

# Phytochemical Screening of Tubers and Leaf extracts of *Sagittaria sagittifolia* L.: Newsa (Arrowhead)

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**Abstract:** The present investigation deals with the preliminary phytochemical estimation of bio-functional parts i.e. Leaves and Tubers. Aquatic starchy tuberous plant *Sagittaria sagittifolia* L. belonging to family Alismataceae, commonly known as Arrowhead. The biofunctional parts were extracted with five different organic solvents viz. Ethanol, Methanol, Acetone, Petroleum Ether, Chloroform and Distilled Water for their primary and secondary phytochemicals and their active constituents like Tannin, Saponins, Flavonoids, Phenols, Steroids, Glycosides, Protein, Amino-acids, Starch, Reducing sugars and Alkaloids. The results show the  $31.1 \pm 0.08$  extract of leaf and  $35.7 \pm 0.15$  extract of tuber shows higher extractive value. The presence of maximum phytochemicals viz. glycosides, steroids, tannins, saponins, terpenoids, flavonoids, carbohydrates, alkaloids, and phenols in ethanol while minimum presence in acetone followed by aqueous. These phytochemicals are useful in medicinal and therapeutic system as well as in traditional and modern medicinal system.

**Key Words:** *Sagittaria sagittifolia*. Phytochemicals, Extractive value, Therapeutics.

## Introduction

Edible aquatic plants constitute an additional source of food and vegetable. They have high medicinal properties. *Sagittaria sagittifolia* L., a beautiful fresh water ethno-nutraceutical plant growing on the side bank of watershed, river, ponds, nullas and muddy substrata. The plant belongs to family Alismataceae native of Asia and Europe, commonly known as Arrowhead and Newsa an indigenous plant of North Eastern Terai Region of U.P. India. The people of the area have significant relationship with plant for various uses as food, vegetable, medicine, and nutraceuticals. [2] The plant is regarded as one of the best Ethno-nutraceutical plant because it possesses various therapeutic properties in their biofunctional parts leaves and tubers. Pharmacologically the plant is also used as anti-microbial, anti-inflammatory, antitumor, antiscorbutic, diuretic, anti-oxidant, immunomodulatory, antidiarrhoeal, antiseptic, anthelmintic and antiviral activity. [9] The aim of this study was examined the Physicochemical and preliminary phytochemical screening of leaves and tubers of *Sagittaria sagittifolia* L. in different organic solvents. The extractive value was also be calculated. The extraction procedure mainly uses for the separation of medicinally active portion of plant parts by using selective organic solvents, then obtained extract are mixture of phytochemical in form of liquid or precipitate.

Therefore, the Phytochemical analyses of biofunctionally active plant parts are important and have commercial interest in both research institute and pharmaceutical industries for manufacturing new compounds, drugs, nutraceuticals and medicines for treatment of various human ailments and diseases.



Fig 1- Habit of *Sagittaria sagittifolia* L. Fig 2-Tubers of *Sagittaria sagittifolia* L.

## Materials and Methods

### Collection of plant materials

The fresh plant parts of *Sagittaria sagittifolia* L. were collected from different sites of water bodies in an around Gorakhpur district U.P. India and the plants were identified in the Department of Botany, DDU Gorakhpur University Gorakhpur. The fresh materials of leaves, stem and tubers were washed under running tap water, and dried under shade then pulverized into fine powder with the help of mechanical blender.

### Preparation of plant Extracts

#### Hot water extraction

Twenty gram of dried powdered plant material was taken in a beaker and 200 ml of distilled water was added then the mixture was heated on water bath with continuous stirring at 30°-40°C for 20 minutes. The water extract was filtered through filter paper and filtrate was used for the phytochemical analysis.

#### Solvent Extraction

The crude extract of *Sagittaria sagittifolia* L. plant parts (leaves and tubers) were prepared by Soxhlet extraction method. Twenty gm powdered plant material was uniformly packed into a thimble and extracted with 200 ml of 90 percent organic solvents (Ethanol, Methanol, Acetone,

Aqueous, Chloroform and Petroleum Ether) separately about 48 hours or till the solvent in siphon tube of an extractor become colorless. After that the extract was filtered through a paper filter (Whatman, no.1) and evaporated under reduced pressure and controlled temperature (45-50°C) by the rotatory evaporator to make more concentration and it was stored in dark glass bottle at 4°C for further analysis. [5]

### **Extractive value of plant sample**

The extractive value or the yield percentage of the plant sample is calculated before and after extraction process using the formula-

$$\text{Percent Extractability} = (W1/W2) \times 100$$

W1= Net weight of powder in gram after extraction

W2= Total weight of powder in gram taken initially for extraction

### **Phytochemical Screening (Qualitative)**

Stock solution was prepared from 100 mg of each of the crude extract (Ethanol, Methanol, Acetone, Aqueous, Chloroform and Petroleum Ether), dissolved in 10 ml of their own mother solvent. The obtained stock solution was subjected to preliminary phytochemical analysis through proper standard method [3].

### **Estimation of moisture**

Initially the amount of 5 gm of powdered sample of *Sagittariasagittifolia* L. (Leaves and Tubers) was taken in dry and pre-weight, Petri plate in triplicate. The sample was uniformly spread in petri-dish, weight and transfer place into the oven for 8 hours at 105°C. After drying place, the dice into desecrator, cool and reweight the dish and its dried sample.

### **Calculation**

$$\text{Moisture \%} = W1-W2/W1 \times 100$$

W1= Weight (g) of sample before drying

W2= Weight (g) of sample after drying

### **Estimation of Ash Content**

Estimation of ash content of dried sample Leaf, Tuber of *Sagittariasagittifolia* L. was carried out through standard method of AOAC.

### **Statistical analysis:**

The experiments were performing in three determination(Triplicates) and the results were expressed as mean  $\pm$  S.D. (n=3).

## Results and Discussion:

The Phytochemical and bioactive compounds of *Sagittariasagittifolia* L. were tested and summarized in table 3.

### Extractive values

The Extractive values of Crude extract of leaves and tubers of *Sagittariasagittifolia* L. in different organic solvents (Ethanol, Methanol, Acetone, Aqueous, Chloroform and Petroleum Ether) are given in table 1. The highest extractive yield was found in the ethanol extract of tubers and methanol extract of leaves.

### Physico-chemical Analysis

The physico-chemical parameters like moisture content, loss on drying, total ash, water-soluble, acid- soluble extractive values were carried and recorded in table 2.

### Preliminary Phytochemical Screening

The Phytochemical screening of crude extract of leaves and tubers were carried out in different organic solvent. The result revealed the presence of phytochemical like Tannin, Saponins, Flavonoids, Phenols, Steroids, Glycosides, Protein, Amino-acids, Starch, reducing sugars and Alkaloids on the basis of colorations and precipitation on chemical reaction and summarized in table 2 and 3

**Table 1: Extractive value of *Sagittariasagittifolia*L.**

S.No.	Type of Extract	Yield (% W/W)	
		Leaf	Tuber
1	Ethanol	29.1 ± 0.13	35.7 ± 0.15
2	Methanol	31.1 ± 0.08	30.7 ± 0.06
3	Acetone	26.1 ± 2.41	29.1 ± 0.13
4	Petroleum Ether	15.75 ± 0.09	14.5 ± 0.10
5	Chloroform	25.9 ± 0.06	20.89 ± 0.07
6	Distilled Water	21.65 ± 0.11	27.18 ± 0.13

Values are means of three determination ± S.D. (n=3)

**Table 2: Physicochemical Parameters of *Sagittariasagittifolia* L.**

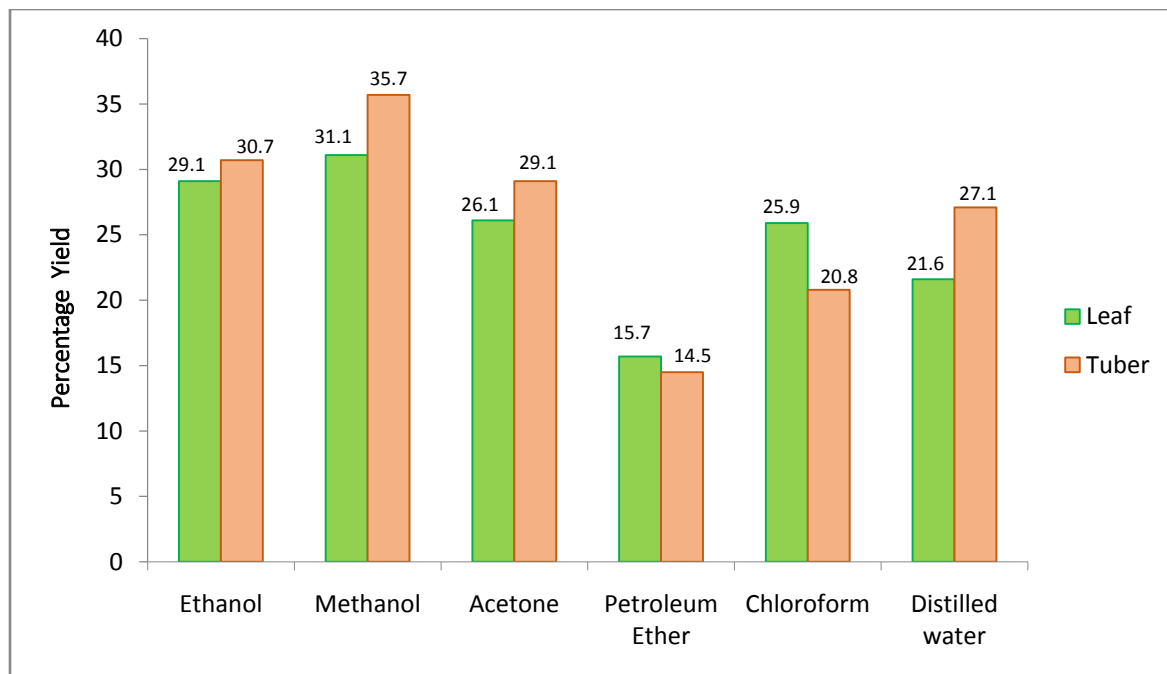
S.No.	Name of Parameters	Values (%) W/W
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		Leaf	Tubers
<b>1</b>	Colour of Powder	Greenish	Creamish
<b>2</b>	PH(5% w/v aqueous solution)	5.7	6.3
<b>3</b>	Moisture content	9.07±0.10	8.39 ± 1.75
<b>4</b>	Total ash	4.29±0.16	2.82±0.03
<b>5</b>	Water soluble extractive	3.16±0.04	1.23±0.04
<b>6</b>	Acid soluble extractive	0.13±0.02	0.40±0.01

**Table 3: Phytochemical Analysis of Extract of *Sagittariasagittifolia* L.**

Phytochemical	Chemical test	Leaf extract				Tuber extract			
		Aqueous	Ethanol	Methanol	Acetone	Aqueous	Ethanol	Methanol	Acetone
<b>Glycosides</b>	Keller Killiani	-	+	+	-	-	+	+	
<b>Steroids</b>	Liebermann	-	+	-	+	-	+		+
<b>Tannins</b>	Ferric chloride	+	+	+	-	-	-	+	
<b>Saponins</b>	Foam	+	+	+	+	+	+		+
<b>Terpenoids</b>	Salkowski	+	+	+	-	-	+	+	
<b>Flavonoids</b>	Alkaline reagent	-	+	+	-	+	+	+	+
<b>Protein</b>	Ninhydrin	+	+	-	-	+	+	+	+
<b>Carbohydrate</b>	Benedict's	+	-	+	-	+	+	+	+
<b>Alkaloids</b>	Mayer's	-	+	+	+	-	-	-	-
<b>Phenols</b>	Ferric chloride	+	+	+	+	+	+	+	+

**+= presence - =Absence**



**Fig 3-** Percentage yield different extracts of leaves and tubers of *Sagittaria sagittifolia* L.

## Conclusions

Phytochemical are naturally occurring non-nutritive part of plant chemicals that have protective and defensive properties. The intake of phytochemical in dietary purposes may promote the health benefit and protective against many diseases like cardiovascular and chronic diseases. [8] The qualitative phytochemical screening of leaves and tubers of *Sagittaria sagittifolia* L. were performed initially with different solvents to detect out the nature and presence of secondary metabolite in their extract. The present study revealed the presence of Steroids Terpenoids, Tannin, Phenols, Saponins, Alkaloids, Glycosides, Flavonoids, Protein, Amino acids, and Starch in leaves and tubers (Table-3). The presence of these phytochemicals indicate the *Sagittaria sagittifolia* L. having potential source of Therapeutic medicine. The study suggested that this plant is needed to explore and their utilization in field of Medicine and Pharmaceutical science more beneficial.

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