

## Phytochemical Study on Leaves of *Rhynchosia volubilis* Lour.

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### Abstract

*Rhynchosia volubilis* Lour., local name (Nwe - chin) is a herbaceous twinner belonging to the family Fabaceae. In this study, the plant was collected from Ngwetaung mountain, Nyaung Shwe Township, Southern Shan State of Myanmar during December 2018 to February 2019. Sensory characters of powdered leaves were yellowish green, acerbity taste, odour pungent, texture with the granular. The preliminary phytochemical investigations were carried out. These results showed the presence of alkaloid, amino acid, carbohydrate, flavonoid, glycoside, phenolic compound, saponin, starch, steroid, tannin, polyphenol and protein. The content of heavy metals were analyzed by using AAS, these results showed higher content of calcium (Ca). The nutritional values from powdered leaves of *Rhynchosia volubilis* Lour. were determined. This result revealed the presence of protein was higher percent. The findings of the present research may be helpful for further investigation.

**Key Words:** *Rhynchosia volubilis*, Fabaceae, Sensory characters, Phytochemical

### Introduction

The Fabaceae or leguminosae commonly known as the legume, pea or bean family is a large economically and medically important family of flowering plants. (<https://en.m.wikipedia.org>). *Rhynchosia* is a genus within the tribe Phaseoleae, a group of papilionoid legumes that are economically important both for human and animal consumption because of their high protein content (Manyelo 2014).

The name *Rhynchosia* was first introduced by Loureiro in 1790 to accommodate one species, *Rhynchosia volubilis* Lour. For a period of 60 years from 1899, *Rhynchosia*, commonly known as snout bean, was included as synonym under the name *Dolicholus* Medikus until 1959, when it was conserved against the latter. The genus comprises about 230 species centred mainly in Africa and Madagascar but also extends to warm temperate and tropical Asia, northern Australia, tropical and subtropical America (Manyelo 2014).

In contrast to other leguminous plants generally used as food *Rhynchosia volubilis* Lour. a small soybean with a black seed coat, has been used as traditional oriental remedy for various human diseases in Eastern Asia. The protective effect of *R. volubilis* Lour. makes against dry eye disease (Kang *et al.* 2018).

The plant is harvested from the wild for local use as a medicine. It has potential for use in making tofu. The seeds of *R. volubilis* Lour. have been used as an expectorant in Japanese folk medicine (<http://tropical.theferns.info>).

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The studied plant had not been recorded in recently published checklist of Myanmar Kress *et al.* (2003). In this research, the rare species *Rhynchosia volubilis* Lour., local namely Nwe-chin was selected. The plants were collected from Ngwe - taung mountain, Nyaung Shwe Township, Southern Shan State and studied from December, 2018 to August, 2019. The collected area is located at North Latitude 20°37'30.7" and East Longitude 96°58'04.7".

In Myanmar, those plants were used native people from the collected area as traditional medicines. Infusion of leaves was used to relieve dropsy, edema and hydropic. The dried leaves were prepared as blood clearing.

The aim of the present research is to be aware the medicinal uses of *Rhynchosia volubilis* Lour. The objectives are to study the morphological characters of this plant and to perform the phytochemical investigation of leaves.

### Materials and Methods

The fresh parts of this plant were used for morphological study. In morphological study, the fresh plant parts were thoroughly examined and described according to the standard literatures used in Department of Botany, University of Taunggyi (Nyo Maung 2012). The plants were recorded to show morphological features by taking photographs. Both the vegetative and reproductive parts of fresh specimens were dried, pressed and mounted on herbarium sheets according to Lawrence 1963. The fresh specimens of leaves were washed with water and air dried in shade for three weeks and weighed intermittently. When constant weight was obtained the samples were completely dried. Then specimens were pulverized by grinding machine and store in air tight containers to prevent moisture changes, contamination and kept for phytochemical screening. Elemental analysis was analysed by using Atomic Absorption Spectrometry (AAS) at University of Research Center, University of Yangon and phytochemical screening was carried out by Trease & Evans 1978, at the Department of Chemistry, Taunggyi University. The nutritional values of this powdered seeds were determined by using David Pearson 1976 at Ministry of Agriculture, Livestock and Irrigation Small Scale Industries Department.

### Results

#### I. Botanical studies

Scientific Name	- <i>Rhynchosia volubilis</i> Lour.
English Name	- Black soybean
Common Name	- Unknown
Local Name	- Nwe chin
Family	- Fabaceae
Flowering & Fruiting Period	- November-March

A slender herbaceous twinner, creeping or twining, more or less villous or pubescent, stem slightly angulate. Leaves simple, 3-foliate, leaflet papery, terminal leaflets rhomboid or obovate-rhomboid, 2 - 7 cm long, 1.8 - 7.5 cm wide, both surfaces gray or light yellow villous, with yellow-brown sessile glands, basal veins 3, lateral vein 3 - 5 pairs, base broadly cuneate, apex acute or obtuse, lateral leaflets smaller, usually oblique, stipule small, lanceolate, 1 - 3 mm long, petiole 0.6 - 5.5 cm long, petiolules 2 - 4 mm. Inflorescence axillary raceme, 6 - 8 flowers, 2.5 - 4 cm, bracts usually caducous. Flower 2 - 2.5 cm, yellow, axillary, sexual, complete, zygomorphic, hypogynous, pedicel slender 4 - 6 mm. Calyx 5, synsepalous, campanulate, 8 - 10 mm, lobes lanceolate. Corolla 5, yellow, vexillum suborbicular, 1 - 1.8 cm and inflexed auricles, wings obovate-oblong, 1 - 1.5 cm, base with 1 long

auricle at one side, keel rostrate, 1 - 1.2 cm. Stamens 9 + 1, diadelphous, filaments 1.6 - 1.8 cm long, anther extrorse, longitudinal dehiscence. Ovary pubescent, with clustered glands, slender globose 6 - 7 mm long, style 1, curved, stigma capitate, 1 locular, one ovule in each locule in transverse section, marginal placentation. Fruits legume, green in young, brownish green when mature, oblong, 2.5 - 4 cm long, extremely compressed, slightly constricted between seed, sparsely hairy to almost glabrous, apex with small beak. Seeds black, elliptic or subreniform shining, 3 - 5 mm.

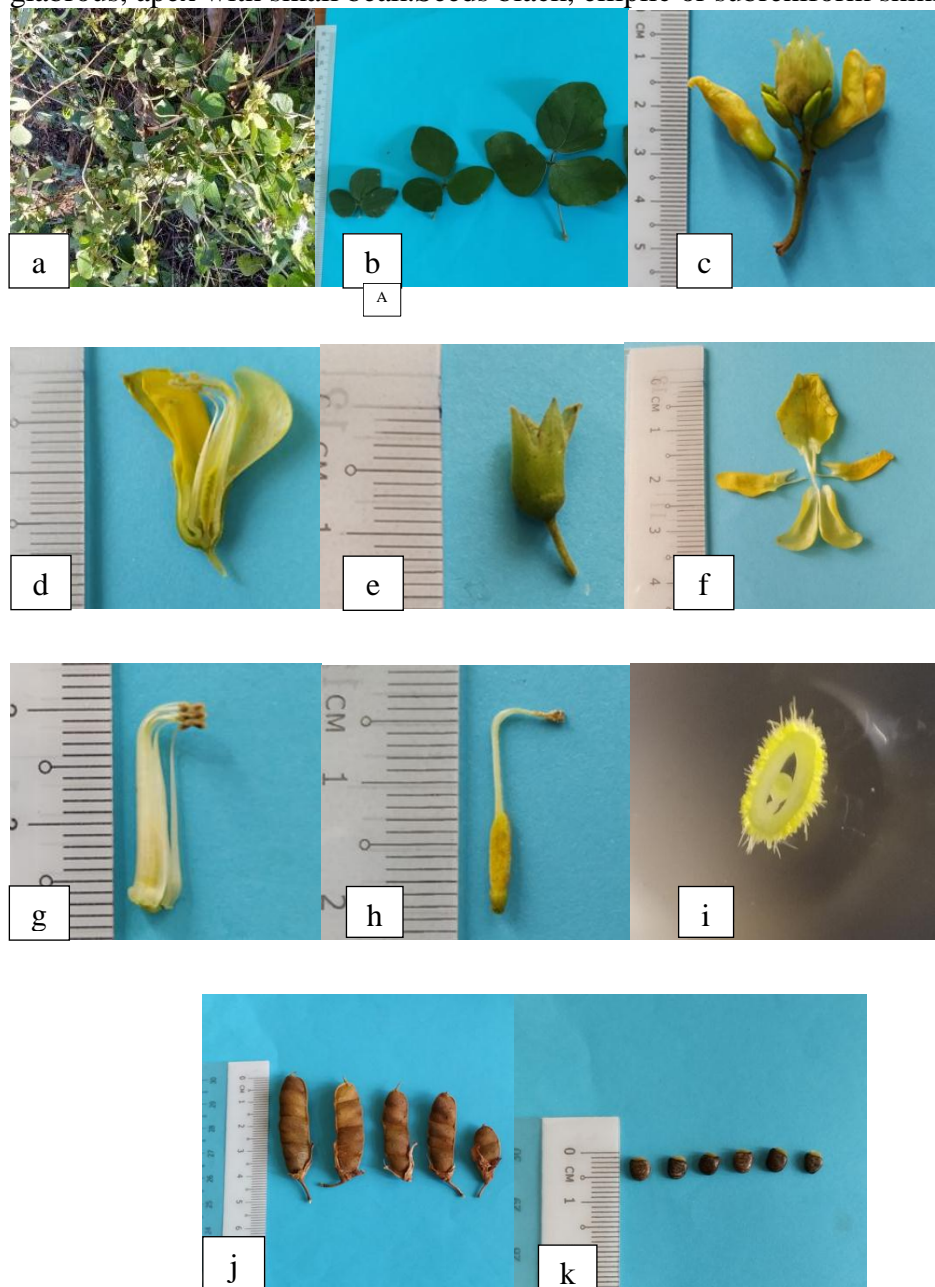


Figure 1 *Rhynchosia volubilis* Lour. (a) Habit, (b) Leaves, (c) Inflorescence, (d) LS flower, (e) Calyx, (f) Corolla, (g) Androecium, (h) Gynoecium, (i) TS ovary, (j) Fruits, (k) Seeds

Table 1 Sensory characters of the powdered Leaves of *Rhynchosia volubilis* Lour.

Sensory characters	Leaves
Colour	Yellowish green
Odour	Slightly Pungent
Taste	Acerbity
Texture	Granular

## II. Phytochemical Studies of *Rhynchosia volubilis* Lour.

Table 2 Preliminary phytochemical screening of the powdered leaves from *Rhynchosia volubilis* Lour.

No.	Test	Extract	Test reagents	Observation	Results
1	Alkaloid	1% HCl	Dragendorff's reagent	Orange ppt.	+
2	Amino acid	H <sub>2</sub> O	Ninhydrin reagent	Violet color	+
3	Carbohydrate	H <sub>2</sub> O	Benedict's solution	Red color	+
4	Flavonoid	EtOH	Mg turning + Conc: HCl	Reddish-pink color	+
5	Glycoside	H <sub>2</sub> O	10% Lead acetate	White ppt.	+
6	Phenolic compound	EtOH	10% FeCl <sub>3</sub>	brown color	+
7	Reducing sugar	H <sub>2</sub> O	Benedict's solution	red color	-
8	Saponin	H <sub>2</sub> O	Conc: H <sub>2</sub> SO <sub>4</sub>	Foaminess	+
9	Starch	H <sub>2</sub> O	Iodine solution and potassium iodide	deep blue color	+
10	Steroid	EtOH	Acetic anhydride + Conc: H <sub>2</sub> SO <sub>4</sub>	Green color	+
11	Tannin	EtOH	NaCl, 1% Gelatin	deep blue color	+
12	Terpenoid	EtOH	Acetic anhydride + Conc: H <sub>2</sub> SO <sub>4</sub>	pink color	-
13	Lipophilic group	H <sub>2</sub> O	0.5M KOH	deep color	-
14	Polyphenol	EtOH	1% FeCl <sub>3</sub> + 1% K <sub>3</sub> Fe(CN) <sub>6</sub>	greenish-blue color	+
15	Protein	H <sub>2</sub> O	NaOH solution, CuSO <sub>4</sub> solution	red ppt.	+

(+) = presence,

(-) = absence,

ppt = precipitate

Table 3 Nutritional values of the powdered leaves of *Rhynchosia volubilis* Lour.

No.	Experiment	Present Chemical Analysis Results
1	Protein ( % )	14.09
2	Fiber ( % )	21.04
3	Fat ( % )	3.73
4	Ash ( % )	11.18
5	Moisture ( % )	10.02

Table 4 Elemental analysis of the powdered leaves of *Rhynchosia volubilis* Lour.

No.	Elements	Mg / L
1	Calcium (Ca)	72.94
2	Manganese (Mn)	0.835
3	Lead (Pb)	-3.593
4	Magnesium (Mg)	8.645
5	Cromium (Cr)	-0.803
6	Cadmium (Cd)	0.047
7	Zinc (Zn)	0.038
8	Copper (Cu)	0.026

### Discussion and Conclusion

*Rhynchosia volubilis* Lour. has been studied in this research. The morphological characters of both vegetative and reproductive parts of this plant were studied and phytochemical investigation of powdered leaves were analysed. This plant was to be rarely found as a wild plant in Myanmar, native people from the collected area used as traditional medicines.

*Rhynchosia volubilis* Lour. was herbaceous twinner, 3 - foliateleaves, leaflet papery, lateral leaflet small and stipule small lanceolate, inflorescence axillary, flower yellow, calyx campanulate, vexillum suborbicular, wings obovate-oblong and keel rostrate, ovary pubescent, legumes oblong, apex with small beak, seeds shining black. These characters are in agreement with those given by Hooker 1885 & Ren *et al.* 2010.

The sensory characters of powdered leaves of *Rhynchosia volubilis* Lour. were yellowish green in colour, slightly pungent and acerbity taste. The texture of powdered sample was granular.

The results of preliminary phytochemical analysis of *Rhynchosia volubilis* Lour. were showed that the presence of alkaloid, amino acid, carbohydrate, flavonoid, glycoside, phenolic compound, saponin, starch, steroid, tannin, polyphenol and protein. Reducing sugar, terpenoid and lipophilic group were absent in its leaves. The elemental analysis of powdered leaves sample was carried out by Atomic Absorption Spectrophotometer (AAS) showed that the presence of high elemental concentration was Calcium (Ca) and the lowest concentration was Lead (Pb). In the determination of nutritional values, protein, fiber, fat, ash and moisture present in the powdered leaves of *Rhynchosia volubilis* Lour. were found. Protein was present higher percent than the others.

According to this research, the leaves of *Rhynchosia volubilis* Lour. were rich in nutrient content, would also be used for traditional medicine and nutritional value. *Rhynchosia volubilis* Lour. a small soybean with a black seed coat, has been used as traditional oriental remedy for various human diseases in Eastern Asian (Kang *et al.* 2018). In Myanmar, these plants were used native people from the collected area as traditional medicines. Infusion of its leaf was used to relieve dropsy, edema and hydropis. The dried leaves were prepared as blood cleaning. Thus, this plant should be carried out for further research.

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