

Vegetation of the cisterns/watering-places of the island of Brač (Dalmatia, Croatia)

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Introduction

The island of Brač (Fig. 1) is a middle Dalmatian island (Crkvenčić et al. 1974). It is 36 km long (Rubić 1952) and 12 km wide, and, with an area of 395 km², third largest Adriatic island. At the same time it is the highest island in the Adriatic, with the elevation of 778 m above the sea level (Vidova gora mountain). Phytogeographically, the island of Brač belongs to the middle evergreen area (eumediterranean and submediterranean zone) of the Adriatic province of the Mediterranean vegetational region (Horvatić 1963). People used to build cisterns/watering-places for domestic animals all over the island long ago, due to arid conditions of the Mediterranean climate. After the water supply system was built these cisterns/watering-places were neglected and transformed into larger or smaller ponds (some of them run dry temporarily). Such human impact drove to increase of vegetational and floristic diversity of this island.

Results and discussion

There are three cisterns/watering-places on the first location near the settlement of Supetar (eumediterranean zone), which belong to the *Erico-Cistetum cretici* H-ić 1958 community. Cisterns/watering-places are situated on 45, 50 and 75 meters above sea level, northern exposition. The largest one, named Stubal, is on 75 meters above sea level. According to Nastić et al. 1957/58 cisterns are on the geological basis of light brown and white limestones (eocen). Another location (boundary area between eumediterranean and submediterranean zone) is cistern/watering-place near Nerežišća, which belongs to the *Quercu ilicis-Pinetum dalmaticae* Trinajstić 1986. community, on 316 meters above sea level, northern exposition. According to Nastić et al. 1957/58 it is on the geological basis of dolomitized limestones (senon). The third location is Trolokve area with three cisterns/watering-places, situated in the plateau of protected area Vidova gora (submediterranean zone). Those cisterns belong to the *Erico manipuliflorae-Pinetum dalmaticae* Trinajstić 1986 community. The hight above sea level is 678 meters and, according to Nastić et al. 1957/58, the geological basis consists of light brown limestones and dolomites (turon). On those locations (according to DZZP 2009) following plant communities are recorded:

Class *POTAMETEA* R. Tx. et Preising 1942
Order *Potametalia* W. Koch 1926
Alliance *Potamion eurosibiricum* W. Koch 1926
1. Ass. *Potameto-Najadetum* Horvatić et Micevski 1960
2. Ass. *Potametum natantis* Lkšić. et Pavlović 1976

Class *PHRAGMITO-MAGNOCARICETEA* Klika in Klika et Novák 1941
Order *Phragmitetalia* W. Koch 1926
Alliance *Phragmition* W. Koch 1926
3. Ass. *Typhetum angustifoliae* Pignatti 1953

Table 1. Vegetation of the cisterns/watering places of the island of Brač

Associations	1	2	3	4
Number of phytocenological releves	6	6	6	6
<i>Potamogeton natans</i> L. (Fig. 3)	.	V	.	.
<i>Potamogeton crispus</i> L.	V	.	.	.
<i>Potamogeton pusillus</i> L.	.	II	II	.
<i>Myriophyllum verticillatum</i> L.	V	.	.	.
<i>Zannichelia palustris</i> L.	.	V	IV	.
<i>Typha latifolia</i> L.	.	.	V	.
<i>Eleocharis palustris</i> (L.) Roem. et Schult.	.	.	.	V
<i>Juncus bufonius</i> L.	II	.	III	IV
<i>Juncus compressus</i> Jacq.	I	.	.	III
<i>Juncus acutiflorus</i> Ehrh. ex Hoffm.	.	.	.	I
<i>Ranunculus trichophyllus</i> Chaix in Vill. (Fig. 4)	IV	.	II	.
<i>Ranunculus aquatilis</i> L.	I	.	.	.
<i>Ranunculus chius</i> DC.	.	.	I	.
<i>Ranunculus sardous</i> Crantz	V	.	.	.
<i>Epilobium tetragonum</i> L.	.	.	III	I
<i>Lythrum hyssopifolia</i> L.	.	.	III	.
<i>Rorippa sylvestris</i> (L.) Besser	.	.	.	II

1. *Potameto-Najadetum* (Trolokve-Vidova Gora), 2. *Potametum natantis* (Stubal- Supetar), 3. *Typhetum angustifoliae* (Supetar: two cisterns/watering-places), 4. *Cyperetum flavescentis* (Nerežišća)

Material and methods

The research area consists of three locations (Fig. 2) of cisterns/watering-places. The first one is the location of three cisterns/watering-places in the area of the settlement of Supetar. Second one is a cistern/watering-place near the Nerežišća village, and the third one is the Trolokve area with three cisterns/watering-places, in the protected area of the Vidova gora mountain. Floristic and vegetational researches were carried out during 2014 in all seasons. Vegetational research was carried out in accordance to the Zürich-Montpellier school (Braun-Blanquet 1964). Six phytocenological records (4 April, 15 May, 11 June, 10 July, 7 August and 4 September 2014) were carried out on each location, and the results are presented in the synthetic table. The determination of the taxa was carried out in accordance to the standard floristic works: Tutin et al. (1964-1980), Tutin et al. (1993), Pignatti (1982), Domac (1994), and the list of names is adjusted with the data base Flora Croatica (Nikolić 2015).

Class *ISÖETO-NANOJUNCETEA* Br.-Bl. et R. Tx. ex Westhoff et al. 1956.
Order *Cyperetalia fusci* Pietsch 1963
Alliance *Nanocyperion* W. Koch ex Libbert 1932
4. Ass. *Cyperetum flavescentis* W. Koch 1926 em. Aichinger 1933

Synthesis of phytocenological releves for all plant communities are shown in Tab. 1.

During the research of vegetation and flora of cisterns/watering-places (as well as flora of the immediate surroundings) on the island of Brač, following taxa were recorded for the first time (compare Ruščić 2010):
Potamogeton crispus L.
Potamogeton natans L.
Zannichelia palustris L.
Eleocharis palustris (L.) Roem. et Schult.
Juncus bufonius L.
Juncus compressus Jacq.
Juncus acutiflorus Ehrh. ex Hoffm.
Ranunculus aquatilis L.
Ranunculus chius DC.
Lythrum hyssopifolia L.
Ornithogalum gussonei Ten.
Valerianella coronata (L.) DC.
Allium pallens L. ssp. *tenuiflorum* (Ten.) Stearn
Crepis sancta (L.) Babč.
Fumana ericifolia Wallr.
Tragopogon balcanicus Velen.
Sedum caespitosum (Cav.) DC.
Medicago dolia Carmign.
Total number of taxa of the vascular plants registered for the flora of the island of Brač is 1144 so far.



Supetar 1



Supetar 2



Supetar 3



Nerežišća



Figure 2. Locations of cisterns/watering-places of the island of Brač (Dalmatia, Croatia)



Vidova gora 1



Vidova gora 2



Vidova gora 3



Figure 3. *Potamogeton natans* L. from cisterns/watering - places Supetar 3



Figure 4. *Ranunculus trichophyllus* Chaix in Vill. from cisterns/watering-places Vidova gora 3

Conclusion

Vegetational and floristic researches of cisterns/watering-places was carried out during 2014 in three locations on the island of Brač (Dalmatia, Croatia). Cisterns/watering-places are artificial, except one watering-place on Vidova gora mountain (Trolokve). These habitats were completely neglected before so that floristic and vegetational knowledge on diversity of the island of Brač were increased by our study. Following phytosociological method on the following plant communities were detected in the explored locations: Ass. *Potameto-Najadetum* Horvatić et Micevski 1960, Ass. *Potametum natantis* Lkšić. et Pavlović 1976, Ass. *Typhetum angustifoliae* Pignatti 1953 and Ass. *Cyperetum flavescentis* W. Koch 1926 em. Aichinger 1933. Moreover eighteen taxa of vascular plants were recorded for the first time for the flora of the island of Brač. Total number of taxa registered for the flora of the island of Brač is 1144.