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Biodiversity and floral evaluation in Central Albanian ancient olive orchards

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Abstract

Albania has a variety of ecological niches due to the convergence of Mediterranean and continental climates, resulting in multifarious vegetation. In this study, we have first identified 3 AOOs based on the analysis of information regarding flora composition on the sites and reviewing pertinent references, which have allowed analysis and characterization of the olive grove agro-ecosystems in terms of vegetation and biodiversity. After the desk analysis phase, different sites visited. In the 3 chosen AOOs, on-site samplings were taken during spring-summer and autumn. The different vegetation components were characterized on the basis of a targeted floristic analysis using the simplified Raunkiaer method to analyze the herbaceous species. The surveyed species were noted in a form, and the number of individuals surveyed for each species was counted. Based on the values thus acquired, the Diversity value was attributed by calculating Shannon indexes (H' E' and IR). In the Ndroq AOO, a total of 38 species were identified, belonging to 22 families. In the Marikaj AOO, a total of 33 species were identified, belonging to 17 families. In the Prezë AOO, a total of 33 species were identified, belonging to 17 families. For each sampling site, the Shannon Diversity Index (H), Shannon Equitability Index (E), and Species Richness Index (IR) were calculated, and combined values of indices were analyzed. Besides species found through the simplified Raunkiaer method within the borders of the AOOs, we identified a series of associated species, especially perennial, and edible.

Keywords: climate, ecosystem, flora, vegetation, biodiversity, Raunkiaer

1. Introduction

Ancient Olive Orchards (AOOs) cultivated following traditional environment-friendly practices play an important ecological role [2, 3]. They are semi-natural habitats that create structural conditions allowing the diversification of plant and animal species. The main objective of this study is to assess the floristic composition and biodiversity in the targeted AAOs. This detailed investigation will enable management authorities for biodiversity protection to build measures or conservation actions for species/ areas of regional interest. The data collected and related results will be useful to prepare future landscape and olive trees' protection strategies and national Albanian laws. The main objectives of this study are to first undertake the floristic analysis by investigating species presence and individuals' numbers, second, to assess the field and ecological infrastructure, and third, compare the level of biodiversity between AOOs based on the Shannon indexes (H' E'

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and IR). Widely, through this study, we aim to identify biodiversity and list flora species in AOOs areas to promote conservation of landscape with ancient olive trees and orchards.

2. Material and Method

The selection of AOOs was based on specific criteria such as, age of the orchard is between 550 and 1000 years old, diameter of individual olive trees, tree planting spacing between 6,5m – 9m x 10m – 13m, and total field area between 0.7ha and 0.8ha. Based on these criteria, three AOOs were chosen in Ndroq (41°16′N 19°39′E), Marikaj (41°22′N 19°37′E) and Preza (41°25'N 19°39'E'). After the selection of 3 AOOs, a Floristic Biodiversity Survey for the Sustainable Management of Century-old Olive Groves was used. Before assessing the floristic component, to give an overview of the landscape we made a general description of the survey area. First, we assessed and analyzed the presence of different vegetation structures with respect to the territorial area to be characterized, and then moved to the subsequent characterization of different vegetation components on the basis of targeted floristic analysis. Considering that the 3 AOOs belong to the category of cultivated plots, the sampling of the floristic component was the simplified Raunkiaer method [1] to analyze herbaceous species. The plots were almost regular in shape and 9 throws were used diagonal over the plot, using a square metal frame (point quadrats) with a side of 0.25 m. The vegetation cover of each AOO was sampled. Throws were made along the diagonals and 4 – 5 throws for each diagonal (4 + 5). The surveyed species were noted in a form and the number of individuals surveyed for each species was counted. Based on the values thus acquired, the Diversity value was attributed by calculating Shannon indexes (H' E' and IR) [5]. To make such scores comparable, the transformation method proposed by Van der Maaler was applied [4,6] so as to calculate Shannon's indexes from the abundance/dominance scores.

3. Results and Discussions

Through the simplified Raunkiaer method we compared the level of biodiversity between AOOs based on the Shannon indexes (H' E' and IR). In the AOO of Ndroq, a total of 38 species were identified, belonging to 22 families. *Brachypodium sylvaticum* was by far the most dominating species during the spring-summer sampling whilst *Lysimachia arvensis* (L.) U. Manns & A. Anderb. was dominating during autumn. The Shannon Diversity Index (**H**) was 2.90, Shannon Equitability Index (**E**) was 0.89 and Species Richness Index (**IR**) was 5.36 as combined values of indices for spring-summer and autumn samplings (Table 1). In the AOO of Marikaj, a total of 33 species were identified, belonging to 17 families. As expected [7], *Teucrium chamaedrys L.* was the most dominating species during the spring-summer sampling whilst *Trifolium repens* L. was dominating during autumn. The Shannon Diversity Index (**H**) was 2.74, Shannon Equitability Index (**E**) was 0.88 and Species Richness Index (**IR**) was 4.9 as combined values of indices for spring-summer and autumn samplings. In the AOO of Prezë, a total of 33 species were identified, belonging to 17 families. *Trifolium repens L.* was by far the most dominating species during both spring-summer and autumn samplings. The Shannon Diversity Index (**H**) was 2.55, Shannon Equitability Index (**E**) was 0.83 and Species Richness Index (**IR**) is 4.4 as combined values of indices for spring-summer and autumn samplings.

Table 1. Biodiversity indices for AAOs during spring-summer and autumn surveys

AOO	Sampling season	No. of species	Shannon Diversity Index (**H**)	Shannon Equitability Index (**E**)	Species Richness Index (**IR**)
Ndroq	Spring-summer	24	2.90	0.91	5.16
Ndroq	Autumn	28	2.90	0.87	5.56
Marikaj	Spring-summer	22	2.73	0.88	4.86
Marikaj	Autumn	24	2.75	0.87	4.94
Prezë	Spring-summer	24	2.76	0.87	5.01
Prezë	Autumn	20	2.33	0.78	3.70

4. Conclusions

Besides the species found through the simplified Raunkiaer method within the borders of the AOOs, there are a series of associated species, especially perennial ones, which are typically found in the olive groves of this region. We identified 45 species; 7 species were found in all three AOOs. There were 31 species of edibles.

5. References

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