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Ranunculus sphaerospermus, Phragmites australis, Carex otrubae BİTKİLERİNİN VE GÖLMARMARA SUYUNUN BAZI EKOLOJİK ÖZELLİKLERİNİN MEVSİME BAĞLI OLARAK KARŞILAŞTIRILMASI

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Özet: Bu çalışmada Gölmarmara gölünde yaygın olarak bulunan *Ranunculus sphaerospermus* Boiss.& Blanche, *Phragmites australis* (Cav.)Trin.ex Steudel, *Carex otrubae* Podp ve göl suyunun bazı ekolojik özellikleri belirlenmiştir. Araştırma ilkbahar ve yaz aylarında yapılmıştır. Bu mevsimler bitkilerin çiçeklenme ve tohumlanma dönemleridir. Farklı dönemlerde alınan bitki ve su örneklerinin Azot, Fosfor ve Potasyum değerleri belirlenmiştir. Bitki örneklerinde yapılan çalışmada Nisan ayında Azot, Fosfor ve Potasyum değerleri yüksek bulunurken göl suyunda bu değerler haziran ayında yüksek kaydedilmiştir.

Anahtar Kelimeler: *Gölmarmara, Bitki, Ekoloji*

THE SEASONAL COMPARISON OF SOME ECOLOGICAL PROPERTIES OF *Ranunculus sphaerospermus, Phragmites australis, Carex otrubae* AND WATER OF LAKE GÖLMARMARA

Abstract: Lake water and freshwater plant samples were sampled from an area where *Ranunculus sphaerospermus* Boiss.& Blanche, *Phragmites australis* (Cav.)Trin.ex Steudel, *Carex otrubae* Podp. were found widespread in lake Gölmarmara. It shows ecological properties of these species. The research was made in spring and summer. These periods are the flowering and seedling season of the plants. The values of nitrogen, potassium and phosphorus in plant samples and lake water collected in different periods were determined. Nitrogen, potassium and phosphorus concentrations were higher in April in plant samples. But concentrations of these elements were higher in July in the lake water .

Key Words: *Lake Gölmarmara, Plant, Ecology*

1. INTRODUCTION

The plants living in the water are one of the characteristic criterian of aquatic ecosytems. These plants provide conditions for protection, sheltering and reproduction to other living organisms in the water. The distribution and growth of these plants are depend on many ecological factors like depth, temperature and amount of mineral materials in the water [5, 8] The necessary mineral uptake for growth and development of water plants is not only by roots but also by stem and leaf surfaces [5]. Chemical composition of these is similar to agricultural geophyte plants. But water plants depurative properties [4]. The stem of this plant is ca.3m, usually simple. The ligule is a dense fringe of hairs, 0.5 – 1 mm, when young also with a row of erect hairs to 1 cm on the dorsal surface. Leaf blades are contracted at the base 60x3 cm, tapering of fascicles. Spikelets are 3-6-flowered. Glumes are unequal, glabrous; lower ovate, acute, 3-4 mm. Lemma is narrowly lanceolate, long-pointed, 9-10 mm. Hairs on rachilla are 7-9 mm. Anthers are 1-1.7 mm [6].

Ranunculus sphaerospermus Boiss.& Blanche, is belongs to the *Ranunculaceae*. Many species of this family are used as ornamental plants and the source of an anesthetic [11]. *Ranunculus sphaerospermus* has submerged capillary leaves with spreading, numerous and rigid segments when removed from water. Peduncle in fruit is (3-)5-6 (-8 cm). Petals are broadly obovate, contiguous throughout anthesis. Recseptacle is hairy, somewhat elongated in fruit. Carpels are less than 1mm, somewhat rounded, glabrous or slightly hairy around the base of the style [7].

2. MATERIALS AND METHODS

Plant samples of *Ranunculus sphaerospermus*, *Phragmites australis*, *Carex otrubae* and water were taken in April and July 2002 from Gölmarmara lake. Plant samples were dried at °C 70 for 24 hours and then powdered in a hammer mill and ground in a Wiley mill so as to pass through a 20-mesh sieve. For the determination of phosphorus, potassium concentrations, sifted plant samples were homogenized in a mixture of nitric and perchloric acid solution (5:3) under heat about 1 hour and refluxed for 10 minutes. The homogenate was diluted to 100 ml. The analysis of these elements was carried out by standard methods [1]. Nitrogen analyses, homogenized with sulphuric acid and selenium, were determined by using a Kjeldahl apparatus. Some physical and

usually contain more water in their structures than other plants. Ratio of water in these plants is ca. 90 %, ratio of dry materials is about 3 % and 4 % [2]. In this study three fresh water plant species were examined.

Phragmites australis is belong to *Poaeceae* (*Gramineae*). Members of this family are used as grain plants [11]. *Phragmites australis* (Cav.) Trin. Ex Steudel has effective substance that are greatly used for treatment of some illnesses. The source of these is the rhizome, that has diuretic, idiaforetic and

Carex otrubae Podp. belongs to the *Cyperaceae.* Stems and leaves of these plants are used for making baskets, matting and paper. Additionally, rhizomes of these plants are used as animal feed [11]. The stem of *Carex otrubae* is 30-40 cm lenght, scarcely winged, with almost flat surfaces. Leaves are bright green, paler when dry. They are 4-12 mm broad. The ligule is ovate to lanceolate in shape. Inflorescence is branched at least at base. Femule glumes are ovate, acuminate or aristate. Utricles are greenish or orange-brown to dark brown [6].

Lake Gölmarmara is in the west of Turkey. The surface area of the lake is 65 km². Depth of the lake is 6m. *Ranunculus sphaerospermus* and *Phragmites australis* are found widespread in the lake. Kum stream, which flows to the lake, the water enrichmes nutrients for phytoplankton and aquatic source. In addition the Gölmarmara lake is nourished by Gediz river. The purpose of this study is to investigate the relationships between nutrient concentrations of the plants and the lake due to season.

chemical analyses of the lake water were determined by standard methods [3].The results were evaluated by using one-way ANOVA test on a software programme [10].

3. RESULTS AND DISCUSSION

The results of analysis of Gölmarmara lake water during April and July are shown in Table 1 and 2. Moreover concentrations of nitrogen, phosphorus and potassium (N, P, K) in lake water in April and July are shown in Table 3. phosphorus and potassium concentrations of the lake water are higher in July than that in April (Table 3).

Table 1. Results of analysis of lake water in April (2002)

Parameter		Parameter	
Depth (m)	6	Mg^{+2} (mg/lt)	47.54
Temperature (ºC)	20.1	Na+ (mg/lt)	33.52
pH	8.09	K+ (mg/lt)	10.97
Salinity (% 0.)	14	PO_4^{+3} (µg/lt)	0.37
Hardness (F ºS)	17.3	NH_4 - N (µg/lt)	60.2
Dissolved O_2 (mg/lt)	8.1	NH_3 (µg/lt)	4.23
Secchi- disc (cm)	5	NO_3 - N (µg/lt)	164.28
CI^- (mg/lt)	77.2	NO_2 - N (µg/lt)	9.98
Ca^{+2} (mg/lt)	31.87	Total nitrogen (µg/lt)	238.69

Table 2. Results of analysis of lake water in July (2002)

Parameter		Parameter	
Depth (m)	2.15	Mg^{+2} (mg/lt)	32.11
Temperature (ºC)	30.3	Na+ (mg/lt)	60.00
pH	8.06	K+ (mg/lt)	11.00
Salinity (% 0.)	18	PO_4^{+3} (µg/lt)	1.98
Hardness (F ºS)	18	NH_4 - N (µg/lt)	87.83
Disolved Oxygen (mg/lt)	7.9	NH_3 - (µg/lt)	21.46
Secchi- disc (cm)	22	NO_3 - N (µg/lt)	114.19
Cl^- (mg/lt)	98.98	NO_2 - N (µg/lt)	3.63
Ca^{+2} (mg/lt)	19.23	Total nitrogen (µg/lt)	227.11

Table 3. N, P and K (mg/lt) concentrations in lake Gölmarmara water in April and July

	Total of Nitrogen NH_4, NH_3, NO_3, NO_2 (mg/lt)	Phosphorus PO_4^{+3} (mg/lt)	Potassium K+ (mg/lt)
April	0.238	0.00037	10.97
July	0.227	0.0098	11.00

Element (Nitrogen, phosphorus and potassium) concentrations of plant species during April and July are shown in Table 4. In April, plant species have higher nitrogen, phosphorus and potassium concentrations as compared with in July Table 4.

Table 4. N, P and K (%) concentrations in plant samples in April and July

Plant Species	% N		% P		% K	
	*	**	*	**	*	**
Ranunculus sphaerospermus	3.15 / 1.77		0.004/0.002		0.008/0.0018	
Carex otrubae	3.55 / 1.84		0.006/0.002		0.004/0.003	
Phragmites australis	2.84 / 1.04		0.004/0.003		0.007/0.004	
* April			** July			

The mean differences between the two period (April and July) are shown in Table 5. As shown in Table 5, there is a significant difference at the 0.01 level in respect to nitrogen and there is a significant difference at the 0.05 level in respect to phosphorus (%) concentrations for both periods in all plant species. But there is no significant difference in respect to potassium.This result may also be due to the fact that potassium is very phloem-mobile ion, while nitrogen and phosphorus are rather phloem-immobile [12]. In Table 6 and 7 the comparison of N, P and K concentrations in plant and water during both periods (April

and July) were shown. As shown in Table 6 and 7 there no are significant differences in respect to amount of nitrogen, phosphorus, potassium in the plants and the water in April and July.

Table 5. The comparison of N, P, K (%) mean concentrations of all plant samples in April and July

Element	Mean º / º º	Standard deviation º / º º	F- ratio	Probability	Significance
N	3.18/1.55	0.35/0.44	24.68	0.008	**
P	0.004/0.002	0.001/0.005	9.80	0.03	*
K	0.006/0.002	0.002/0.001	6.25	0.06	NS
º April	º º July	NS: Not significant		*P<.05	**P<.01

Table 6. The comparison of N, P, K concentrations of plant samples and water in April

Element	Mean º / º º	Standard deviation º / º º	F- ratio	Probability	Significance
N	3.67/3.18	6.16/0.35	0.02	0.8	NS
P	3.67/0.05	6.16/0.01	1.06	0.3	NS
K	3.67/0.06	6.16/0.002	1.06	0.3	NS
º Water	º º Plant	NS: Not significant		*P<.05	**P<.01

Table 7. The comparison of N, P, K concentrations of plant samples and water in July

Element	Mean º ºº	Standard deviation º ºº	F- ratio	Probability	Significance
N	3.74/1.55	6.28/0.44	0.36	0.5	NS
P	3.74/0.01	6.28/0.14	1.06	0.3	NS
K	3.74/0.003	6.128/0.001	1.06	0.3	NS
º Water	ºº Plant	NS: Not significant		*P<.05	**P<.01

The interelement relationships nutrient in of plants in Table 8 & 9 show that, except P-K, there are close relationships between N-K & N-P in the plant in April and July. Nitrogen has an important role in plant biochemistry so it has close relationships with other elements [12]. High close relationships between N-K, N-P can be explained in this way.

Table 8. The comparison of element pairs in plant samples in April

Element	Mean	Standard deviation	F- ratio	Probability	Significance
N-P	3.18/0.004	0.35/0.001	238.74	0.000	**
N-K	3.18/0.006	0.35/0.002	238.48	0.000	**
P-K	0.004/0.006	0.001/0.002	1.47	0.292	NS
		NS: Not significant		*P<.05	**P<.01

Table 9. The comparison of element pairs in plant samples in July

Table 9. The comparison of element pairs in plant samples in July Element	Mean	Standard deviation	F- ratio	Probability	Significance
N-P	1.55/0.017	0.44/0.014	35.86	0.004	**
N-K	1.55/0.002	0.44/0.001	36.48	0.004	**
P-K	0.017/0.0029	0.014/0.0011	3.07	0.155	NS

NS: Not significant *P<.05 **P<.01

5. CONCLUSIONS

In our study, it was observed that the plants have higher nutrient (NPK) concentrations in April than in July (Table 4). This may be due to the dense physiological activity in April. Little (1979) indicated that nitrogen concentrations in *Myriohyllum* species are higher in spring than summer. Our results support that result. In contrary nutrient concentrations in the water were lower during April than during July (Table 1 & 2).This may be due to the uptake by plants during April.

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