

Botanical and Phytochemical Studies on Leaves of *Stephania Japonica* (Thunb.) Miers. Mont-kyawe`-thae`-pin (Sha-naze)

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Abstract

Stephania japonica (Thunb.) Miers. Mont-kyawe`-thae`-pin (Sha-naze) is a woody climber which belongs to the family Menispermaceae. Both vegetative and reproductive plant parts were collected from Hinthada Environs during the flowering season from June to April, 2016. Precise location of specimens collection were made Map Navigator by using Global Positioning System (GPS) device. Local people used this plant for vegetable and medicine as well as treatment for heart-ailment and jaundice. The morphology of vegetative parts as well as reproductive parts were identified with the help of available literatures and internet information. In phytochemical characterization; the presence of alkaloid, glycoside, reducing sugar, steroid, phenolic compound, flavonoid, α -amino acid, carbohydrate, tannin and protein. Cyanogenic glycoside, saponin, terpenoid and starch were absent. And also physico-chemical properties; the yield of methanol soluble matter was more than other soluble matters. Elemental analysis of powdered sample was determined by using Energy Dispersive X` Rays Fluorescence (EDXRF) spectrophotometer. In this result, potassium (K) was higher than other elements. The contents of heavy metals were analysed by using AAS; the results showed higher content of calcium (Ca). The nutritional values of powdered sample were determined by using AOAC methods. In this result, carbohydrate was higher than other nutrients. The findings of the present research may be helpful for further investigations.

Keywords: *Stephania japonica* (Thunb.) Miers. Mont-kyawe`-thae`-pin (Sha-naze), Morphology, Phytochemical Screening and Nutritional value

INTRODUCTION

Stephania japonica (Thunb.) Miers. is wild growing plants and distributed throughout Myanmar. The local people use this plant for curing heart-ailment and jaundice. The decoction of the leaves is used for heart-ailment, fever and malaria. This plant is commonly known as Mont-kyawe`-thae`-pin (Sha-naze). The English name is snak. This plant belongs to the family Menispermaceae and abundantly found in Hinthada Environs. The Menispermaceae family contains 75 genera and 500 species (Dassanayake, 1995). *Stephania japonica* (Thunb.) Miers. (Mont-kyawe`-thae`) plants are herbaceous or woody vines, leaves mostly peltate, long petiole and palmately nerved. Flowers in axillary umbels. Male flowers: sepals 6-8, in two series, free or connate a base; petals 3-4 in one series; stamens 2-6. Female flowers: sepals 3-4 in one series; petals as many; carpel solitary, style very short, lobed. Fruit is drupes, flattened, subglobose. (Qi-ming, 2007). The powdered sample of the leaves contains potassium and calcium. It is used as a supplement food. Getting enough calcium is not just important for growing kids. Calcium is also needed to support bone, heart muscle and health (Wetsite-9).

MATERIALS AND METHODS

The specimens were collected from Hinthada Environs (Fig. 1). They were collected during the flowering and fruiting periods from June to April, in 2016. The fresh parts of this plants were studied for morphological and histological characters studies. The collected specimens were washed with water to remove impurities. After washing the specimens were weighed and air dried at room temperature and weighed intermediately. When constant

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weight was obtained the samples were completely dried. Then specimens were pulverized by grinding machine and stored in air tight container to prevent moisture changes, contamination and kept for phytochemical screening. The analysis of elemental concentrations was carried out by using the Energy Dispersive X-Rays Fluorescence Spectrometer (EDXRF) and Atomic Absorption Spectrometry (AAS) at University Research Center, University of Yangon.

RESULTS

Scientific name	<i>Stephania japonica</i> (Thunb.) Miers.
Synonyms	<i>Menispermum japonica</i> (Thunb).
English name	Tape vine, snake vine
Myanmar name	Mont-kyawe`-thae`-pin (Sha-naze)
Family	Menispermaceae

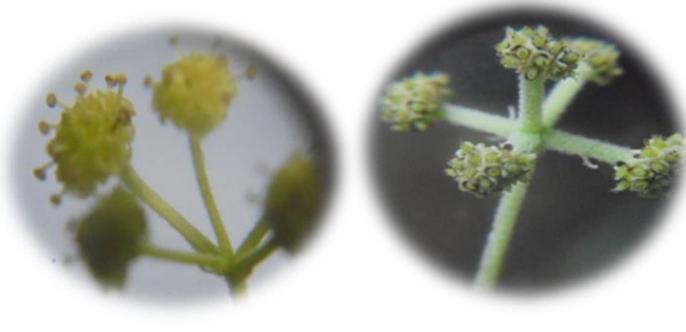
Morphological Characters of *Stephania japonica* (Thunb) Miers.

Habit : perennial shrub, dioecious, climbing vine, 2-10 m long, stem slender, slightly woody when old, sometimes prostrate and rooting at the node, pubescent. **Leaves:** simple, alternate, about 3-12 cm long, equal to wide, triangular-ovate to ovate, peltate, petiole length 0.5-9 cm long and palmately nerved, exstipulate, margin entirely veined from the base. **Inflorescences:** axillary, capitate umbellate cymes, about 2-4 cm long. **Flower:** actinomorphic, unisexual, trimerous, hypogynous, inconspicuous. **Male flower:** sepals 6, aposepalous, in two whorls, imbricate, petaloid (greenish-yellow); petals 3, apopetalous, imbricate, petaloid (greenish-yellow); stamens 6, the filament long and connate into peltate, synandrium. **Female flowers:** sepals 4, aposepalous, imbricate, petaloid (greenish-yellow), inferior, petals 3, apopetalous, imbricate, petaloid (greenish-yellow), inferior. Carpel 1, monocarpellary, syncarpous, unilocular, marginal placentation, one ovule in each locule, style very short, stigma lobed, bi-fixed, superior. **Fruit:** green when mature, orange to red, small rounded but flattened, 0.8 cm long. **Seeds:** with endosperm.

Flowering and fruiting period – June to April.

Preliminary phytochemical screening of powdered sample of leaves

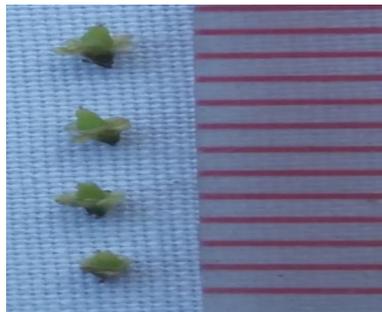
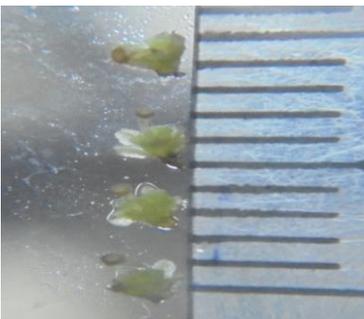
In phytochemical screening; the presence of alkaloid, glycoside, reducing sugar, steroid, phenolic compound, flavonoid, α -amino acid, carbohydrate, tannin and protein were detected. Saponin, cyanogenic glycoside, terpenoid and starch were absent. The results were shown in table (1) .



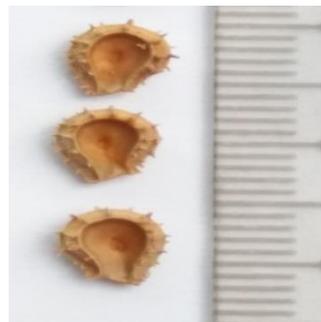
Habits, Male and female inflorescences



Leaves



Male and female flowers



Young and mature fruits

Seeds

Figure (1). *Stephania japonica* (Thunb.) Miers.

Table (1) Preliminary Phytochemical Screening of Powdered Sample of Leaves of *Stephania japonica* (Thunb.) Miers.

No.	Type of compound	Extract	Reagent used	Observation	Results
1	Alkaloid	EtOH	Mayer's reagent	White ppt	+
			Hager's reagent	Reddish brown ppt	
			Wagner's reagent	Yellow ppt	
2.	Glycoside	EtOH	H ₂ O+NaOH	White ppt	+
3.	Reducing sugar	H ₂ O	Fehling solution A&B	Yellow ppt	+
4.	Saponin	H ₂ O	Distilled water	No foaming	-
5.	Cyanogenic glycoside	H ₂ O	Conc; H ₂ SO ₄ sodium picrate paper	No colour change	-
6.	Steroid	EtOH	CHCl ₃ + Conc; H ₂ SO ₄	Green colour	+
7	Terpenoid	EtOH	CHCl ₃ + Conc; H ₂ SO ₄	No colour change	-
8.	Pheolic Compound	EtOH	10% FeCl ₃	Redish brown colour	+
9	Flavonoid	EtOH	HCl/Mg	Pink Colour.	+
10	α-amino acid	H ₂ O	Ninhydrin	Purple spot	+
11.	Carbohydrate	H ₂ O	Benedict's solution	Brick red ppt	+
12.	Tannin	H ₂ O	5% FeCl ₃	Yellow brown ppt.	+
13.	Protein	H ₂ O	Millin's reagent	Brownppt.	+
14.	Starch	H ₂ O	K ₂ I solution	No colour change	-

(+) = present (-) = absent

Table (2). Physico-chemical examination of powdered sample of leaves of *Stephania japonica* (Thunb.) Miers.

No.	Physico- chemical characters	Average (% w/w)
1.	Moisture content	18.96
2.	Total ash content	9.30
3.	Acid-insoluble ash matter content	18.82
4.	Water- soluble ash matter content	45.88
5.	Ethanol soluble matter content	5.20
6.	Methanol soluble matter content	5.70
7.	Petroleum ether matter content	1.10
8.	Ethyl-acetate matter content	0.90
9.	Chloroform soluble matter content	1.90
10.	Acetone soluble matter content	2.50
11.	Aqueous soluble matter content	5.00

In this experiment, the percentage of methanol soluble matter was more than other soluble matters but the percentage of ethyl-acetate soluble matter was found to be the least.

Table (3). Elemental analysis of powdered sample of leaves of *Stephania japonica* (Thunb.) Miers. by using EDXRF

No	Elements	Average (% w/w)
1	Potassium (K)	0.599
2	Calcium (Ca)	0.333
3	Silver (S)	0.051
4	Iron (Fe)	0.011
5	Manganese (Mn)	0.002
6	Strontium (Sr)	0.001
7	Zinc (Zn)	0.001
8	Rudibium (Rb)	0.001
9	Copper (Cu)	0.001
	CH balance	99.001

According to the EDXRF results, Potassium (K) is of the most concentration than other elements.

Table (4). Elemental analysis of ash sample of leaves of *Stephania japonica* (Thunb.) Miers.(AAS)

No	Samples	(mg/L)
1	Calcium (Ca)	2.590
2	Manganese (Mn)	0.241
3	Magnesium (Mg)	1.781
4	Lead (Pb)	0.004
5	Chromium (Cr)	0.002
6	Cadmium (Cd)	0.008
7	Zinc (Zn)	0.068
8	Copper (Cu)	-0.002

According to the AAS data, Calcium (Ca) is macro elements but others are micro elements.

Table (5). Nutritional Values of the powdered sample of the leaves of *Stephania japonica* (Thunb.) Miers.

No.	Test Parameter	Test Method	Result
			Leaves
1.	Moisture	AOAC-2000 (930.04)	17.37%
2.	Ash	AOAC-2000 (930.05)	9.16%
3.	Crude protein	AOAC-2000 (920.152) (Kildahl Method)	15.30%
4.	Crude fiber	AOAC-2000 (978.10)	10.60%
5.	Ether Extract (Crude fat)	AOAC (Buchi Soxhlet Method)	2.06%
6.	Carbohydrate	By Difference	45.51%
7.	Energy Value (kcal/100g)		210

According to these results, the powdered leaves of *Stephania japonica* (Thunb.) Miers.were found to contain moisture, ash, crude protein, crude fiber, crude fats and carbohydrate. Among them, carbohydrate is the highest concentration than other nutrients.

DISCUSSION AND CONCLUSION

In this research, *Stephania japonica* (Thunb.) Miers. belongs to Menispermaceae family and this plant is a herbal plant. As a result, morphological studies on both vegetative and reproductive parts were present.

In this study, *Stephania japonica* (Thunb.) Miers. was a perennial, dioecious climber and glabrous. Stems were woody. Leaves were simple, alternate, lamina broadly triangular-ovate to ovate, apex acuminate. Petiole arises from base of lamina. The flowers were small, subobicular, unisexual, sessile and ovary superior. The fruits were drupes and seeds are often curved. These characters are in agreement with those given by Dassanayake (1995) and website-(1).

In the phytochemical screening, the phytochemical constituents present in leaves of *Stephania japonica* (Thunb.) Miers were alkaloid, glycoside, reducing sugar, steroid, phenolic compound, flavonoid, α - amino acid, carbohydrate, tannin and protein. But saponin, cyanogenic glycoside, terpenoid and starch were absent.

In physico-chemical characterization, the yield of water is more soluble than other soluble matters in the powdered sample of the leaves. The yield of ethyl-acetate is less soluble than other soluble than matters in the powdered leaves.

In the determination of nutritional values; the powdered leaves were found to be consisted of moisture, ash, crude protein, crude fiber, crude fat (ether extract), carbohydrate and energy value.

So, the herbal plants of *Stephania japonica* (Thunb.) Miers. can be used for medicine. It is used for treating heart-ailment and jaundice. These plants have carbohydrate, crude fats and crude fibers. It is useful for health. This study of the morphological, histological, phytochemical, physico-chemical investigation of *Stephania japonica* (Thunb.) Miers. May be helpful in further studies. It is hoped that, the results will give useful information on the active constituents and as a potential source of information about useful drugs.

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