; Fig. 2).

Table 5. Distribution, variation of activity abundance (A) and dominance (D) of the **Tenebrionidae** family in the investigated sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D%	No.	Locality, Year	A	D (%)
1	Brăila, Terasă, 1981	5	0.83	7	Osoi, 1986	-	-
2	Brăila, Terasă, 1982	5	0.65	8	Osoi, 1988	1	1.43
3	Brăila, Terasă, 1983	1	0.12	9	Osoi, 1989	-	-
4	Brăila, Lacul Sărat, 1981	5	0.83	10	Negrești, 1992	906	60.24
5	Brăila, Lacul Sărat, 1982	-	-	11	Broscăuți, 1999	294	8.01
6	Brăila, Lacul Sărat, 1983	1	0.12	12	Broscăuți, 2010, A	3	0.61
Total localities				13	Broscăuți, 2010, B	11	1.36
Total individuals						1,232	

Table 6. Numerical and percentage variation of the presence and absence of the **Tenebrionidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978-2010.

No.	Specification	No.	%
1	Presence in localities	10	76.92
2	Absence	3	23.08
1	Subrecedent below 1%	6	46.15
2	Recedent 1.1 - 2%	2	15.38
3	Subdominant 2.1 - 5%	0	0
4	Dominant 5.1 - 10%	1	7.69
5	Eudominant over 10.1%	1	7.69
Total		10	76.91

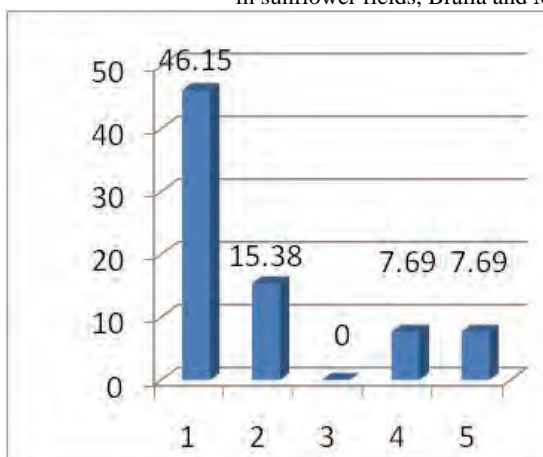


Figure 2. Numerical and percentage variation of the presence and absence of the **Tenebrionidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978- 2010.

The Anthicidae family ranked the third place, with a total number of individuals of 1,167 (9.49%) (Table 7). The species and individuals of the Anthicidae family were collected from 8 crops (61.54%) (Table 7; Table 8; Fig. 3).

Table 7. Distribution, variation of activity abundance (A) and dominance (D) of the **Anthicidae** family, investigated in sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D%	No.	Locality, Year	A	D (%)
1	Brăila, Terasă,1981	18	3.00	7	Osoi, 1986	22	2.22
2	Brăila,Terasă,1982	69	9.0	8	Osoi, 1988	-	-
3	Brăila,Terasă,1983	554	68.14	9	Osoi, 1989	-	-
4	Brăila, Lacul Sărat,1981	18	3.00	10	Negrești, 1992	-	-
5	Brăila, Lacul Sărat,1982	64	7.97	11	Broscăuți,1999	-	-
6	Brăila, Lacul Sărat,1983	421	48.61	12	Broscăuți, 2010, A	1	0.20
Total localities				13	Broscăuți,2010, B	-	-
Total individuals						1,167	

Table 8. Numerical and percentage variation of the presence and absence of the **Anthicidae** family and their dominance classes in sunflower crops, Brăila and Moldova, 1978-2010.

No.	Specification	No.	%
1	Presence in localities	8	61.54
2	Absence	5	38.46
1	Subrecedent below 1%	1	7.69
2	Recedent 1.1 - 2%	0	0
3	Subdominant 2.1 - 5%	3	23.08
4	Dominant 5.1 - 10%	2	15.38
5	Eudominant over 10.1%	2	15.38
Total		8	61,53

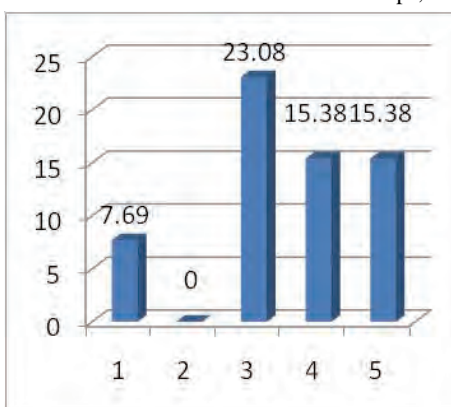


Figure 3. Numerical and percentage variation of the presence and absence of the **Anthicidae** family and their dominance classes in sunflower crops, Brăila and Moldova, 1978- 2010.

The Curculionidae family occupies the fourth position, 461 individuals (3.75%), being absent in only one sunflower crop (7.69%) (Table 9; Table 10; Fig. 4).

Table 9. Distribution, variation of activity abundance (A) and dominance (D) of the **Curculionidae** family investigated in sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D%	No.	Locality, Year	A	D (%)
1	Brăila, Terasă,1981	52	8.65	7	Osoi, 1986	26	2.63
2	Brăila,Terasă,1982	39	5.08	8	Osoi, 1988	1	1.43
3	Brăila,Terasă,1983	146	17.96	9	Osoi, 1989	5	1.39
4	Brăila, Lacul Sărat,1981	52	8.65	10	Negrești, 1992	21	1.40
5	Brăila, Lacul Sărat,1982	6	0.75	11	Broscăuți,1999	22	0.60
6	Brăila, Lacul Sărat,1983	87	10.05	12	Broscăuți, 2010, A	-	-
Total localities				13	Broscăuți,2010, B	4	0.49
Total individuals						461	

Table 10. Numerical and percentage variation of the presence and absence of the **Curculionidae** family and their dominance classes in sunflower crops, Brăila and Moldova, 1978-2010.

No.	Specification	No.	%
1	Presence in localities	12	92.31
2	Absence	1	7.69
1	Subrecedent below 1%	2	15.38
2	Recedent 1.1 - 2%	4	30.77
3	Subdominant 2.1 - 5%	1	7.69
4	Dominant 5.1 - 10%	3	23.08
5	Eudominant over 10.1%	2	15.38
Total		12	92.30

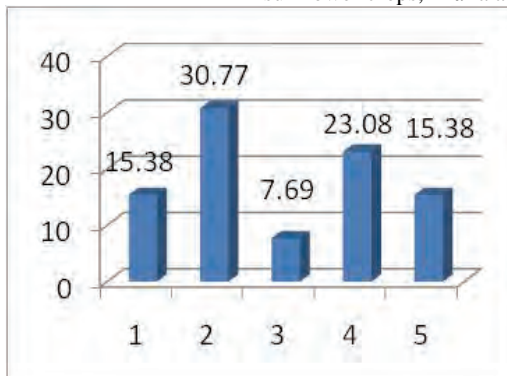


Figure 4. Numerical and percentage variation of the presence and absence of the **Curculionidae** family and their dominance classes in sunflower crops, Brăila and Moldova, 1978- 2010.

The Elateridae family is situated on the 5th place with 379 specimens (3.23%), present in 9 crops (69.23%) (Table 11; Table 12; Fig. 5).

Table 11. Distribution, variation of activity abundance (A) and dominance (D) of the Elateridae family in the investigated sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D%	No.	Locality, Year	A	D (%)
1	Brăila, Terasă, 1981	76	12.65	7	Osoi, 1986	143	14.44
2	Brăila, Terasă, 1982	1	0.13	8	Osoi, 1988	-	-
3	Brăila, Terasă, 1983	-	-	9	Osoi, 1989	3	0.83
4	Brăila, Lacul Sărat, 1981	76	12.65	10	Negrești, 1992	45	2.99
5	Brăila, Lacul Sărat, 1982	1	0.12	11	Broscauți, 1999	-	-
6	Brăila, Lacul Sărat, 1983	33	3.81	12	Broscauți, 2010, A	1	0.20
Total localities				13	Broscauți, 2010, B	-	-
				Total individuals		379	

Table 12. Numerical and percentage variation of the presence and absence of the Elateridae family and their dominance classes in sunflower fields, Brăila and Moldova, 1978-2010.

No.	Specification	No.	%
1	Presence in localities	9	69.23
2	Absence	4	30.77
1	Subrecedent below 1%	4	30.77
2	Recedent 1.1 - 2%	0	0
3	Subdominant 2.1 - 5%	2	15.38
4	Dominant 5.1 - 10%	0	0
5	Eudominant over 10.1%	3	23.08
	Total	9	69.23

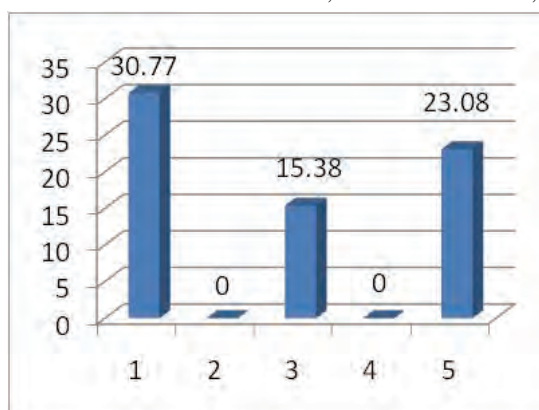


Figure 5. Numerical and percentage variation of the presence and absence of the Elateridae family and their dominance classes in sunflower fields, Brăila and Moldova, 1978-2010.

The sixth position is occupied by the Staphylinidae family, with 368 individuals (2.99 %), present in 12 crops (92.31 %) (Table 13; Table 14; Fig. 6).

Table 13. Distribution, variation of activity abundance (A) and dominance (D) of the Staphylinidae family investigated in sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D%	No.	Locality, Year	A	D (%)
1	Brăila, Terasă, 1981	73	12.15	7	Osoi, 1986	35	3.54
2	Brăila, Terasă, 1982	13	1.69	8	Osoi, 1988	2	2.86
3	Brăila, Terasă, 1983	9	1.11	9	Osoi, 1989	-	-
4	Brăila, Lacul Sărat, 1981	73	12.15	10	Negrești, 1992	76	5.05
5	Brăila, Lacul Sărat, 1982	4	0.50	11	Broscauți, 1999	20	0.54
6	Brăila, Lacul Sărat, 1983	11	1.27	12	Broscauți, 2010, A	45	9.18
Total localities				13	Broscauți, 2010, B	7	0.86
				Total individuals		368	

Table 14. Numerical and percentage variation of the presence and absence of the Staphylinidae family and their dominance classes in sunflower fields, Brăila and Moldova, 1978-2010.

No.	Specification	No.	%
1	Presence in localities	12	92.31
2	Absence	1	7.69
1	Subrecedent below 1%	3	23.08
2	Recedent 1.1 - 2%	3	23.08
3	Subdominant 2.1 - 5%	2	15.38
4	Dominant 5.1 - 10%	1	7.69
5	Eudominant over 10.1%	3	23.08
	Total	12	92.31

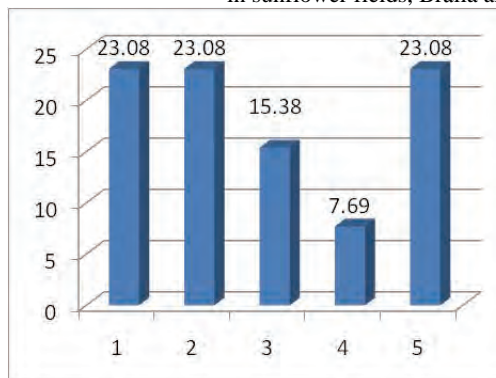


Figure 6. Numerical and percentage variation of the presence and absence of the Staphylinidae family and their dominance classes in sunflower fields, Brăila and Moldova, 1978-2010.

The Dermestidae family, in our collectings, has a total number of individuals very close to the **Staphylinidae** family, 353 (2.87%), being collected from 11 crops (84.62%) (Table 15; Table 16; Fig. 7).

Table 15. Distribution, variation of activity abundance (A) and dominance (D) of the **Dermestidae** family investigated in sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D%	No.	Locality, Year	A	D (%)
1	Brăila, Terasă,1981	26	4.33	7	Osoi, 1986	2	0.20
2	Brăila,Terasă,1982	1	0.13	8	Osoi, 1988	-	-
3	Brăila,Terasă,1983	1	0.12	9	Osoi, 1989	2	0.55
4	Brăila, Lacul Sărat,1981	26	4.33	10	Negrești, 1992	49	3.26
5	Brăila, Lacul Sărat,1982	-	-	11	Broscăuți,1999	84	2.29
6	Brăila, Lacul Sărat,1983	1	0.12	12	Broscăuți, 2010, A	117	23.88
Total localities				13	Broscăuți,2010, B	44	5.43
				Total individuals		353	

Table 16. Numerical and percentage variation of the presence and absence of the **Dermestidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978-2010.

No.	Specification	No.	%
1	Presence in localities	11	84.62
2	Absence	2	15.38
1	Subrecedent below 1%	5	38.46
2	Recedent 1.1 - 2%	0	0
3	Subdominant 2.1 -5%	4	30.77
4	Dominant 5.1 -10%	1	7.69
5	Eudominant over 10.1%	1	7.69
	Total	11	84.62

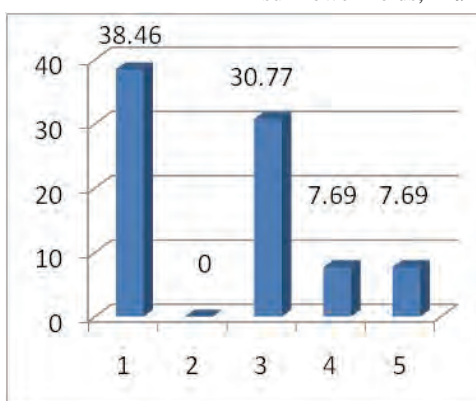


Figure 7. Numerical and percentage variation of the presence and absence of the **Dermestidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978-2010.

The Chrysomelidae family has a total of 224 specimens (1.82%), present in 12 crops (92.31%) (Table 17; Table 18; Fig. 8).

Table 17. Distribution, variation of activity abundance (A) and dominance (D) of the **Chrysomelidae** family investigated in sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D	No.	Locality, Year	A	D (%)
1	Brăila, Terasă,1981	60	9.98	7	Osoi, 1986	15	1.52
2	Brăila,Terasă,1982	31	4.04	8	Osoi, 1988	2	2.86
3	Brăila,Terasă,1983	4	0.49	9	Osoi, 1989	3	0.83
4	Brăila, Lacul Sărat,1981	60	9.98	10	Negrești, 1992	6	0.40
5	Brăila, Lacul Sărat,1982	10	1.25	11	Broscăuți,1999	27	0.74
6	Brăila, Lacul Sărat,1983	5	0.58	12	Broscăuți, 2010, A	1	0.20
Total localities				13	Broscăuți,2010, B	-	-
				Total individuals		224	

Table 18. Numerical and percentage variation of the presence and absence of the **Chrysomelidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978-2010.

No.	Specification	No.	%
1	Presence in localities	12	92.31
2	Absence	1	7.69
1	Subrecedent below 1%	6	46.15
2	Recedent 1.1 - 2%	2	15.38
3	Subdominant 2.1 -5%	2	15.38
4	Dominant 5.1 -10%	2	15.38
5	Eudominant over 10.1%	0	0
	Total	12	92.29

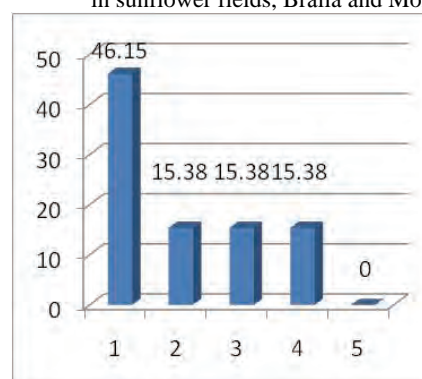


Figure 8. Numerical and percentage variation of the presence and absence of the **Chrysomelidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978-2010.

The Silphidae family occupies the 9th position, with a total number of 135 individuals (1.10%), being present only in 3 crops (23.08%) (Table 19; Table 20; Fig. 9).

Table 19. Distribution, variation of activity abundance (A) and dominance (D) of the **Silphidae** family, investigated in sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D%	No.	Locality, Year	A	D (%)
1	Brăila, Terasă,1981	-	-	7	Osoi, 1986	4	0.40
2	Brăila,Terasă,1982	-	-	8	Osoi, 1988	-	-
3	Brăila,Terasă,1983	-	-	9	Osoi, 1989	-	-
4	Brăila, Lacul Sărat,1981	-	-	10	Negrești, 1992	-	-
5	Brăila, Lacul Sărat,1982	-	-	11	Broscăuți,1999	-	-
6	Brăila, Lacul Sărat,1983	-	-	12	Broscăuți, 2010, A	103	21.02
Total localities				13	Broscăuți,2010, B	32	3.95
				Total individuals		135	

Table 20. Numerical and percentage variation of the presence and absence of the **Silphidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978- 2010.

No.	Specification	No.	%
1	Presence in localities	3	23.08
2	Absence	10	76.92
1	Subrecedent below 1%	1	7.69
2	Recedent 1.1 - 2%	0	0
3	Subdominant 2.1 -5%	1	7.69
4	Dominant 5.1 -10%	0	0
5	Eudominant over 10.1%	1	7.69
	Total	3	23.07

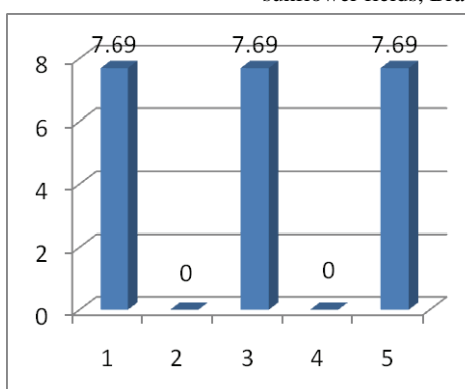


Figure 9. Numerical and percentage variation of the presence and absence of the **Silphidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978- 2010.

Starting with the Cantharidae family, the number of captured individuals gets smaller. The total number of captured individuals belonging to the **Cantharidae** family was 58 (0.47%), collected from 9 crops (69.23%) (Table 22; Fig. 10).

Table 21. Distribution, variation of activity abundance (A) and dominance (D) of the **Cantharidae** family, investigated in sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D%	No.	Locality, Year	A	D (%)
1	Brăila, Terasă,1981	12	2.0	7	Osoi, 1986	2	0.20
2	Brăila,Terasă,1982	6	0.78	8	Osoi, 1988	1	1.43
3	Brăila,Terasă,1983	-	-	9	Osoi, 1989	3	0.83
4	Brăila, Lacul Sărat,1981	12	2.0	10	Negrești, 1992	2	0.13
5	Brăila, Lacul Sărat,1982	12	1.49	11	Broscăuți,1999	8	0.21
6	Brăila, Lacul Sărat,1983	-	-	12	Broscăuți, 2010, A	-	-
Total localities				13	Broscăuți,2010, B	-	-
				Total individuals		58	

Table 22. Numerical and percentage variation of the presence and absence of the **Cantharidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978- 2010.

	Specification	No.	%
1	Presence in localities	9	69.23
2	Absence	4	30.77
1	Subrecedent below 1%	5	38.46
2	Recedent 1.1 - 2%	4	30.77
3	Subdominant 2.1 -5%	0	0
4	Dominant 5.1 -10%	0	0
5	Eudominant over 10.1%	0	0
	Total	9	69.23

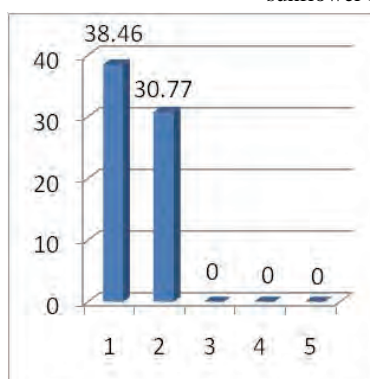


Figure 10. Numerical and percentage variation of the presence and absence of the **Cantharidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978- 2010.

The Coccinellidae family occupied the 11th position, with a total number of individuals of 48 (0.39%), present in 12 crops (92.31%) (Table 23; Table 24; Fig. 11).

Table 23. Distribution, variation of activity abundance (A) and dominance (D) of the **Coccinellidae** family, investigated in sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D %	No.	Locality, Year	A	D (%)
1	Brăila, Terasă, 1981	7	1.16	7	Osoi, 1986	1	0.10
2	Brăila, Terasă, 1982	2	0.26	8	Osoi, 1988	-	-
3	Brăila, Terasă, 1983	2	0.25	9	Osoi, 1989	8	2.22
4	Brăila, Lacul Sărat, 1981	7	1.16	10	Negrești, 1992	3	0.20
5	Brăila, Lacul Sărat, 1982	11	1.37	11	Broscăuți, 1999	2	0.05
6	Brăila, Lacul Sărat, 1983	1	0.12	12	Broscăuți, 2010, A	1	0.20
Total localities				13	Broscăuți, 2010, B	3	0.37
Total individuals						48	

Table 24. Numerical and percentage variation of the presence and absence of the **Coccinellidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978-2010.

No.	Specification	No.	%
1	Presence in localities	12	92.31
2	Absence	1	7.69
1	Subrecedent below 1%	8	61.54
2	Recedent 1.1 - 2%	3	23.08
3	Subdominant 2.1 -5%	1	7.69
4	Dominant 5.1 -10%	0	0
5	Eudominant over 10.1%	0	0
Total		12	92.31

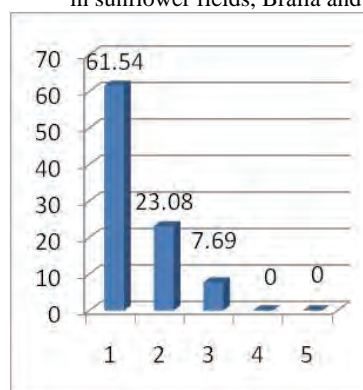


Figure 11. Numerical and percentage variation of the presence and absence of the Coccinellidae family and their dominance classes in sunflower fields, Brăila and Moldova, 1978- 2010.

The Chryptophagidae family in sunflower crops occupied the 12th position, with a total number of individuals of 33 (0.27) (Table 25; Table 26; Fig. 12).

Table 25. Distribution, variation of activity abundance (A) and dominance (D) of the **Chryptophagidae** family, investigated in sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D%	No.	Locality and Year	A	D (%)
1	Brăila, Terasă, 1981	11	1.83	7	Osoi, 1986	2	0.20
2	Brăila, Terasă, 1982	5	0.65	8	Osoi, 1988	-	-
3	Brăila, Terasă, 1983	-	-	9	Osoi, 1989	1	0.28
4	Brăila, Lacul Sărat, 1981	11	1.83	10	Negrești, 1992	-	-
5	Brăila, Lacul Sărat, 1982	1	0.12	11	Broscăuți, 1999	1	0.03
6	Brăila, Lacul Sărat, 1983	1	0.12	12	Broscăuți, 2010, A	-	-
Total localities				13	Broscăuți, 2010, B	-	-
Total individuals						33	

Table 26. Numerical and percentage variation of the presence and absence of the **Chryptophagidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978- 2010.

No.	Specification	No.	%
1	Presence in localities	8	61.54
2	Absence	5	38.46
1	Subrecedent below 1%	6	46.15
2	Recedent 1.1 - 2%	2	15.38
3	Subdominant 2.1 -5%	0	0
4	Dominant 5.1 -10%	0	0
5	Eudominant over 10.1%	0	0
Total		8	61.53

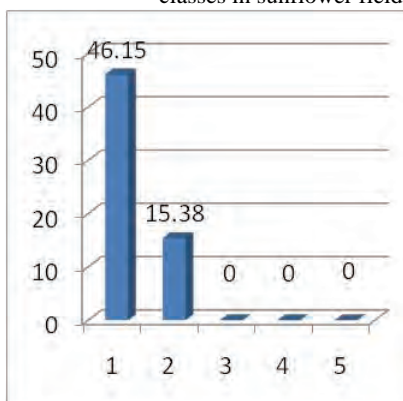


Figure 12. Numerical and percentage variation of the presence and absence of the Chryptophagidae family and their dominance classes in sunflower fields, Brăila and Moldova, 1978- 2010.

The Scarabaeidae family, phytophagous, was on position 13, with a total number of individuals of 24 (0.20%), present in 9 crops (69.23%) (Table 27; Table 28; Fig. 13).

Table 27. Distribution, variation of activity abundance (A) and dominance (D) of the **Scarabaeidae** family, investigated in sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D %	No.	Locality, Year	A	D (%)
1	Brăila, Terasă, 1981	-	-	7	Osoi, 1986	1	0.10
2	Brăila, Terasă, 1982	2	0.26	8	Osoi, 1988	-	-
3	Brăila, Terasă, 1983	2	0.25	9	Osoi, 1989	-	-
4	Brăila, Lacul Sărat, 1981	-	-	10	Negrești, 1992	1	0.07
5	Brăila, Lacul Sărat, 1982	7	0.87	11	Broscăuți, 1999	1	0.03
6	Brăila, Lacul Sărat, 1983	4	0.46	12	Broscăuți, 2010, A	2	0.41
Total localities				13	Broscăuți, 2010, B	4	0.49
				Total individuals		24	

Table 28. Numerical and percentage variation of the presence and absence of the **Scarabaeidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978-2010.

	Specification	No.	%
1	Presence in localities	9	69.23
2	Absence	4	30.77
1	Subrecedent below 1%	9	69.23
2	Recedent 1.1 - 2%	0	0
3	Subdominant 2.1 -5%	0	0
4	Dominant 5.1 -10%	0	0
5	Eudominant over 10.1%	0	0
	Total	9	69.23

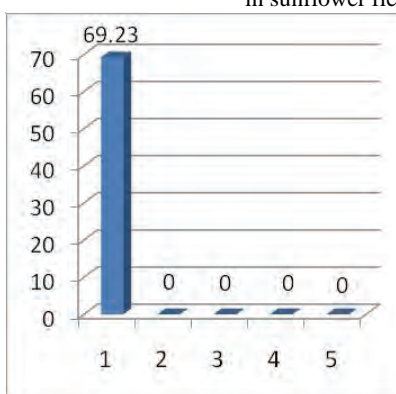


Figure 13. Numerical and percentage variation of the presence and absence of the Scarabaeidae family and their dominance classes in sunflower fields, Brăila and Moldova, 1978- 2010.

The Histeridae family, 19 individuals (0.15%), was collected only from 4 crops (30.77%) (Table 29, Table 30, Fig. 14) and the Cerambycidae family with 14 individuals (0.11%) was collected from only two crops (15.38%) (Table 31; Table 32; Fig. 15).

Table 29. Distribution, variation of activity abundance (A) and dominance (D) of the **Histeridae** family, investigated in sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D %	No.	Locality, Year	A	D (%)
1	Brăila, Terasă, 1981	-	-	7	Osoi, 1986	-	-
2	Brăila, Terasă, 1982	-	-	8	Osoi, 1988	-	-
3	Brăila, Terasă, 1983	-	-	9	Osoi, 1989	-	-
4	Brăila, Lacul Sărat, 1981	-	-	10	Negrești, 1992	11	0.73
5	Brăila, Lacul Sărat, 1982	-	-	11	Broscăuți, 1999	2	0.05
6	Brăila, Lacul Sărat, 1983	-	-	12	Broscăuți, 2010, A	3	0.61
Total localities				13	Broscăuți, 2010, B	3	0.37
				Total individuals		19	

Table 30. Numerical and percentage variation of the presence and absence of the **Histeridae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978- 2010.

No.	Specification	No.	%
1	Presence in localities	4	30.77
2	Absence	9	69.23
1	Subrecedent below 1%	4	30.77
2	Recedent 1.1 - 2%	0	0
3	Subdominant 2.1 -5%	0	0
4	Dominant 5.1 -10%	0	0
5	Eudominant over 10.1%	0	0
	Total	4	30.77

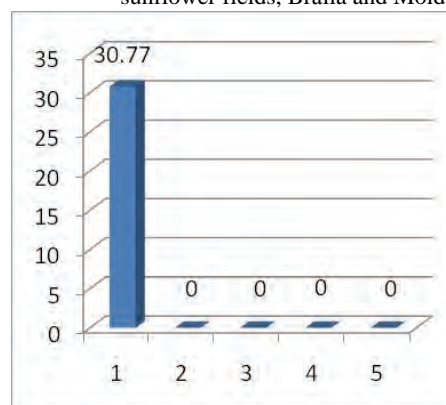


Figure 14. Numerical and percentage variation of the presence and absence of the **Histeridae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978- 2010.

Table 31. Distribution, variation of activity abundance (A) and dominance (D) of the **Cerambycidae** family, investigated in sunflower crops, Brăila and Moldova, 1981-2010.

No.	Locality and Year	A	D%	No.	Locality, Year	A	D (%)
1	Brăila, Terasă,1981	-	-	7	Osoi, 1986	13	1.31
2	Brăila,Terasă,1982	-	-	8	Osoi, 1988	-	-
3	Brăila,Terasă,1983	-	-	9	Osoi, 1989	-	-
4	Brăila, Lacul Sărat,1981	-	-	10	Negrești, 1992	-	-
5	Brăila, Lacul Sărat,1982	-	-	11	Broscăuți,1999	1	0.03
6	Brăila, Lacul Sărat,1983	-	-	12	Broscăuți, 2010, A	-	-
Total localities				13	Broscăuți,2010, B	-	-
				Total individuals		14	

Table 32. Numerical and percentage variation of the presence and absence of the **Cerambycidae** family and their dominance classes in sunflower fields, Brăila and Moldova, 1978- 2010.

	Specification	No.	%
1	Presence in localities	2	15.38
2	Absence	11	84.62
1	Subrecedent below 1%	1	7.69
2	Recedent 1.1 - 2%	1	7.69
3	Subdominant 2.1 -5%	0	0
4	Dominant 5.1 -10%	0	0
5	Eudominant over 10.1%	0	0
	Total	2	15.38

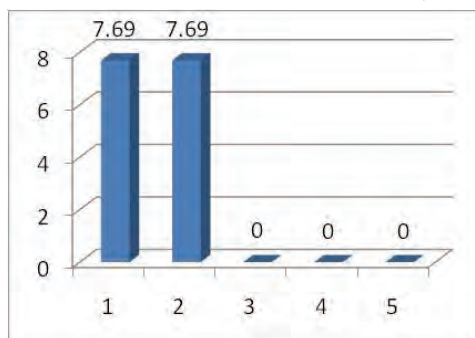


Figure 15. Numerical and percentage variation of the presence and absence of the Cerambycidae family and their dominance classes in sunflower fields, Brăila and Moldova, 1978-2010.

DISCUSSIONS

Synthesis is the superior stage of knowledge that generalizes and integrates what exists in and through the particular.

Discussions concretize the analysis, the examination of the coleopterological material to make some generalizations and, in particular, the ecological interpretations of the results. The law of unity and interaction of things and phenomena is general, but with concrete results, depending on the genus of ecosystems, because there are all related to everything.

The fundamental and unique form of the existence of life is the individual who possesses all the general and specific characteristics (from the kingdom to that of the species).

The numerical characteristics of a species is the number of individuals as the result of evolution and interactions with the environment, food, predators, maintained by natural selection. In a coenosis, depending on the number of individuals of each species, there are 5 classes of taxa (families, species), mentioning only the first class, subrecedent taxa with a numerical number less than 1%, lower limit and eudominant taxa, with a numerical value bigger than 10.1% as the upper limit.

The habitat of taxa is represented by three general components: physical, biological and ecological (soil, nutrition, temperature and humidity).

The mean of the number of individuals of those 15 Coleoptera families in 13 sunflower crops was 819, with extremely variable limits, 1 individual (Cerambycidae) and 3,208 (Carabidae family).

In the coleopterological analysed material from Muntenia (one county) and Moldova (four counties), 10 seasons, from 1981 to 2010, the Coleoptera Order is represented by 15 families (Table 2) compared to 22 families identified in maize crop (VARVARA, 2016) and 16 families in wheat crops (VARVARA, 2015).

The presence of the families of the Coleoptera Order in sunflower crops is variable. Only the Carabidae family was present in all the crops.

The total number of individuals of the Carabidae family was 7,778 (63.27%) and the variation of the presence of those 14 families in crops was between two crops (15.38%), the Cerambycidae family, and 12 crops (92.31%) (Families: Curculionidae, Staphylinidae, Chrysomelidae, Coccinellidae).

Unity and interaction of organisms with the environment, habitat, the spectrum of differences in the local conditions in the sunflower crops, Brăila and Moldova (South, Center, North) determines the number of Coleoptera individuals, making the same family to be subrecedent, recedent, subdominant, in some localities, or dominant, eudominant, in other localities, with more favorable conditions. For example, the Tenebrionidae family, phytophagous, was subrecedent in 5 localities in Brăila County, (Terasă and Salt Lake), because of the sandy and a little salty soil, and eudominant in Negrești, Vaslui County. The Staphylinidae family, zoophagous, in the collecting surface from those 12 localities (Table 14, Fig. 6) was subrecedent in three localities, recedent in other three localities and eudominant in three localities. Concretely, the Staphylinidae family was

eudominant in the locality Terasa (Terrace), Brăila County, 1981, 1982, 1983. In the same locality, recedent, eudominant, Brăila Terasa, 1981, and eudominant, Lacul Sărat (Salt Lake), 1981.

Comparing the overall average of the number of individuals collected from the sunflower crops, 10 seasons 1981-2010, with wheat crops, 12 seasons, 1977-2002, and with that from maize crops, 12 seasons, 1978-2012, it results that the means of the number of specimens collected on crops were: sunflower, 819; wheat 1,672; maize, 1,010. In the wheat crop, there was collected 2.04 times more individuals of Coleoptera than in sunflower crops, and in the maize crop, 1.23 times.

The wheat crops favour the presence of several individuals from five families (Carabidae, Tenebrionidae, Staphylinidae, Coccinellidae, Dermestidae, Anthicidae); The soil moisture in wheat crops is one of those factors that favour the number of individuals. For example, in the Staphylinidae family, mesophyllous, there was collected 6.43 times more individuals in the wheat crops compared to sunflower crops (2,366, total wheat crops, Staphylinidae: 368, the total number of Staphylinidae in the sunflower crops). The total number of Staphylinidae collected from maize and sunflower crops was close: 509 (maize), 368 (sunflower), the proportion being of 1.38 individuals in maize crops relative to sunflower crops. The soil humidity is also influenced by the density of the plants.

CONCLUSIONS

Effort and perseverance of collecting coleopterological material, determination and taxonomic classification of the 12,293 specimens collected from 15 sunflower crops over a period of 10 seasons, actually (1978-2010), from Muntenia, Brăila County and Moldova, (Vaslui, Iași, Botoșani counties) give us the opportunity to say the following:

- The epigeic coleopterans belong to 15 families. According to their total abundance, they are: Carabidae, Tenebrionidae, Anthicidae, Curculionidae, Elatheridae, Staphylinidae, Dermestidae, Chrysomelidae, Silphidae, Cantharidae, Coccinellidae, Chryptophagidae, Scarabaeidae, Histeridae, Cerambycidae;
- The numerical and percentage presence of families varied from two localities (15.38%) (Cerambycidae family) to 15 localities (100%), only the Carabidae family;
- The collecting percentages of individuals of the coleopteran families were between 0.11% (Cerambycidae family) and 63.27% (Carabidae family) (Table 2);
- The numerical and percentage variation of the collected epigeic Coleoptera belonging to the 15 families is influenced by the pedoclimatic conditions from the collecting localities.

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