DIVERSITY OF BIRD POPULATIONS IN ECOSYSTEMS OF AGRICULTURAL CROPS IN THE SUBURBAN AREA OF TIMISOARA CITY, IN HIEMAL SEASON

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Abstract: *Agroecosystems of periurban areas in Timisoara city are represented by agricultural crops (in the north is USAMVB Timisoara resort, adjacent thoroughfares to Calea Aradului si Calea Torontalului and in the south Calea Sagului area), pastures (Freidorf area in the western side and in the south eastern the areaof Calea Buziasului – Calea Mosnitei , aiming at a mixed grassland ecosystem, agricultural crops and residential areas). This paper aims to show a picture of the avifauna from ecosystems of agricultural crops, heavily modified by humans, share the adaptability of species of birds in such habitats. These lists may contribute to the composition of similar databases as the Common Bird Monitoring Program of the Romanian Ornithological Society, very important data for nature conservation throughout the country and at international level; through this kind of research is attempted the composition of data bases on the conservation status of bird populations and to find strategies to limit negative effects on society due to their development.The investigation method applied is based on the path method (Ferry and Frochot, 1958), improved through a statistical method processed by specialists from the Zoology Department of the Faculty of Chemistry, Biology and Geography of the Western University from Timisoara.* ***The method emphasizes both aspects of abundance and species coverage of energy and the importance of species in ecosystem. From observations, that are present between 12 and 24 species of birds, with few exceptions, the typical season, this type of ecosystems and their peculiarities. The degree of dominance varies from one ecosystem to another, depending on the vegetation, especially woody vegetation, the vicinity of transport routes, with wooded areas or residential areas. Most adapted proved to be the antropofile and ubicviste species.The rapace are described in various specialized works as generally useful agricultural species through biological control that is unintentionally practiced by the act of feeding, such as owl (Athene noctua) (Catuneanu, 1952), which in a month consumes 300 mice , Asio flammeus and Buteo buteo or Corvus frugilegus , which contributes more to combat beetle by feeding with its larvae that are unearthed during plowing.***

Key words: *agroecosystem, birds, dominance, Timisoara*

INTRODUCTION

Agricultural ecosystems are considered young ecosystems where man intervenes to maintain the agroclimax state. Of the total area of Timis County, the largest share is held by agricultural areas - 82.2%.

There are several types of agricultural ecosystems:

- ecosystem of annual grass and biennial crops;
- ecosystem of permanent meadows and pasture

The ecosystem of annual grass and biennial crops, with the following characteristics of biotope – a pronounced spatial uniformity, an uniformly substrate, a less variable microclimate. Maintenance requires high energy consumption to maintain uniformity. Biocoenosis has a small number of species, the bigger part is occupied by crops, and weeds (*Anthemis sp, Matricaria sp, Papaver royas, Centaurea cyanus, Cirsum arvense*, etc.),

invertebrates, some of them bad for cultures (bacteria, fungi, mites , worms, insects), birds - antropofile species predominate: C*orvus frugilegus, Corvus monedula, Pica pica, Columba livia domestica, Streptopelia decaocto* and steppe species: *Galerida cristata, Alauda arvensis*, etc..

Among the mammals most common are rodents.

These ecosystems are diversified by belts of shrubs vegetation, being shelter and nesting place favorable for the bird populations. Timisoara is part of the steppe floor and the birds here are included by Dimitrie Radu in Columbidae Family.

MATERIAL AND METHODS

The investigation method applied is based on the routes method (FERRY AND FROCHOT, 1958), improved by Prof. Univ. Phd. Biol. Dan STĂNESCU, by including in the calculation of threshold values of the dominant three indices, besides assessing the participation percentage. These indices are: kilometric abundance index (IKA), biomass, metabolic index, called consumption by KORODY (1958), reconsidered by STĂNESCU et al. (1999) as a metabolic index, which is actually the flies or body surface area calculated by the energy loss by Turcek in the tables that bear his name. According to him, STĂNESCU et al. (1999) speaks of the involvement of the user or consumer species in the ecosystem.

Dominance thresholds values are considered as follows:

→ Absolute dominance threshold is given by all values placed above the average values plus standard deviation,

→ Dominance threshold of all values that are above the average values

→ Subdominance threshold of all values above the average value minus standard deviation

→ Auxiliary threshold of all values less than the average values and standard deviation

→ Quality of accident (accident) of all values under 20% of the auxiliary value (STĂNESCU et al. 1999).

Margin of error is calculated by 0.05%.

All calculation is made by using a soft, made in the informatics laboratory of Zoology Department belonging to Biology-Geography Faculty (West University of Timişoara). Currently the program is in the custody of prof. Dan Stănescu

RESULTS AND DISCUSSIONS

Investigations have been made in the hiemal season of the years 2008, 2009, 2010, 2011.

By summing up the data collected in these years, during hiemal season the results are as follows:

In the area of the Didactic Station of University of Agricultural Sciences and Veterinary Medicine Timisoara we met 17 species of which two antropofile species are absolutely dominant *Columba livia domestica* and *Corvus frugilegus*, followed by eight dominant ,usual species of crop ecosystem with 3 antropofile species *Passer domesticus, Corvus monedula, Pica pica*, an ubicvista species *Streptopelia decaoto,* an introduced species *Phasianus colchicus*, 3 subdominante, 3 auxiliary and accidental species *Parus ater*, *Phasianus colchicus,* 3 subdominante, 3 auxiliary and accidental species *Parus ater,* common species for coniferous forest, which in winter is searching for food in cities. We note the presence of characteristic species of forest ecosystem *Parus sp, Dendrocopos major* which is due to the woody vegetation from the edge of drainage channels and the proximity of this area with Pădurea Verde (Green Forest).

Table 1.

Avifauna in the ecosystem of agricultural crops from USAMVBT resort (between Calea Aradului and Calea Torontalului)

Nr. crt	Species	Ika	Frecvence (%)	Biomase	I_{cons}	Σ_{log}	Dominance
1	*Columba livia domestica* L. 1758	4.30	3.16	12.11	10.25	29.86	AD
2	*Corvus frugilegus frugilegus* L. 1758	3.72	3.42	12.15	10.08	29.37	AD
3	*Corvus monedula monedula* L. 1758	2.20	2.48	9.77	7.98	22.43	DOM
4	*Phasianus colchicus* L. 1758	0.61	1.29	9.58	7.33	18.81	DOM
5	*Pica pica pica* L. 1758	1.00	1.72	8.82	6.81	18.35	DOM
6	*Streptopelia decaoto decaocto* Friv. 1838	1.21	1.36	8.68	6.93	18.18	DOM
7	*Passer domesticus domesticus* L. 1758	2.12	1.47	7.75	6.61	17.95	DOM
8	*Passer montanus montanus* L. 1758	1.99	1.42	7.42	6.35	17.18	DOM
9	*Falco tinnunculus tinnunculus* L. 1758	0.49	1.22	8.01	6.24	15.96	DOM
10	*Buteo buteo buteo.* L.1758	-0.27	0.53	0.63	6.40	15.29	DOM
11	*Parus major major* L.1758	0.78	1.36	5.89	4.92	12.97	SD
12	*Carduelis carduelis carduelis* L.1758	0.49	0.53	5.48	4.60	11.10	SD
13	*Dendrocopos major major* L.1758	-1.53	0.72	5.08	3.61	6.44	SD
14	*Parus caeruleus caeruleus* L.1758	-1.12	-0.72	3.66	2.81	4.63	AUX
15	*Galerida cristata cristata* L 1758	-2.22	-1.42	3.81	2.54	2.71	AUX
16	*Carduelis chloris chloropus* L. 1758	-2.22	-1.42	3.33	2.22	1.92	AUX
17	*Parus ater ater* L. 1758	-2.22	-1.42	3.30	1.53	0.20	ACC
						Σ	243.28
						M	14.31
						Ab standard	8.98

Abbreviations: IKA- index of abundance, freq-frequency, biom - biomass, Icons - index metabolic ΣLOG - sum of indices for species AD - absolutely dominant, DOM - dominant, SD - subdominant, AUX - Auxiliary, ACC - accidentally , Σ - sum total, Ab. st - standard deviation, M- average

Agro-ecosystems adjacent to Calea Sagului are an ecosystem of crops like USAMVB resort. Particularities of this area are: it is crossed by a transportation artery with heavy traffic, a significant share is held by industrial and commercial objectives also woody vegetation that could provide shelter for bird species is almost absent, and due to this the diversity in species is the lowest from all studied ecosystems.

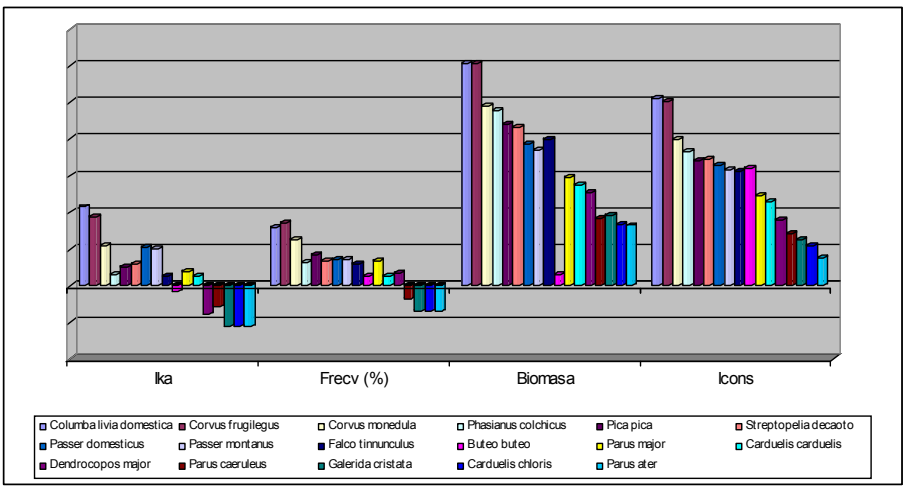

Fig.1. Graphical representation of abundance and energy flow of bird populations in agro-ecosystems adjacent to Calea Aradului

Table 2

Avifauna in the ecosystem of agricultural crops adjacent to Calea Sagului

Nr. crt	Species	Ika	Frecvence (%)	Biomass	I_{cons}	Σ_{log}	Dominance
1	*Corvus frugilegus frugilegus* L.1758	4.36	3.53	12.77	10.70	31.35	AD
2	*Columba livia domestica* L.1758	2.88	2.72	10.67	8.81	25.08	AD
3	*Corvus monedula* L. 1758	1.99	2.69	9.54	5.75	21.29	DOM
4	*Passer montanus montanus* L. 1758	2.48	1.86	7.89	6.82	19.03	DOM
5	*Passer domesticus domesticus* L.1758	2.09	2.25	7.69	6.56	18.59	DOM
6	*Pica pica pica* L.1758	0.69	1.86	8.48	6.49	17.53	DOM
7	*Streptopelia decaoto decaocto* Friv. 1838	0.37	1.51	7.81	6.86	15.16	SD
8	*Falco tinunculus tininculus* L. 1758	-0.22	1.11	7.38	5.61	13.98	SD
9	*Galerida cristata cristata* L. 1758	0.11	1.33	6.11	4.84	12.37	SD
10	*Athene noctua noctua* Scop 1769	-1.10	0.13	6.17	4.48	9.61	AUX
11	*Accipiter nisus nisus L. 1758*	-1.50	-0.28	5.99	4.23	8.44	AUX
12	*Buteo buteo buteo*. L.1758	-2.20	-0.97	6.68	4.46	7.97	AUX
						Σ	201.79
						M	16.82
						Ab st	7.02

Abbreviations: IKA- index of abundance, freq-frequency, biom - biomass, Icons - index metabolic ΣLOG - sum of indices for species AD - absolutely dominant, DOM - dominant, SD - subdominant, AUX - Auxiliary, ACC - accidentally , Σ - sum total, Ab. st - standard deviation, M- average

Over all 12 species were observed from which two species are absolutely dominant *Columba livia domestica* and *Corvus frugilegus*, four dominant species, antropofile species, 2 subdominant and 3 auxiliar species. The synoptic table is completed by rape species and contributes significantly by energy flow and a species characteristic for steppe *Galerida cristata*, which has adapted very well to anthropogenic habitats.

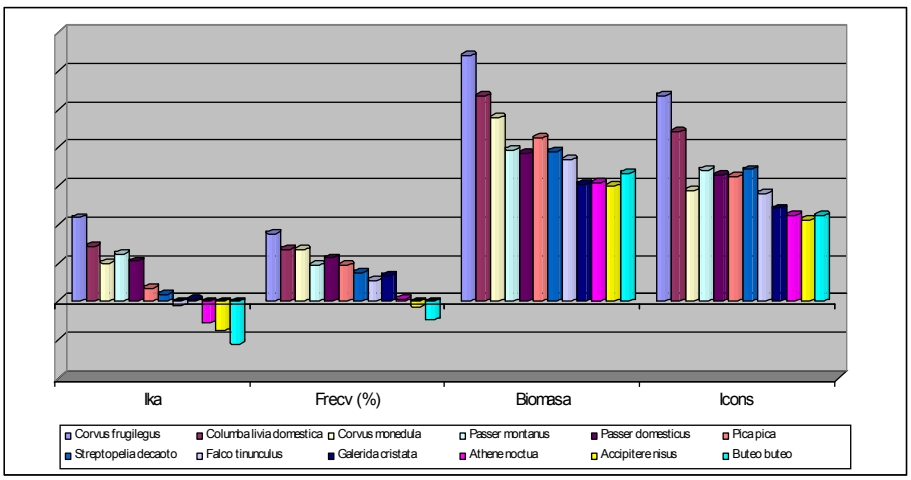

Fig.2 Graphical representation of abundance and energy flow of bird populations in agro-ecosystems adjacent to Calea Sagului

CONCLUSSIONS

- In the 4 years of studies in hiemal season there were observed approximately 19 species.
- Highest ranks of dominance are represented by antropofile species, followed by ubicuist species and by the opportunistic species well adapted to ecosystems with a high degree of human intervention.
- Synoptic picture contains sedentary species and erratic species, higher or lower diversity being given by the specifics of each other.
- Superior dominance degrees are being hold by antropofile birds or by those that have a high adaptability degree to anthropogenic stress factors.
- But, in crops ecosystems was observed small number of species, the difference between them being made by weight wood vegetation that borders the drainage channels.
- The smallest bird species diversity was recorded in the crop agricultural ecosystem adjacent to Calea Sagului thoroughfares, where traffic is intense, and woody vegetation, which gives shelter to birds, is almost missing.
- The importance of biodiversity of urban areas is given by its increased contribution to the biodiversity of the entire urban ecosystem.

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