ECOLOGICAL CHARACTERISTICS
OF SOME WEEDS FROM THE DOJRAN LAKE

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ABSTRACT. Qualitative analyses were done of weeds from the Dojran Lake. The ecological plant groups were determined by using (of) ecological indices according to the indicative values of some ecological factors of research habitat. Ecological analyses have been carried out on 20 weed species, which belong to 12 families. According to the life form of analyzed weed species in Dojran Lake, 13 species are hemicryptophytes and 7 species are therophytes. According to the ecological factor of humidity (F), all of the analyzed species have indicative value of F_5 and they belong to ecological group of hygrophytes, i.e. hydrohelophytes. The biggest number of analyzed species (55%) have indicative value of F_{5U}. According to the ecological factor of soil reaction (R), 55% of analyzed species have indicative value of R_3, i.e. they are neutrophyles. According to the ecological factor of nutrition (N), (the) most of the analyzed species have value of N_3 i.e. they are mesotrophic species. According to the ecological factor of light (L), the greatest number of analyzed species (60%) have indicative value of L_3 i.e. they are semisciophytes. According to the ecological factor of temperature (T), the analyzed plants belong to three ecological groups: mesotherms (30%), thermophiles (30%) and the intermediate group between mesotherms and thermophiles (40%).

Key words: Dojran Lake, ecological characteristics, ecological factor, indicative value, weeds.

INTRODUCTION

The Dojran Lake is the third largest natural lake in Macedonia and it enters the list of world's rarities due to its special features. Its rich and heterogeneously flora and fauna make it natural treasure not only for our state but for the world too.

Because of its geotectonic location and climate characteristics, Dojran Lake has a very rich biodiversity. The lake and its biodiversity are influenced by uncontrolled human activities and climatic inconveniences as well. Due to these main causes the result is rapid and large water level and volume decrease. Since 1988 the lake is facing (the) environmental catastrophe. According to the biologists over 140 species of flora and fauna have disappeared (POPOVSKA and BONACCI, 2008).

The dispersion of plant species, the density of their populations and their distribution are determined by the ecological factors. Ecological factors do not influence plants singly, but their effects in combination with other factors thus forming a complex combination. The biotope life conditions are rarely uniform due to some local differences with secondary role that are reason for different species distribution. The fortification of the ecological specifics of the plant species, present in the phytocenosis has a great meaning not just for a closer plant community characterization, but also for detailed notice of the relations in the biotopes as well as plant ecological and plant geographical status of the research area. These relations are noticeable by regular use of the indicative geobotanical knowledge, i.e. by applying the ecological indices of plant species for the most important ecological factors. Each plant species grows and exists in certain habitat conditions and in the same time it is more or less indicator of habitat conditions. By applying the indicative values of the ecological indices, it is possible to make concisely and comparatively plant characterization, as well as ecological characterization of the habitat.

MATERIALS AND METHODS

Qualitative analyses were done of weeds from the Dojran Lake. Their numerical and percent representation in certain ecological groups was determined according to the ecological factors of: humidity (F), soil reaction (R), nutrition (N), light (L) and temperature (T). The weed species were analyzed for each ecological factor, according to the values of the ecological indices, i.e. the indicative values from 1 to 5. For the ecological factor of humidity (F) were also used the following signs:

W - a sign that the soil is significantly moist during the rainy season, and in dry season soil becomes drier than it should be for this ecological index.

U - a sign for submerged plants that grow entirely below and up the water's surface. This sign is always used together with the ecological index of humidity - 5.

V – a sign for submerged plants that have floating plant organs. This sign is always used together with the ecological index of humidity - 5.

S – a sign that the plants have floating leaves at the water's surface. This sign is always used together with the ecological index of humidity - 5.

I – a sign for plants that grow in water and their leaves are above the water's surface. It is used together with the ecological index of humidity - 5w or rarely 4w.

The ecological analyses i.e. determination of ecological groups of species and indicative values of species, in relation to certain ecological factors, were done by using the following methods: ELLENBERG (1950-1986), LANDOLT (1977) and SOO (1980) (quoted by KOJIĆ and JANJIĆ 1994).

RESULTS AND DISCUSSION

By using qualitative analyses of the Dojran Lake 20 different weed species were determined belonging to 12 families. Analyses of their live forms showed that 13 species are hemicryptophytes and the rest (7 species) are therophytes (Tab. 1). KOJIĆ and JANJIĆ (1994) also described those species as fish-pond weeds and canal weeds. For some ecological factors in the habitat, some species show different indicative values of the ecologic indices (Tab. 2).

According to the ecological index of humidity (F), obtained results show(s) that all analyzed species have indicative value of F_5, and most of them (55%) have indicative value of F_{5U}. It means that they grow entirely below and up the water's surface. 15% of the analyzed species have indicative value of F_{5WI}, which means that they live in the habitat that is significantly moisture during the wet season and in dry period it is significantly drier than it should be for this ecological index (F_{5W}), or the plants grow in water and their leaves are above the water's surface (F_{5I}). 15% of

analyzed species have indicative value of F_{5V}, i.e. submerged plants that have some floating organs. Also, 15% of analyzed species have indicative value of F_{5S}, i.e. plants with floating leaves at water's surface. According to the indicative values of this ecological index (F_5), analyzed species are hygrophytes or hydrohelophytes (Tab. 2a). According to ŠUMATIĆ et al. (1999), amphibious and floating hydrophytes (aquatic plants whit aerial or floating leaves) have indicative value of F_6. Those authors also claim that submerged hydrophytes (aquatic plants that are entirely submerged) have indicative value of F_7.

According to the ecology factor of soil reaction i.e. soil acidity (R), analyzed species have indicative values of R_2, R_3, and R_4. The greatest number of the species (11 species i.e. 55% of analyzed species) have indicative value of R_3, which means that they are neutrophyles and always exist in neutral or weak acid soil (pH=4.5 – 7.5), and they can not be found in strong acid soil. 35% of analyzed species have indicative value of R_4 and they belong to the intermediate group between neutrophilic and alcaliphilic species. According to KOJIĆ and JANJIĆ (1994), plants that have indicative value of R_4, mostly exist in alkaline soil (pH = 5.5 – 8.0) and they cannot exist in strong acid soil. In same time those species are indicators for alkaline soil. The minor percentage of the analyzed species (10%) have indicative value of R_2, i.e. they are in the intermediate group between acidophilic and neutrophilic species (Tab. 2b). According to KOJIĆ and JANJIĆ (1994) these plants are mostly present in acid soil (pH = 3.5 – 5.5) and they can (be) rarely exist in neutral or alkaline soil. These species are indicators for acid soil.

According to the ecological factor of nutrition (N) (amount of nitrogen), analyzed species are characterized by these indicative values of ecological index: N_2, N_3, N_4, and N_5. Most of them, 55%, have indicative value of N_3, i.e. mesotrophic species that can be found in average nutrient-rich habitat. 25% of analyzed species have indicative value of N_4, and they belong to the intermediate group between mesotrophic and eutrophic species. These species are characteristic of nutrient-rich habitat, but they can (be) rarely exist in nutrient-pour habitat (KOJIĆ and JANJIĆ, 1994). Three plant species or 15% of analyzed species have indicative value of N_2 and they belong to the intermediate group between olygotrophic and mesotrophic species. They are typical of nutrient-pour habitat, i.e. they are indicator of unfertile habitat. Only one species, *Ceratophyllum demersum* L. has an indicative value of N_5 and it belongs to the ecology group of eutrophic (nitrophilic) species that live in nutrient-rich habitat (especially nitrogen). This group cannot exist in nutrient-poor habitat (Tab. 2c).

According to the ecology factor of light (L), analyzed species have the indicative values of L_3, L_4 and L_5. Most of them (60%) have indicative value of L3 i.e. semisciophytes. These plants can not exist if full daylight intensities are fewer than 10%. Seven species have ecology value of L_4, which means they belong to the intermediate group between sciophytes and heliophites, i.e. they mainly exist in full daylight intensities but also they can exist in the shady area. Only one species, *Salvinia natans* has indicative value of L_5. and it belongs to the ecological group of heliophites which means that it lives in condition of full daylight intensities, and it can exist in the shady area. These ecology groups are indicator for light condition (Tab. 2d).

According to the ecology factor of temperature (T), analyzed species have indicative values of T_3, T_4 and T_5. Analyzed species belong to three ecological groups: mesotherms (30%), thermophiles (30%) and intermediate group between mesotherms and thermophiles (40%) (Tab 2e).

PEJČINOVIĆ and KOJIĆ (1988), KOJIĆ (1973), and KOJIĆ et al. (2003) present their results of weed analyses refer to the using of ecological indices for the most important ecological factors of the habitat.

CONCLUSIONS

- 20 weed species were identified in the Dojran Lake, belonging to 12 families, described (such) as fish-pond weeds and canal weeds.

-According to the life form of analyzed weed species in Dojran Lake, 13 species are hemicryptophytes and 7 species are therophytes.

-According to the ecological factor of humidity (F), all of analyzed species are hygrophites i.e. hydrohelophytes.

-According to the ecological factor of soil reaction (R), 55% of analyzed species are neutrophyles, 10% are in the intermediate group between acidophilic and neutrophlic species, and 35 % are in the intermediate group between neutrophilic and alcaliphilic species.

- According to the ecological factor of nutrition (N), indicative values are variable from N_2 to N_5. The biggest number of analyzed species (55%) belong(s) to mesotrophic ecological group, and only one species belong to ecological group of eutrophic (nitrophilic) species.

-According to the ecological factor of light (L), 60 % of analyzed species are semisciophytes, 35% belong(s) to the intermediate group between semisciophytes and heliophites, and only one species belong(s) to the ecological group of heliophites.

-According to ecological factor of temperature (T), mesotherms and thermophyles are represented by 6 species (30%) respectively. 40% of analyzed species belong to the intermediate group between mesothems and thermophyles.

References:

[1] ČANAK, M., PARABUĆSKI, S., KOJIĆ, M. (1978): *Ilustrovana korovska flora Jugoslavije*. Matica srpska. Novi Sad.

[2] DOMAC, R. (1984): *Mala flora Hrvatska i susjednih podruchja*. Školska knjiga. Zagreb.

[3] *FLORA SR SRBIJE*: (1970) Tom 1. Srpska akademija nauka i umetnosti. Belgrad.

[4] KOJIĆ, M. (1973): Osnovne karakteristike višegodišnjih travnih korova i njihova zastupljenost u našim korovskim zajednicama. *Simpozium za klasesti pleveli*. Ohrid.

[5] KOJIĆ, M., GURIĆ, G., MITRIĆ, S., JANJIĆ, B. (2003): Ekološke, fitogeografske, fitofenološke karakteristike karovske flore voćnjaka sjevernozapadne Bosne. *Agroznanje*. God. IV, Br. 2. Banja Luka.

[6] KOJIĆ, M., JANJIĆ, V.(1994): *Osnovi herbologije*. Institut za istraživanja u poljoprivredi. Beograd.

[7] KOVAČEVIĆ, J. (1978): *Bonitiranje staništa pomoću biljka*. Zagreb.

[8] PEJČINOVIĆ, D., KOJIĆ, M. (1988): Primena ekoloških indexa za karakterizaciju korovske vegetacije Kosova. Treći kongres o korovima. Zbornik referata. Ohrid.

[9] POPOVSKA, C., BONACCI, O. (2008): Ecohydrology of Dojran Lake. Dangerous Pollutants (Xenobiotics) in Urban Water Cycle. *Springer Netherlands*. 151-160.

[10] ŠUMATIĆ, N., TODOROVIĆ, J., KOMLJENOVIĆ, I, MARKOVIĆ, M. (1999): *Atlas korova*. Banja Luka.