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NEW RECORDS OF THE DWARF AND TALL *SAGITTARIA CHILENSIS* ENGELMANN (*ALISMATACEAE)* FROM THE EUPHRATES RIVER, BASRAH PROVINCE, IRAQ, WITH NOTES ON *S. SAGITTIPHOLIA* L. AND *S. GRAMINEA* MICHAUX FROM THE REGION

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Abstract

The dwarf and tall plants of *Sagittaria chilensis* Engelmann belong to the aquatic herbs, of the family *Alismataceae,* are examples of a monocotyledonous leaf which is differentiated into distinct blade, petiole, and sheath regions . The dwarf and tall adult plants are of arrowhead-shaped leaves, their veins are running lengthwise towards the tip .Their physical descriptions can list them into distinct places within the species of the genus *Sagittaria.* It was only found once over the past 130 years in Al- Qurna town. This plant reappeared in Al –Madayna district which is located on the Euphrates River particularly on the River's bank. This report is the first records of the dwarf *S. chilensis* in the middle and the tall *one* in the South of Iraq after 130 years of absence in the region.

Key words: *Sagittaria chilensis***,** the aquatic herbs , Euphrates River , Al –Madayna.

Introduction

Sagi Name

Sagittaria (*Alismataceae*) are aquatic herbs with 40 described species and eight infraspecific taxa. The genus has a natural distribution throughout North and South America, Europe, Africa and Asia, but species diversity is highest in the neotropics, temperate North America and eastern Asia. The name *Sagittaria* is derived from the Latin word sagitta, meaning 'arrow', which refers to the arrowhead shape of the emergent leaf blades produced by many species (Adair *et al.*, 2012).

Description

The genus *Sagittaria* is primarily emergent but a few species are submersed and produce floating leaves (1): All species are herbaceous with basal leaves and scapose inflorescences (2): Leaves of *Sagittaria* are petiolate with a distinct blade or phyllodial without an expanded blade (Adair *et al*., 2012).

The inflorescences are racemose or paniculate, producing nodes with whorled flowers, the proximal node or nodes usually produce carpellate flowers or less often functionally carpellate flowers with abortive stamens, or rarely perfect flowers, the distal nodes of the inflorescence bear staminate flowers. Flowers of *Sagittaria* are comprised of 3 sepals and 3 petals which are white, rarely with a purplish spot, the carpellate flowers bear numerous carpels spirally attached to a conical receptacle. Staminate flowers produce up to 30 stamens (Adair *et al*., 2012).The fruits of *Sagittaria* are achenes with the style forming a distinct beak. In Australia, there is evidence from herbarium records that potentially five species have naturalized: *S. platyphylla* (Engelmann) J.G. Smith, *S. calycina* Engelmann, *S. filiformis* J.G. Smith, *S. macrophylla* Zuccarini, and an uncertain sagittate-leaved species. Of these five species, only two (*S. platyphylla* and *S. calycina*) were found to be well represented in herbaria and thus firmly naturalized, the other three species may or may not be established well enough to be considered naturalized. Historical reports of other species, *S. graminea* Michaux, *S. montevidensis* Cham. and Schltdl . and *S. brevirostrata* Mack. & Bush appear to be in error (Adair *et al*., 2012). Reports of *S. sagittifolia* L. in New South Wales have not been substantiated and may have been confused with *S. montevidensis* (Harden, 1992), as both species possess a purple spot at the base of the petals

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(Adair *et al.*, 2012).

Distribution World

The Alismataceae is distributed within the tropical, subtropical and sub-temperate regions of the eastern and western hemispheres (Rataj, 1972a, b). *Sagittaria* is cosmopolitan, occurring in temperate and tropical regions of both hemispheres (Adair *et al.*, 2012).The total number of *Sagittaria* species remains undetermined. However, most described species occur in North America, where there are 24 species (Lot and Novelo , 1992; Cook, 1996; Haynes *et al*., 1998; Haynes and Hellquist, 2000). Up to four species occur in Europe and Asia (Haynes and HolmNielsen, 1994).

***Sagittaria* (*Alismataceae*)**

Perennial or biennial herbs, bulbous or rhizomatous. Stem scapose or leafy. Leaves sessile, usually alternate or radical filiform or linear. Infl. cyme, umbel- like, scapose, sometimes solitary or terminal. Flowers, actinomorphic, bisexual. Perienth Trimerous in 2 whorls, free or fused .Stamens 6 in 2 whorls. Ovary superior, trilocular, axile placentation . Fruit a capsule. The family is of 13 genera and 680 species. and is characterized by smell of onion and scapose umbel- like infl. (AL-Mayah, 2016).

Fig. 1: The tall aquatic plant *Sagittaria chilensis* planted in a glass tank.

Fig. 2: The tall aquatic plant *Sagittaria chilensis* planted in a plastic pots.

Fig. 3: The dwarf aquatic plant *Sagittaria chilensis* planted in a plastic pots.

Materials and Methods

Sagittaria chilensis (Dwarf *Sagittaria* species); is found on the Euphrates River banks, in the region of middle Euphrates and tall *Sagittaria* species is found in Al- Madayna district which is located on the Southern Euphrates River, Basrah Province . The tall plants of *Sagittaria chilensis* were collected, brought to the laboratory at the beginning of January, 2019, and were divided into two groups; the first group was maintained in a glass tank, with water covered the roots up to 1cm, the tank was put beside the window in order to be exposed to direct sun light (Fig. 1) . The second group of these plants was planted into plastic pots filled with Shatt Al – Arab River bank soil (humus soil) (Fig. 2). Both groups of plants were daily irrigated with tap water and every two weeks were fertilized with a chemical fertilizer. As to the dwarf *Sagittaria chilensis* the same was done as with the tall plants ,were planted into plastic pots of the above mentioned second group of the tall *Sagittaria chilensis* (Fig. 3). The water maintained plants and those in the plastic pots were planted in January, 2019. At the end of January and the beginning of February of the same year the inflorescences started.

Ecological data ; this plant requires a rather nutritive bottom and appropriate temperature (12°C).

Cultivation ; this herb needs rich bottom with coarse river sand mixed with clay or humus and plenty of calcium and detritus, plenty of light, especially sunlight, is highly desirable, under these conditions, if the water surface is dropped in Summer, this herb blooms easily. The ideal temperature is 59 to 67°F. The water should be alkaline, pH value 8-10, the alkalinity can be intensified by adding lime. The plant is also suitable for garden pools, where it hibernates without any special attention (Stodola, 1967).

Results and Discussion

A perennial rhizomatous herb plant is as high as 75 cm, the leaves are green, they are at first tiny ribbon-shaped grow from rootstock. The width of leaves is 4 -6 cm with 5 veins running lengthwise. The emerged leaves have a sheath and a long petiole of 12 cm long. The

blade is lanceolate, narrowed towards the tip of a 27 cm long .The first leaf is broadened and spoon –shaped, the tall one is of 39 cm long ,the number of leaves is 10 . The cluster- like inflorescence is above water at a height of 75 cm. The blossoms are white, on stems each one of 4-8.5 cm long and 0.8 cm wide .The female blossoms are more vigorous, they have 3 green sepals and 3 white petals. The male blossoms have many stamens with yellow pollen. The female blossoms in the lower part of the inflorescence have numerous clustered ovaries in spherical formation. Female blossoms never last more than two days, and after fading the petals with the sepals dry on the stem, the female blossoms bloom earlier than the much more numerous male blossoms, by pollination the ripening and development of seeds is achieved and immediately after pollination the inflorescences turn down with the stem. Figures 4a, 4b, 5 and 6 showed, respectively, the growing inflorescence, 5 veins- leaves and the mature inflorescence of the tall *Sagittaria chilensis*.

Fig. 4a: The tall aquatic plant *Sagittaria chilensis* with growing inflorescence.

Fig. 4b: The tall aquatic plant *Sagittaria chilensis* with growing inflorescence.

Fig. 5: The leaves with 5 veins of tall *Sagittaria chilensis*, from Al- Madayna , district.

Fig. 6: The mature inflorescence of the tall *Sagittaria chilensis*, from Al- M^{k}dayna, district, Southern Iraq.

The dwarf *S. chilensis*

A perennial rhizomatous herb plant as high as 27.9 cm, the leaves are green, they are at first tiny ribbon-

Fig. 7: Inflorescence and leaves of the dwarf aquatic plant *Sagittaria chilensis* from the middle of the Euphrates River.

Fig. 8: The dwarf aquatic plant *Sagittaria chilensis* with male and female blossoms (inflorescences).

Fig. 9: A comparison between the leaves and blossoms of the tall *Sagittaria chilensis* on the left and those of the dwarf one on the right.

shaped grow from rootstock. The width of the leaves is 3 .2 cm with 5 veins running lengthwise. The emerged leave has a sheath and a long petiole, of a 5 cm long . The blade is lanceolate, narrowed towards the tip of 15 cm length .The first leaf is broadened and spoon –shaped, the largest one of a 20cm long ,the number of leaves is 10 .The cluster- like inflorescence is above water of a 27.9 cm height. The blossoms are white, on stems each one of 2.4 cm long and 0.5 cm wide , and the female blossoms are more vigorous, they have 3 green sepals and 3 white petals. The male blossoms have many stamens with yellow pollen. The female blossoms in the lower part of the inflorescence have numerous clustered ovaries in spherical formation. Female blossoms never last more than two days, and after fading the petals with the sepals dry on the stem, and female blossoms bloom earlier than the much more numerous male blossoms, by pollination the ripenning and development of seeds is achieved and immediately after pollination the inflorescences turn down with the stem. Figures 7, 8 and 9 showed the inflorescence and leaves of the aquatic dwarf plant *Sagittaria chilensis from* the middle of the Euphrates River, male and female blossoms of the dwarf *Sagittaria chilensis and* the comparison between the leaves and blossoms of the tall and those of the dwarf *Sagittaria chilensis.*

Remarks

The studied aquatic plant is a species belonging to the genus *Sagittaria*, family Alismataceae. It was only found once since 130 years ago in Al- Qurna (Townsend and Guest, 1985) and was not found since then (AL-Mayah, 2016). The seeds of the plant could be transferred by birds when migrate from their 0riginal homelands to Iraq during Winter (January) and they remain, survived. It seems that the temperatures, sun light of Winter and Spring, pH, texture of the soil are quite fit for planting and cultivating of the plant. The physical description of the studied plant resembles the species *Sagittria chilensis*.

Alismataceae

Sagittaria sagittifolia L.

Name; Common Arrow Head (E).

Distribution; Iraq ,Iran , Asia , Afg . , Eur.

I.F.; Perennial, emergent erect herb with heterophyllus floating and submerged leaves.

Rem; only found once over 130 years ago in Al-Qurna No 206, 207 (Townsed and Guest, 1985) and was not collected since then (AL- i Mayah, 2016).

Sagittaria graminea Michaux, a perennial swamp plant, its leaves at first are tiny ribbon-shaped grow from the rootstock, 2-4 cm wide with 2-4 veins running lengthwise. The cluster- like inflorescence is above water, the blossoms arranged in ternate whorls. There are usually 5-7 in each group. The blossoms are white, on stems, and female blossoms are more vigorous. The studied plant resembles the aquatic plant *Sagittaria chilensis,* leaves are lanceolate long ribbon- shaped, narrowed towards their tips. The emerged leaves have sheath and long petiole of 12 cm and a blade of 27 cm long, the leaf total length is 39cm, is broadened (4-6 cm) with 5 veins running lengthwise. There are 4 inflorescences, each inflorescence of 75 cm high, 6 cm long and 2 cm wide. World maps of distribution of the aquatic plant *Sagittaria* do not include Iraq.

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