

OPINION

By Prof. Dr. Valko Yordanov Biserkov, IBER-BAS: Department of "Ecosystem Research, Ecological Risk and Conservation Biology", Section "Community Ecology and Conservation Biology".

About: dissertation work of *Silvia Peteva Dyulgerova* – full-time doctoral student at Department of Community Ecology and Conservation Biology (IBER-BAS), with the topic: *Impact of the abandonment and intensification of agricultural land use on bird communities in model areas in Bulgaria*, for the award of the educational and scientific degree "Doctor", scientific specialty: Ecology and Ecosystem Conservation.

Silvia Dyulgerova graduated from Sofia University, Kl. Ohridski, Faculty of Biology 2010 as a bachelor in *Ecology and Environmental Protection*; 2012 as a master in Ecology. The full continuity between her education as a bachelor and master is a significant advantage over masters whose bachelor's degree is not in the same scientific field.

Even as a university student, Dyulgerova actively participated in a number of ornithological projects. In 2011-2012, as a participant in the AGRALE project (Sub-project ERA 164/04 a lasting interest in the processes in bird communities was developed in Dyulgerova, as a result of the abandonment of agricultural lands in Eastern European countries, in which the agricultural sector collapsed during the change of the political and economic system.

In 2016, Dyulgerova started working as an assistant at IBEI and became a full-time doctoral student.

The initial idea for the topic of the doctoral studies was related to the impact of pesticides on wild birds and the impact of hormonal preparations in carcass materials dumped in landfills. Training was planned in a specialized Spanish laboratory. Due to a change in circumstances related to the Spanish side, it was necessary to fundamentally change the topic and redefine it in its current form. In turn, this required Dulgerova to upgrade her knowledge in programs such as *Arc Map* and *FRAGSTATS*.

Silvia Dyulgerova's PhD is an original study of the relationship between bird communities and landscape changes in succession from abandoned arable lands through grassland, herbaceous-shrub to forest communities. Due to the vastness of the topic, efforts have been focused on three

tasks. The results obtained have been published in two articles in impact factor journals. A third article is in preparation, which is presented as a manuscript in the PhD.

Doctoral tasks:

- Determining changes in bird communities during vegetation succession as a result of agricultural land abandonment.

For this task, **18** squares of 1 km² each from the central part of the Fore-Balkan were surveyed. The distance between the centers of two adjacent squares is over 4 km. To determine the vegetation structure (VS), land cover from orthophotos from 2011 was used. It was compared with land cover from aerial photographs from the military archive 1945-1946. VS was divided according to the coverage with shrubs and forests into three groups: VS1 < 60%; VS2 60-90%; VS3 >90%. Of the 64 squares assessed as suitable, 18 were randomly selected for collecting data on birds. The point method was used, with 9 points per square. The field season was 2011, and the repeat observations were made in 2012. Birds, according to their preferences for their main habitat, are classified into three groups: grassland, shrub, forest and those preferring other habitat types. **3,587** specimens of birds belonging to **61** species were registered. Appropriate tools were selected for the statistical processing of the obtained data. Generally accepted indicators were used to assess the communities: Species richness, Shannon index and Abundance, and the Kruskal-Wallis ANOVA test and Spearman correlation coefficient were applied.

Two main groups of species have been identified along the landscape gradient - those associated with open landscapes and those associated with forests and rural mosaics. The dominant bird species have been identified in newly formed pastures, scrubland and forests. Along the landscape gradient, it was found that despite stable abundance, there is a decrease in total species richness. The results are interpreted competently and are illustrated with informative maps, histograms and PCA graph.

- Testing landscape indices that can characterize changes in habitats that affect bird communities.

A similar methodology was followed for the field data as in the first task. 161 points from 20 squares were analyzed. 2063 specimens of 60 species were selected from the collected data. A database of orthophoto images (2011) was used. The layer was converted into a raster for calculating landscape indicators with FAGSTATS,

The layer has been reclassified into 4 landscape classes: open, shrubland, open forest, forest [open landscapes (OL), shrubland (SH), open forest (OF) and forest (FO)].

When agricultural lands are abandoned, the condition of associated birds deteriorates due to direct habitat loss and due to reduced suitability of the remaining patches. A good understanding of the

relationship between landscape indicators and bird community parameters allows the development of different landscape management scenarios to improve habitat for guilds from focal habitats.

It has been found that when agricultural lands are abandoned, four landscape indices - ***PLAND***, ***TE***, ***SHAPE_MN*** and ***NDCA*** - provide sufficiently informative results and can be used in studies for conservation purposes.

- Establishing the relationships between the percentage coverage of arable land in agroecosystems (agricultural intensification) and the characteristics of the bird communities inhabiting them.

The field studies were conducted in the Sakar Mountain region, in .

60 sample sites - points with a buffer radius of 150 m. Habitats are categorized into three different types - arable land, pastures and pastures with tree/shrub cover. Bird counts were conducted twice within the breeding season.

At the community level, bird species richness and abundance increase with grassland and woody vegetation cover in grasslands, with a maximum value at 30% woody and shrub cover. Shannon index values show a negative relationship with the area of cropland and a positive relationship with the area of woody vegetation in grasslands.

At the guild level, farmland birds show a positive correlation with cropland cover and a negative one with tree and shrub cover, generalists and forest species show opposite relationships. At the species level, most species show a negative correlation with cropland area and a positive one with grassland and tree/shrub cover.

General remarks on the materials presented for the defense.

There is still to be desired regarding the formulation of the contributions in the doctoral thesis and the relationship between the abstract and the main text of the doctoral thesis. These remarks do not diminish the value of the two publications and the manuscript of the future article.

CONCLUSION

The doctoral student has achieved significant scientific results. The results are based on a large amount of data obtained during field research by the doctoral student.

Adequate modern tools were used in the data analysis. The doctoral student has fulfilled the requirements for the relevant number of credits in the training process.

I recommend to the Scientific Jury to award the scientific and educational degree "doctor" to doctoral student Silvia Peteva Dyulgerova.

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Prepared by:

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