

THE GENUS *SPARGANIUM* (TYPHACEAE) IN IRAN; TWO NEW ADDITIONS FOR THE FLORA IRANICA AREA

A. Naqinezhad & M. Bidarlord

Received 2014.03.04; accepted for publication 2015.04.12

Naqinezhad, A. & Bidarlord, M. 2015. 06. 30: The genus *Sparganium* (Typhaceae) in Iran, two new additions for the Flora Iranica area. *Iran J. Bot.* 21 (1): 30-34. Tehran.

Sparganium L. (Typhaceae) includes five taxa in the aquatic flora of Iran. *Sparganium emersum* and *S. natans* are reported here for the first time in Iran and Flora Iranica area. These species were collected in two high mountain wetlands in Ardabil province. A detailed determination key for five Iranian *Sparganium* taxa is given.

Alireza Naqinezhad (correspondence <anaqinezhad@gmail.com>), Department of Biology, Faculty of Basic Sciences, University of Mazandaran, Babolsar, Mazandaran, Iran.- Mahmoud Bidarlord, Department of Plant Biology, Faculty of Biological Sciences, University of Kharazmi, Tehran, Iran.

Key words: New records; *Sparganium*; Neor Lake; Ardabil wetlands; Iran.

جنس *Sparganium* در ایران؛ دو گزارش جدید برای منطقه فلورا ایرانیکا

علیرضا نقی نژاد، دانشیار گروه زیست شناسی، دانشکده علوم پایه، دانشگاه مازندران، بابلسر

محمود بیدار لرد، دانشجوی دکتری، گروه زیست‌شناسی گیاهی، دانشکده علوم زیستی، دانشگاه خوارزمی، تهران

جنس *Sparganium* (Typhaceae) شامل پنج آرایه مختلف آبی در فلور ایران می باشد. دو گونه *Sparganium emersum* و *S. natans* برای اولین بار از ایران و منطقه فلورا ایرانیکا گزارش می‌گردند. این گونه ها در دو مانداب کوهستانی در استان اردبیل جمع‌آوری شده‌اند. در ادامه، کلید دقیقی برای شناسایی پنج آرایه موجود از جنس *Sparganium* در ایران ارائه می‌گردد.

INTRODUCTION

Sparganium L. (Typhaceae) is a genus of aquatic monocots containing \pm 14 species, with flowers aggregated in unisexual, spherical heads, and habit ranging from floating to emergent (Sulman et al., 2013). This genus has already been represented by three species in the Flora Iranica (Riedl 1969) of which two species, *S. erectum* L. and *S. neglectum* Beeby were reported from different parts of Iran. To these species, one new taxon (*S. erectum* subsp. *mazandaranicum* Ponert) was then added by Ponert (1972). He also considered all mentioned taxa within *S. erectum* including different subspecies. Most floras followed subspecies concept within *S. erectum* (Uotila 1984; Cook 1980; Townsend 1985), except the Flora of USSR (Yuzepchuk 1934). A survey on all available literatures concerning this genus indicates that there are no other taxa in the genus in Iran. Boissier (1881) reported only one species *S. ramosum* Hudson (= *S. erectum*) without any subspecies from north of Iran. This species was also reported by Parsa in the Flora of

Iran (Parsa 1950).

During some field trips to mountainous areas of Ardabil Province, two species of the genus *Sparganium* were collected from some aquatic mountain wetlands and determined under *S. emersum* and *S. natans*. In this paper we report these two as new records for the flora of Iran. Furthermore a new identification key for the five taxa of the genus *Sparganium* in Iran is given.

MATERIALS AND METHODS

During a field survey for determination of wetland plants on the road of Ardabil to Hashtpar (Talesh), large numbers of aquatic plants were collected with flower and fruits. The collected specimens were crosschecked with various Sparganiaceae and Typhaceae accounts given in the relevant literatures (Cook 1961 in *Sparganium* of Britain; Riedl 1969 in Flora Iranica, Yuzepchuk 1934 in Flora of USSR; Uotila 1984 in Flora of Turkey; Cook 1980 in Flora Europaea; Townsend 1985 in Flora of Iraq and eFloras 2008 for flora of China, Pakistan and North America).

All characters of the specimens were surveyed by stereomicroscope (Nikon: SMZ-1). The materials recorded here are deposited in the Mazandaran University Herbarium.

RESULTS AND DISCUSSION

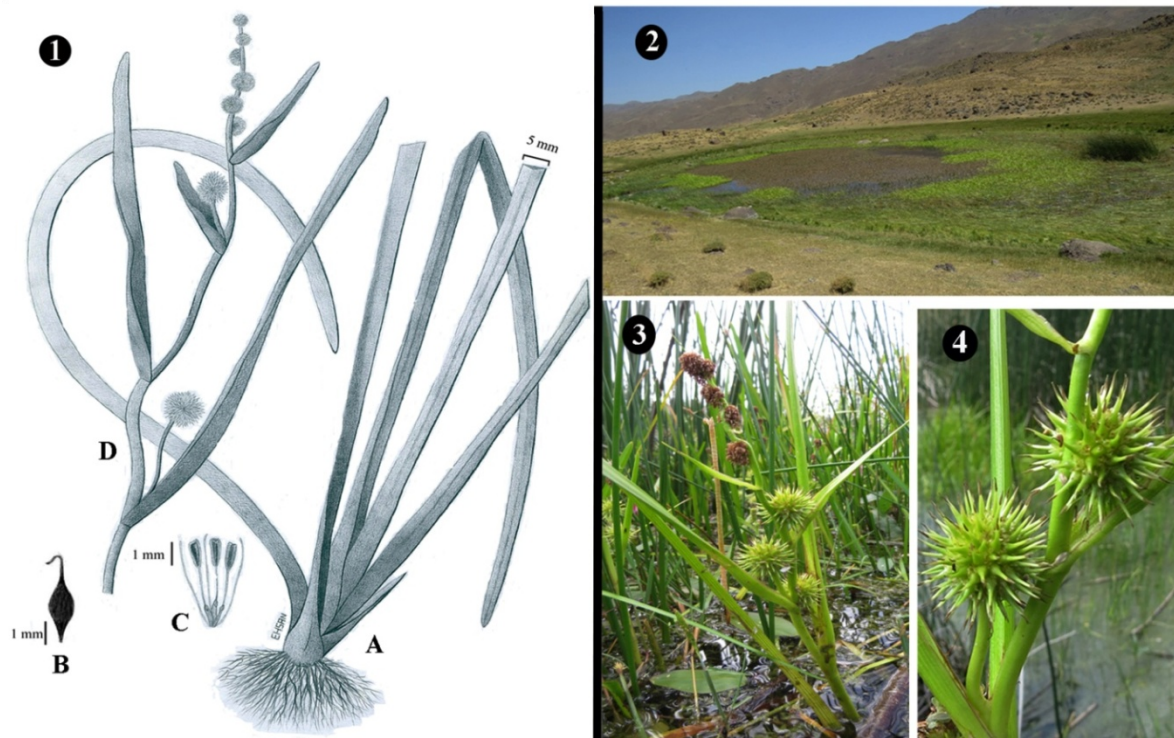
Sparganium emersum Rehmann, Verh. Naturf. Ver. Brünn 10:80 (1871).

= *S. simplex* Hudson, *S. diversifolium* Graebner

Examined specimen: Ardabil province, 43 km on the road of Ardabil to Khalkhal, near to Neor lake, 37° 57' 42" N, 48° 33' 10" E, 2553 m a.s.l., A. Naqinezhad & M. Bidarlord, 07.2013. 3000- Herbarium of

Mazandaran University. The same area, Bidarlord, 09.2014. 6500- Herbarium of Mazandaran University.

Stem 20-70 cm, erect or floating. Leaves mostly floating, 4-7 mm broad, keeled, triangular in transverse section. Inflorescence simple. Lower bracts longer than the inflorescence, erect. Female capitula 2-4, remote, lower ones pedunculate, peduncle (at least in upper ones) united to the main axis. Male capitula 3-6, remote. Anthers 1-1.5 mm. Fruit 4-5 mm, brown or green, ellipsoid, constricted at the middle, long stipitate, stipe 2.5-3.5 mm, gradually tapering toward apex; style 3-4 mm (figs. 1- 4).



Figs. 1-4. *Sparganium emersum*. A, habit; B, female flower; C, male flower. 2, Habitat of the plants. 3, Inflorescence emerged from water surface. 4, Female spikes with fruits.

Habitat: *Sparganium emersum* was collected in an aquatic wetland with more than 1m depth. This species is accompanied by other wetland species such as *Batrachium trichophyllum*, *Lemna trisulca*, *Butomus umbellatus*, *Hippuris vulgaris*, *Alisma plantago-aquatica*, *Potamogeton nodosus*, *P. crispus*, *Schoenoplectus lacustris*, *Polygonum amphibium*, *Eleocharis palustris*, *Ranunculus sceleratus* and *Potentilla anserina* in the studied wetlands (fig. 2). In the other countries, it grows in shallow pools and

streams or wet soils in higher altitudes (Uotila 1984). This plant occasionally penetrates into deeper waters where it produces submerged forms with floating leaves (Yuzepchuk 1934).

Sparganium emersum is distributed in N. temperate regions of Europe, Asia and N. America. The nearest reports of this species to Iran are Turkey and Transcaucasus area (Boissier 1881; Uotila 1984), (fig. 6).

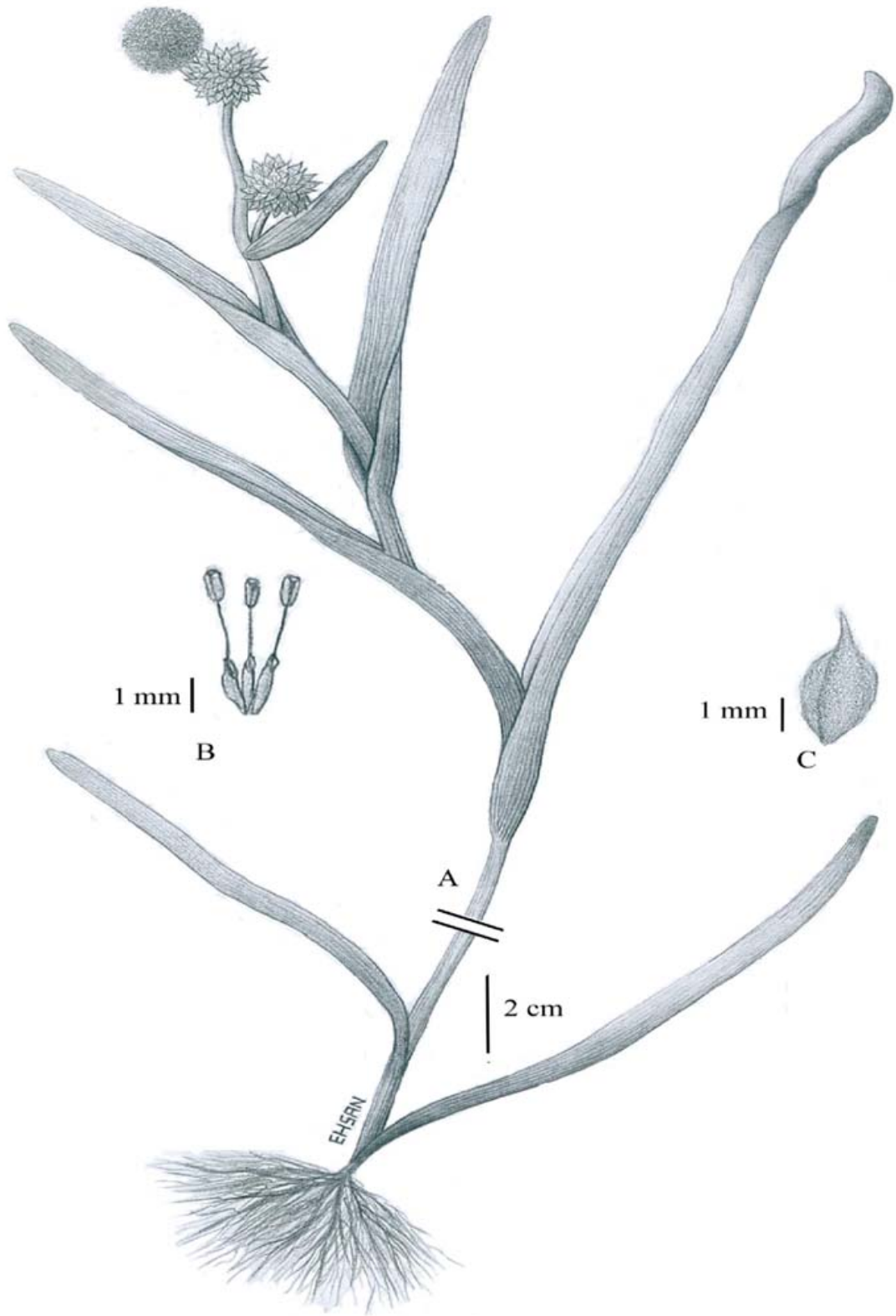


Fig. 5. *Sparganium natans*, A, habit; B, stamens; C, fruit.

Sparganium natans L. Sp. Pl. 2: 971 (1753).

= *S. minimum* Wallroth.

Examined specimen: Ardabil province, 43 km on the road of Ardabil to Khalkhal, Neor lake to Karvansaray-e Abbasi, 37° 55' 02" N, 048° 33' 10" E, 2620 m a.s.l., A. Naqinezhad & M. Bidarlord, 2999-Herbarium of Mazandaran University.

Stem 30-40 cm, floating. Leaves floating, 3-6 mm broad, flat, light green, often translucent. Inflorescence simple; female capitula 2-3, sessile or lowermost pedicellate, always on leaf axils, remote. Male capitula usually 1. Anthers less than 1 mm. Fruit 4-5 mm, sessile or with short stipe up to 1mm long, slightly obovoid or fusiform; style 1 mm (fig. 5).

Habitat: *Sparganium natans* was collected in an aquatic wetland site near to Neor Lake with 40-50 cm depth (fig. 1). This species is accompanied with other wetland species such as *Potamogeton nodosus*, *P. pectinatus*, *Lemna minor*, *Hippuris vulgaris*, *Eleocharis palustris*, and *Carex* sp. in the studied wetlands. In Turkey, this plant grows in marshes in the altitudes higher than 1700 m (Uotila 1984).

Sparganium natans is distributed in temperate Eurasia and N. America. Caucasus (E Transcaucasus) and N.E. Anatolia are the adjacent localities of this species (fig. 6).

Determination key for *Sparganium* species of Iran

1. Perianth segments thick, with dark brown to black

apex, inflorescence usually much branched, stem erect; leaves entirely areal, sharply keeled; male capitules on lateral branches; seed with 6-10 longitudinal ridges; fruits 5-10 x 2.5-8 mm. subgen. *Sparganium*

2 (*S. erectum*)

-Perianth segments thin, translucent, uniformly light brown; inflorescence simple; stems often floating or slightly prostrate in wate; all male capitules on the main axis; fruits not more than 5 x 2 mm; seeds smooth. subgen. *Xanthosparganium* 4

2. Fruit 5-10 mm (excluding style), 4-6 (-8) mm wide (at shoulder), obpyramidal with distinct shoulder near to style base; the upper part of fruit flattened, dull, dark brown or black; the lower part shiny, light brown, distinctly angled in transverse

S. erectum subsp. *erectum*

- Characters are different from the upper 3

3. Fruit ellipsoid, 6-10 x 3-4 mm, peduncle sessile or subsessile, yellowish to light brown, shiny, terete, rotundate at apex, male capitules usually 12-20

S. erectum subsp. *neglectum*

- Fruits ellipsoid, 7-9 x 3-5 mm, costate-sulcate at apex; peduncle 1-2 mm; male capitules more than 10

S. erectum subsp. *mazanderanicum*

4. Leaves keeled beneath (\pm triangular in transverse section), floating or erect; male capitules 3-6, remote; style long (3-4 mm)

S. emersum

- Leaves \pm flat, translucent, usually floating, male capitule usually solitary, style short (c. 1 mm)

S. natans

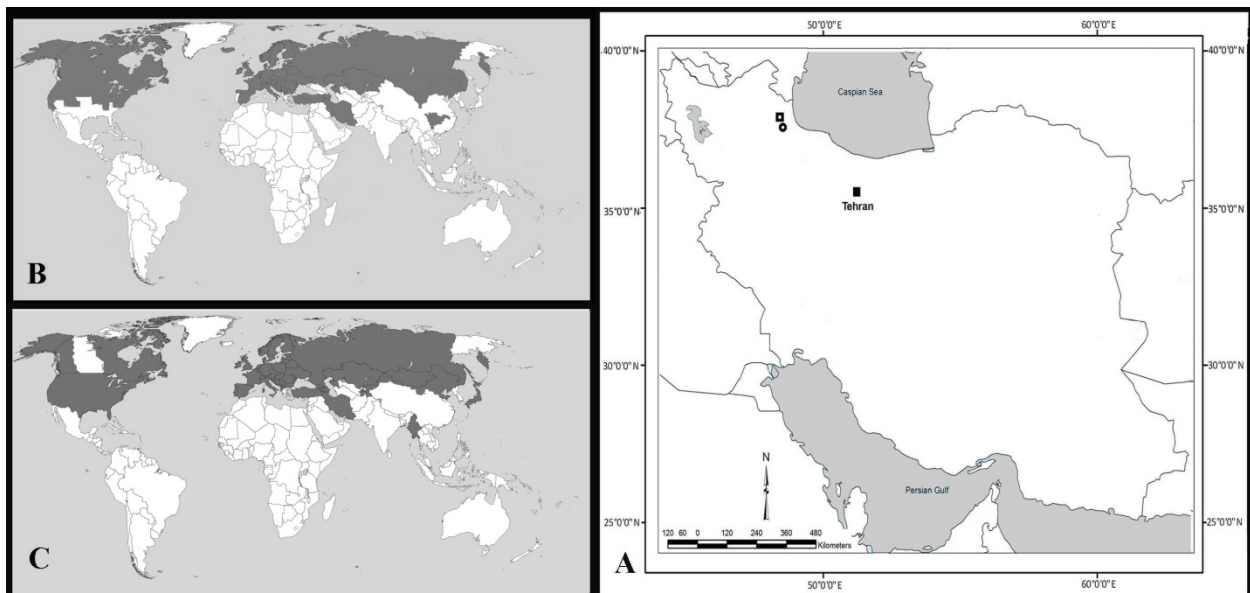


Fig. 6. Map of distribution of *Sparganium emersum* (■) and *S. natans* (●) in Iran (A) and their general distributions *S. natans* (B) and *S. emersum* (C), after eMonocot home (<http://www.emonocot.org>).

ACKNOWLEDGEMENTS

This research work has been supported by a research grant from the University of Mazandaran (Grant No. 6553/91/33). We wish to thank Mr. S. E. Moussavi for the line-drawings.

REFERENCES

- Boissier, E. 1881: *Flora Orientalis*, vol. 5. -Genevae et Basileae
- Cook, C.D.K. 1961: *Sparganium* in Britain. -*Watsonia* 5: 1-10.
- Cook, C.D.K. 1980: *Sparganium*. Pp. 274-275. in: Tutin, T.G., Heywood, V.H., Burges, N.A., Valentine, D.H., Walters, S.M. & Webb, D.A. (eds.), *Flora Europaea*, vol. 5.- Cambridge: Cambridge Univ. Press.
- eFloras 2008: Published on the Internet <http://www.efloras.org> [accessed 15 January 2014] Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, Cambridge, MA.
- Parsa, A. 1950: *Flore de l'Iran*, vol. 5. -Publication du Ministre d'Education, Teheran.
- Ponert, J. 1972: New subspecies of *Sparganium erectum* L. from Iran. -*Folia Geobotanica Phytotaxa* 7: 309-312.
- Riedl, H. 1969: Sparganiaceae. in: Rechinger K.H. (ed.) *Flora Iranica*, 59:1-4.- Akad. Druck- u. Verlagsanstalt, Graz.
- Sulman, J. D., Drew, B. T., Drummond, C., Hayasaka, E., & Sytsma, K. J. 2013: Systematics, biogeography and character evolution of *Sparganium* (Typhaceae): Diversification of a widespread, aquatic lineage. -*American Journal of Botany*, 100: 2023-2039.
- Townsend, C.C. 1985: Sparganiaceae Pp. 208-211. In Townsend C.C, Guest, E. (eds.) *Flora of Iraq*, vol. 8.- Ministry of Agriculture & Agrarian Reform Republic of Iraq, Baghdad.
- Uotila, P. 1984: *Sparganium* P.p. 555-558. In Davis, P.H. (ed.) *Flora of Turkey and the East Aegean Islands*. vol. 8. -Edinburgh University Press, Edinburgh.
- Yuzepchuk, S.V. 1934: *Sparganium*. Pp. 170-180 In Komarov, V. L. (ed.), *Flora of the USSR*, vol. 1. Izdatel'stvo.- -Akademii Nauk SSSR, Leningrad (translated to English in 1968 by Israel Program for Scientific Translations, Jerusalem).