**Short Communication**

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

**A NEW SPECIES IN BULGARIAN FLORA**

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<th><em>Correspondence</em></th>
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<td>Velichkova Katya</td>
<td>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 ster., Tribonema sp.</td>
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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 Landolt¹−². 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, Africa³−⁴. 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.

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**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.

REFERENCES


Source of support: Nil; Conflict of interest: None Declared