RESEARCH ON BIODIVERSITY CONSERVATION AND MANAGEMENT IN THE VITICULTURAL AGROECOSYSTEM IN THE DEALUL BUJORULUI VINEYARD

CERCETARI PRIVIND CONSERVAREA SI GESTIONAREA BIODIVERSITATII IN AGROECOSISTEMUL VITICOL DIN PODGORIA DEALUL BUJORULUI

TABARANU G.[1]*, ENACHE Viorica[1], DONICI Alina[1], BÎRLIGA N.[1]
*Corresponding author e-mail: gabitabaranu@yahoo.com

Abstract. *The paper presents the research carried out at the Bujoru Viticulture and Wine Research and Development Station between 2016 and 2017. Research has focused on conservation and enhancement of functional and planned biodiversity through the implementation of all bio-resources of the greenhouse system and multifunctional protection areas, which are conducive to reducing the pathological risks and reducing external inputs (diesel, pesticides). Assessment of the state of conservation of biodiversity in the viticultural ecosystem of pogoria Dealul Bujorului.Biodiversity is a specific feature of our planet that ensures the optimal functioning of ecosystems, the existence and development of the biosphere in general. Lately, the issue of protecting biodiversity at ecosystems, species and populations has become increasingly vital to reducing the human impact on the biosphere. The viticultural ecosystem is defined as the functional unit of biosphere created and controlled by man in order to obtain high yields of grapes, of high quality and in more economical and socially advantageous conditions.*
Key words: grapevine, biodiversity, ecosystems

Rezumat. *Lucrarea prezintă cercetările efectuate la Staţiunea de Cercetare şi Dezvoltare pentru Viticultură şi Vinificaţie Bujoru în perioada 2016-2017. Cercetările au vizat studii privind conservarea şi consolidarea biodiversităţii funcţionale şi planificate prin implementarea tuturor bio-resurselor a sistemului de înverzire şi a zonelor multifuncţionale de protecţie, favorabile reducerii riscurilor patologice şi diminuării inputurilor externe (motorină, pesticide. Evaluarea stării de conservare a biodiversităţii în ecosistemul viticol din pogoria Dealul Bujorului. Biodiversitatea reprezintă o particularitate specifică a planetei noastre, care asigură funcţionarea optimă a ecosistemelor, existenţa şi dezvoltarea biosferei în general. În ultima perioadă, problema protejării biodiversităţii la nivel de ecosisteme, specii şi populaţii a devenit tot mai vitală pentru reducerea impactului uman asupra biosferei. Ecosistemul viticol este definit ca fiind acea unitate funcţională a biosferei creată şi controlată de către om, în vederea obţinerii unor producţii ridicate de struguri, de calitate superioară şi în condiţii economice şi sociale tot mai avantajoase.*
Cuvinte cheie: viţă de vie, biodiversitate, ecosistem

[1] Research and Development Station for Viticulture and Winemaking Bujoru, Galati, Romania

INTRODUCTION

Sustainable growth of production and income in vineyard culture requires extensive measures to combat pathogens and pests. Beside the beneficial effect of the phytosanitary measures on the vine, these may have negative effects on the preservation of biodiversity in wine ecosystems.

At the same time, reducing damages caused by diseases, pests and herbage, must be achieved by reducing the dependence of culture on conventional resources (D. Ball *et al.*, 1986; Tălmaciu M. *et al.*, 1996).

MATERIAL AND METHOD

Research was conducted between 2016 and 2017 in the vineyard plantations of the Bujoru Viticulture and Wine-growing Research and Development Station.

In order to evaluate the positive impact of implementation of bio-resources, of greening systems and of multifunctional protection areas on functional biodiversity in vineyard ecosystems in vineyards were identified and installed six experimental variants located on terraces located on the level cubes with a width of about 20 m and a length of 600 m (tab. 1).

Table 1

Identification data of experimental lots - SCDVV Bujoru

Culture	Parcel	The variety	Soil maintenance system	Lat. N	Long. E	Altitude (m)
Vine	Variant 1	Rkatiteli	black field	45.50.01.59	27.55.25.06	40
	Variant 2	Rkatiteli	string mulch chopped	45.50.01.20	27.55.24.22	45
	Variant 3	Fetească albă	black field	45.50.00.46	27.55.22.22	49
	Variant 4	Fetească albă	string mulch chopped	45.50.00.29	27.55.21.18	53
	Variant 5	Babească gri	black field	45.49.58.94	27.55.15.60	66
	Variant 6	Babească gri	string mulch chopped	45.49.58.60	27.55.14.97	71

RESULTS AND DISCUSSIONS

In order to assess the conservation status of biodiversity in wine ecosystems two indicators were taken into account, namely the amount of semi-natural elements in the landscape of the vineyard holding and their quality.

The quantitative indicator represents the share of the total surface area of the component elements (artificial landscape and infrastructure in relation to the surface of the vineyard).

The case of the six experimental lots, the surface actually occupied by vine is 17.11 ha, and the agro-ecological infrastructure represented by grasshoppers, isolated trees and other crops occupy 9,01 ha. Under these circumstances the ratio between IAE and UAE is 53% and the artificialism rate is 47%.

The structure and morphology of the viticultural habitat in the Bujoru ecosystem: Total wine-growing = 26.12 ha of which:
Surface occupied by multifunctional protection areas = 9.01 ha:

- grasshoppers: 13500 m x 5 m = 6.75 ha;
- isolated trees: 10 m x 10 m = 0.01 ha;
- trenches: 2m x 1250m = 0.25ha;
- wetland specific vegetation = 0.50 ha;
- squid = 1,00 ha and alfalfa = 0.50 ha.

Total surface actually occupied by vineyard culture: 17.11 ha
17.11 ha => IAE/UAE= 53% Rate of artificialization= 100-53= 47%

The qualitative indicator reflects the conservation status of the landscape elements. Quality is evaluated based on several indicators defined for each tipe of IAE. Indicators are divided into three categories: structure, composition and functions assimilated here to degradations. These indicators are being deducted for each type of IAE in rating grids and are then classified into three categories: good, medium, unfavorable, depending on their condition. Farm level, quality is assessed by aggregating all the conservation status obtained for all IAEs on the holding. This allows to obtain a radial pattern diagram showing the IAE share of good conservation, medium and unfavorable.

Barber soil traps, filled 2/3 with formalin solution (formaldehyde) 4%, 3/ each variant, have been installed on the vineyard rows in order to establish the quantitative and qualitative structure of entomofauna from the soil surface between May-August.

With Barber soil traps, entomological material (specimens of insects - juveniles, adults) was collected. Traps were disposed randomized in the experimental lot trying to cover as many ecological niches as possible (habitats). The entomological material collected and labeled was transported to the laboratory washed under water jet and then passed into a solution of ethyl alcohol 7%. The identification and counting of the entomofauna was done with the trinocular magnifier (KRÜSS) with two WF 10x20 magnifiers.

The relative numerical abundance (A.r.%) of a population is defined as the proportion represented by the number of individuals of a species or group compared to the total number of individuals belonging to all species in the sample.

In the observations on entomological material collected at ground level using Barber soil traps (May - August) we found the following (tab. 2):

Variant 1: 9 arthropod species or groups belonging to the *Myriapoda, Insecta* and *Arachnida* classes were identified, but most belong to the *Insectae* class. The highest relative abundance was recorded by the species of the *Formicidae* family (23.21%), followed by the *Lycosidae* (22.92%), fam. *Cicadidae* (11.75%) *Carabidae* (8.02%), *Apidae* (5.16%), *Diptera (*5.44%) and other species (18.91%).

Variant 2: Ground fauna consisted of 9 species or groups of arthropods belonging to the classes: *Insecta* and *Arachnida*. The largest population was represented by the *Lycosidae* family (23.08%) and the *Formicidae* family with (21.63%), fam. *Cicadidae* (9.62%), *Carabidae* (8.65%) and other species (19.23%). The *Coccinellidae* family recorded (0,48%).

Variant 3: Ground fauna consisted in 12 species or groups of arthropods belonging to the classes: *Insecta* and *Arachnida*. The most numerous population was the *Formicidae* family (26.00%), *Lycosidae* family (15.4%) and *Carabidae* family (14.54%).

Variant 4: the fauna at the ground level consisted in 9 species or arthropod groups belonging to the classes: *Insecta* and *Arachnida*. The largest population was represented by the *Formicide* family (26.64%), the *Lycosidae* family (14.29%), the *Carabidae* family (12,74%) and other species (23,55%).

Variant 5: 11 arthropod species or groups belonging to the *Insecta* and *Arachnida* classes were identified, but most belong to the *Insecta* class. The highest relative abundance was recorded by the species of the *Formicidae* family (37.88%), followed by the *Lycosidae* family (14.44%), the *Cicadidae* family (10.64%), the *Carabidae* (8.17%) and other species (15.53%).

Variant 6: 9 arthropod species or groups belonging to the classes of *Insecta* and *Arachnida* have been identified, but most of them belong to the *Insecta* class. The highest relative abundance was recorded by the species of the *Carabidae* (33.09%), the *Formicide* family (20.96%), followed by the *Lycosidae* (14.34%), the *Diptera* Order (4.41%) and other species (13,24%).

Slope grassy: 10 arthropod species or groups belonging to the classes of *Insecta* and *Arachnida* have been identified, but most of them belong to the *Insecta* class. The highest relative abundance was recorded by the species of the *Lycosidae* family (22.94%), followed by the *Formicidae* (17.59%), fam. *Carabidae* (13.77%), fam. *Gryllidae* (6.69%), *Diptera (*6.88%) and other species (18.93%).

To manage biodiversity in order to protect and preserve it, it is necessary to measure it. In this respect, the following biodiversity characterization indices were used to quantify the biodiversity of the studied agroecosystem: the number of species (species richness), the Simpson index (D), the Shannon (H) diversity index, the Shannon-Weaver index H) and equity (E) (tab. 3).

Table 2

Structure of the species caught in the Bujoru agroecosystem - 2017

Systematic classification (species, family, order)	The percentage (%) main culture														Total catches
	Vine														
	V1		V2		V3		V4		V5		V6		Slope grassy		
	Number of catches	A %	Number of catches	A %	Number of catches	A %	Number of catches	A %	Number of catches	A %	Number of catches	A %	Number of catches	A %	
Alopecosa pulverulenta/ fam. Lycosidae	80	22.92	48	23.08	53	15.14	37	14.29	53	14.44	39	14.34	120	22.94	430
Formica rufa / fam. Formicidae	81	23.21	45	21.63	91	26.00	69	26.64	139	37.88	57	20.96	92	17.59	574
Epicometis hirta Poda./fam. Scarabeidae	0	0	0	0	8	2.29	0	0	0	0	4	1.47	2	0.38	14
Apis sp./ fam. Apidae	18	5.16	8	3.85	5	1.43	10	3.86	20	5.45	7	2.57	8	1.53	76
Carabus sp./ fam. Carabidae	28	8.02	18	8.65	51	14.54	33	12.74	30	8.17	90	33.09	72	13.77	322
Eurigaster Maura. Subordinul Geocoridae	1	0.29	0	0	2	0.57	0	0	4	1.09	0	0	22	4.21	29
Gryllus campestris/ fam. *Gryllidae*	7	2.01	12	5.77	12	3.43	13	5.02	10	2.72	11	4.04	35	6.69	100
Fam. *Vespidae*	8	2.29	5	2.40	12	3.43	5	1.93	3	0.82	1	0.37	17	3.25	51
Coccinella septempunctata/ fam. Coccinellidae	0	0	1	0.48	0	0	0	0	0	0	0	0	0	0	1
Cicada viridis/ fam. Cicadidae	41	11.75	20	9.62	23	6.57	21	8.11	39	10.63	15	5.51	20	3.83	179
Ord. Diptera	19	5.44	11	5.29	18	5.14	10	3.86	11	3.00	12	4.41	36	6.88	117
Myriapoda	0	0	0	0	1	0.29	0	0	0	0	0	0	0	0	1
Forficula auricularia / fam. Forficulidae	0	0	0	0	0	0	0	0	1	0.27	0	0	0	0	1
Other species	66	18.91	40	19.23	74	21.14	61	23.55	57	15.53	36	13.24	99	18.93	433
TOTAL	**349**	***100***	**208**	***100***	**350**	***100***	**259**	***100***	**367**	***100***	**272**	***100***	**523**	***100***	**2328**

Table 3

Simpson Diversity Index (D); Shannon-Weaver (H) and Equality (E) diversity index for the Bujoru viticultural agroecosystem – 2017

Agroeco system	Number individuals of a species	Number total catches in the perimeter analyzed	Proportion of representation	Simpson index (D)		Diversity Index (H)	Equity (E)
the species	ni	N	pi=ni/N	(pi)2	lnpi	-pi*lnpi	E=H/ln(S)
1	430	2328	0.1847	0.0341	-1.6890	0.3120	0.1182
2	574	2328	0.2466	0.0608	-1.4001	0.3452	0.1308
3	14	2328	0.0060	0.0000	-5.1137	0.0308	0.0117
4	76	2328	0.0326	0.0011	-3.4220	0.1117	0.0423
5	322	2328	0.1383	0.0191	-1.9782	0.2736	0.1037
6	29	2328	0.0125	0.0002	-4.3855	0.0546	0.0207
7	100	2328	0.0430	0.0018	-3.1476	0.1352	0.0512
8	51	2328	0.0219	0.0005	-3.8209	0.0837	0.0317
9	1	2328	0.0004	0.0000	-7.7528	0.0033	0.0013
10	179	2328	0.0769	0.0059	-2.5654	0.1973	0.0747
11	117	2328	0.0503	0.0025	-2.9906	0.1503	0.0570
12	1	2328	0.0004	0.0000	-7.7528	0.0033	0.0013
13	1	2328	0.0004	0.0000	-7.7528	0.0033	0.0013
14	433	2328	0.1860	0.0346	-1.6820	0.3129	0.1185
Sum = 14				**0.1607**		**2.0172**	**0.7644**

CONCLUSIONS

1. The most common species of insects were: Formicidae (574 individuals. respectively 24.66%). Lycosidae (430 individuals and 18.47% respectively) and the Carabidae family (322 individuals and 13.83% respectively).

2. The results obtained in 2017 show that in the vineyards there is a rich fauna. both as a number of species and as a number of individuals.

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