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Short Communication

WOLFFIA GLOBOSA (ROXBURGH) HARTOG ET PLAS (LEMNACEAE):

A NEW SPECIES IN BULGARIAN FLORA

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Abstract

Wolffia globosa is one of the smallest flowering plants on the Earth. We discovered *Wolffia globosa* in a vegetation season unusual for our latitudes – the winter of 2010. The species was discovered in a little pond near the town of Hisar – Plovdiv district, Bulgaria. The plant was together with two other species of Lemnaceae - *Lemna gibba* and *L. minuta* in a community with the following aquatic plants: *Typha latifolia*, *Ranunculus aquatilis*, *Alisma plantago-aquatica* and algae - *Spirogyra* sp. ster., *Tribonema* sp.

Keywords: distribution, invasive species, new data, *Wolffia globosa*

INTRODUCTION

Wolffia is a genus, which includes the smallest flowering plants on the Earth. *Wolffia* species are rootless free-floating thalli, green or yellow-green. *Wolffia* is a genus which includes up to 11 species: *W. angusta* Landolt; *W. arrhiza* (L.) Horchel ex Wimm.; *W. australiana* (Benth.) Hartog et Plas; *W. borealis* (Engelm. ex Hegelm.) Landolt; *W. brasiliensis* Wedd.; *W. columbiana* H. Karst. *W. cylindracea* Hegelm.; *W. elongata* Landolt; *W. globosa* (Roxb.) Hartog et Plas; *W. microscopica* (Griff.) Kurz; *W. neglecta* Landolt^{1,2}. *W. globosa* is native to Southeast Asia - India, Malaysia, Philippines, Thailand. It is probably introduced into North America - United States (Florida, California), South America - Ecuador and Columbia, Hawaiian Islands, Africa^{3,4}. Relatively strong invasiveness of *Wolffia globosa* can probably be explained by the fact that it belongs to a group of species commonly cultivated in Asia, North and South America: *Wolffia globosa* in Asia, North and South America; *W. angusta* in Asia to Australia; *W. arrhiza* in Europe, Africa, South America; *W. welwitschia* in Africa, Central and South America⁵. The plant is known as "khai-nam" in Thailand. The word means "water eggs" (the *Wolffia* plants resemble millions of tiny green eggs). *Wolffia globosa* is the edible in Thailand. It has been harvested for food for many generations in Burma and Laos. *Wolffia globosa* contains about 40 percent protein (dry weight), it is the same percentage of protein as soy beans contain. Like legumes, *Wolffia* contains high levels of all essential amino acids except methionine⁶. Species of the genus *Wolffia* are important for biological self-purification of water⁷. In Bulgaria the genus is presented only with one species - *Wolffia arrhiza* which is widely spread around the world. *W. arrhiza* grows in mesotrophic to eutrophic quiet water in temperate to subtropical regions with relatively mild winters; 0-800 m; it can be found in Europe, Asia, Africa, it is also introduced in America - California and Brasil⁸. The presence

of *W. arrhiza* was first recorded in Bulgaria at the beginning of last century⁹. The aim of this article is to describe the morphological characteristics of *Wolffia globosa* (Roxb.) Hartog et Plas 1970 (= *Lemna globosa* Roxburg, 1832) which is a new found species for the flora of Bulgaria.

MATERIALS AND METHOD

Wolffia globosa collected during the period 2010-2013 from a little pond near the town of Hisar – Plovdiv district (42°29.010'N, 024°43.432'E), Bulgaria. The species are determined by Flora of North America¹⁰. The pictures of *Wolffia globosa* was taken with a microscope Leica DM 2500 with a digital camera Leica DFC 295. Herbarium materials from *Wolffia globosa* are presented in the herbarium of the Agricultural University – Plovdiv, Bulgaria in numbers SOA - 059712, 059713, 059714.

Figure 1: *Wolffia globosa*

RESULTS AND DISCUSSION

We discovered *Wolffia globosa* in a vegetation season unusual for our latitudes – the winter of 2010 (Figure 1). The species was found in little pond near the town of Hisar – Plovdiv district. The plant was together with two other species of Lemnaceae - *Lemna gibba* and *L. minuta* in a community with the following aquatic plants: *Typha latifolia*, *Ranunculus aquatilis*, *Alisma plantago-aquatica* and algae - *Spirogyra* sp. ster., *Tribonema* sp. The species evolution was traced in the following 2011 monthly (March to December). During the warm months (March-September) *Wolffia globosa* was shaping individual spots among the other two species from Lemnaceae - *L. gibba* and *L. minuta*. In our last visit on 12.01.2013 the swamp was frozen (covered with a thin icy crust). Nevertheless the species was still in a good condition – life (replicating vegetative mass) with these two species from Lemnaceae, but independent (pure) spots were not formed. The population from Hisar has the following characteristics: fronds broadly ovate, spherical to oblong - 0,4 - 0,8 mm long 0,3 - 0,5 mm wide and 0,4 - 0,5 mm deep; lower submersed plant body is transparent green; dorsal surface is green, without brown epidermal pigment cells (pitted with 8; 10; 8; 15; 4; 12; 4; 13; 7; 11; 8; 10; 8; 7; 9; 7; 9; stomata). Daughter fronds produced in a funnel-shaped at basal end budding pouch with a circular opening, often with distinct collar of elongated cells at junction with daughter plant. Solitary or 2 connected. Finding *Wolffia globosa* in our country in cold water during the winter, even in freezing water (under the ice crust) in healthy population is an indicator of greater tolerance to the temperature factor.

CONCLUSION

For the first time a species *Wolffia globosa* was discovered in a little pond in Bulgaria. The literature review shows that this locality of *Wolffia globosa* is the first one for the East Europe.

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