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Sagittaria trifolia L.: A potential nutraceutical of the Northeastern part of India

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ABSTRACT

Sagittaria trifolia L. *is a perennial, stoloniferous, aquatic and wetland flora of the family Alismataceae. It is commonly known as Chinese arrowhead. It forms an arrow like tuber which is generally cooked and taken as vegetables by the Meitei community of Manipur. In this paper, the medicinal uses of the tuber of Sagittaria trifolia are discussed considering its nutritive values and medicinal properties. This paper highlights the potential of S. trifolia as a nutraceutical and suggests the cultivation of it.*

INTRODUCTION

There is always been a search for nutraceutical with the competition of obtaining nutrition as well as medicinal from a single source as our normal everyday diet. In a developing country like India, there is a need for exploring the nutraceutical plants and making the right use of it is essential as according to the Global Hunger Index of 2018, India ranks 103 out of 119 nations. Finding importance in tuber crops is a key to reduce hunger and meet the nutrient deficiency and help to fight against diseases at the same time.

Sagittaria trifolia L. is a tuberous plant mainly found growing in wetlands, rivers, lakes, ponds, marshy areas, etc. It also grows in a moist wet loamy soil and can be cultivated in home gardens in sunny position. It prefers warm temperature for at least 6 months to produce crop. During dormant period the plant is tolerant to cold temperature with upto -10º C although the young growth can be severely damaged. (Larkcom 1991). The species found in the wild are normally smaller than the cultivated ones. The tubers are borne at the

end of the roots. The tubers are cooked and eaten as vegetables by the Meitei community of Manipur. The tubers are starchy with a distinct taste and a very slight bitterness (Facciola 1990). The sub species of *Sagittaria trifolia* is widely cultivated as edible tubers in China and other parts of Asia (Hedrick 1972). It is also found to be eaten in Southern European Russia, Siberia, Southeast Asia like Malaysia, Indonesia and Philippines and China, Japan. The dried tubers are ground into flour and used in making bread and other culinary. The tuber contains proteins, fats, carbohydrates, fiber, calcium, phosphorous iron, potassium, thiamine, riboflavin, niacin and ascorbic acid (Duke & Ayensu 1985; Suzuki et al. 1993). The young petiole leaves and tuber are used in soups in Vietnam. The young leaves are also used as vegetables (Tanaka & Nguyen 2007; Lim 2014). It was also revealed that the corm can be enlarging up to 90 days and so is the sugar content increased (Zhao et al. 2011). The presence of D-raffinose, D-verbascose, D-fructose and glucose was reported by Li in 2008. Cultivation of this plant showed that growing in moist but less soggy soil yields more corm than that is grown in soggy or aquatic place. It was cultivated by the Meitei community of Manipur (Figure 3).

Plant Morphology

Sagittaria trifolia L. (Figure 2)

It is a glabrous perennial herb of about 1m height forming axillary stolons often ending with a corm or tuber. The leaves sagittate, apex acuminate to rouded, lateral lobes longer than the middle lobe triangular in shape forming an arrow head. Inflorescence racemose; 3 to many whorls of 3 flowers, lower 1-3 whorls usually branched; bracts free or connate towards base; Flowers unisexual, female flower on lower 1-8 whorls with short pedicels, male flower with pedicels; Sepals reflexed, ovate; Petals obovate; Stamens numerous; Anthers yellow (Ci 2010). Fruit forms an oblate head consist of numerous triangular obovate achenes with laterally bent beak (Lim 2014).

Medicinal Uses (Figure 1):

The plant is diuretic and also used against scurvy. The leaf is used against skin diseases. The tuber has got galactofuge activity and discutient and can cause premature birth (Grieve 1984; Duke & Ayensu 1985). In Chinese traditional medicine, the essential oil of *S.trifolia* is used during childbirth and to cure skin diseases. In relation to it, the antimicrobial activity of this essential oil showed a significant result against several microorganisms (Zheng et al. 2006). In Vietnam, it is used against pimples and in times of dizziness (Tanaka & Nguyen 2007). The species was reported to have a rich phytoconstituents like phenolic compounds and flavonoids which can scavenge free radicals in the body and can be a potential antioxidant. In that study about 40 free radical scavenging compounds was reportedly detected in addition to the presence of nutrients and minerals like carbohydrate, fat, proteins, fiber, calcium, magnesium, potassium, sodium, iron, zinc and copper (Ahmed et al. 2019). The terpenoid, sandaracopimaric acid was isolated from the tuber of *S. trifolia* showed a good immunosuppressive activity (Yuan et al. 1993). Several diterpene trifoliones A, B, C and D were isolated showed inhibitory effects on the histamine release during the in-vitro immunomodulatory test in rats (Yoshikawa et al.1993; 1996)

Future Aspect

Considering the food values with good amount of starch content as well as the presence of various macro and micro nutrients, *S. trifolia* can be a food substitute of most less nutritive foods. It can also be grown in home gardens. More research needs to be carry forwarded to identify its phytochemicals and medicinal properties so that people can cultivate and be taken as a nutraceutical understanding the importance of it.

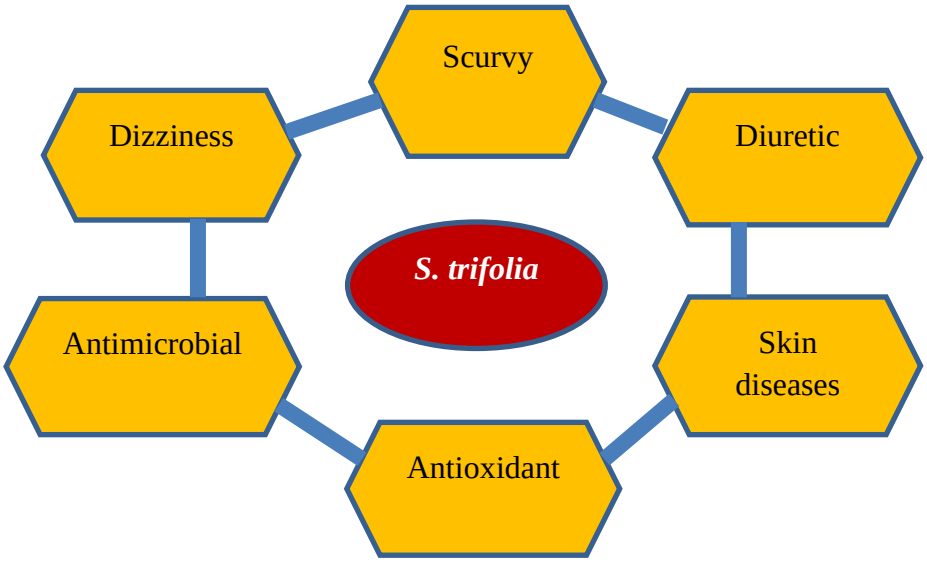

Figure 1: Medicinal properties of *S. trifolia*

Figure 2: *Sagittaria trifolia* L.

Figure 3: *Sagittaria trifolia* cultivation in home garden and its harvest

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