

## Botanical and Phytochemical Studies on Leaves of *Vitex Trifolia* L. (Kyaung - Ban)

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### Abstract

Leaves of *Vitex trifolia* L. were collected in Hinthada University, Hinthada Township. The location of specimens collection was made by using Global Positioning System (GPS) device. It belongs to the family Verbenaceae of the order Verbenales. The powdered sample of leaves were used for phytochemical and physico-chemical studies in this research. The phytochemical properties; alkaloid, glycoside, reducing sugar, steroid, saponin, terpenoid, phenolic compound, flavonoid, carbohydrate, tannin and protein were present. Cyanogenic glycoside,  $\alpha$ -amino-acid and starch were absent. In physico-chemical properties, the powdered sample of leaves were most soluble in methanol. Elemental analysis of the powdered sample of leaves was carried out by using Energy Dispersive X-ray Fluorescence (EDXRF). In this result, potassium was the most concentration in other elements. In Atomic Absorption Spectrometry (AAS), calcium was the most concentration in all elements. The nutritional values of powdered leaves were identified according to Analytical Official Association Chemis Methods (AOAC). Carbohydrate was the highest concentration in all nutrients in this result.

**Keywords:** *Vitex trifolia* L. (Kyaung-ban), Morphology, Phytochemical Screening, Nutritional value

### Introduction

*Vitex trifolia* L. is a wild type and it is distributed throughout Myanmar. In Myanmar, *Vitex trifolia* L. is commonly known as Kyaung-ban. *Vitex trifolia* L. is found in a teak forest, secondary forest and is thick up to 100 m altitude, but also in mangrove forest and along the shore, Prosea, (1999).

These plants are grown in Hinthada University Campus, at Hinthada Township situated between (East Longitude 095 ° 26.193' and North Latitude 17 ° 38.465''). *Vitex trifolia* L. plants are deciduous shrubs or small trees, which are about 6 meters in height with aroma. Young shoots are square and densely pubescent. Old branches turn round and all the hairs gradually fall off.

The powdered sample of leaves contain alkaloid, glycoside, reducing sugar, saponin, steroid, phenolic compound, carbohydrate, acid-base, tannin and flavonoid. (Myanmar Traditional Medicine).

*Vitex trifolia* L. is often used as hedge plant, although it may trigger various allergic reactions (Sneezing respiratory problems, dizziness, headache, nausea) to people trimming or pruning such hedges, Prosea, (1999).

Thus, this plant was selected for this research work. The aim of this study is to examine the medicinal plant scientifically to know its medicinal values. The main objectives are to study the morphology and histological characters, characterization of powdered drug and to perform the qualitative and quantitative analysis of this plant.

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## Materials and Methods

The specimens of *Vitex trifolia* L. used in this research were collected from Hinthada Township. The specimens were personally collected during the flowering and fruiting period throughout the year. The fresh parts were used for morphological and histological characters studies. Specimens were dried, pressed and mounted on herbarium sheets.

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

## Results

### 1. Botanical studies

Scientific name	- <i>Vitex trifolia</i> L.
Synonym	- <i>Vitex rotundifolia</i> L.f.
Myanmar name	- Kyaung-ban
English name	-Indian wild pepper.
Family	-Verbenaceae
Location	-Hinthada University
	N 17° 38.465" / E 095° 26. 193"

### Morphological Characters of *Vitex trifolia* L.

**Habit:** shrub or small tree young stems tomentose. **Leaves:** opposite some simple, some palmately 3-foliolate, exstipulate, petiolate, leaflets elliptic, obovate or obovate-oblong, the margin entire, the tip acute, the upper surfaces glabrescent, the lower tomentose, sessile, rather very short petiolulate. **Inflorescences:** paniculate cymes, usually terminal. **Flower:** ebracteate, pedicellate, bisexual, zygomorphic, pentamerous, hypogynous. **Calyx:** synsepalous, 5-toothed, campanulate, persistent. **Corolla:** synpetalous, tubular, 5-lobed, bilabiate, the lower lip 3-lobed, the middle lobe largest, tomentose, purple blue. **Androecium:** polyandrous, stamens 4, didynamous, epipetalous, exerted, the filament base pubescent, the anther dithecous, divaricate, introrse, dehiscence longitudinal. **Pistil:** 1, ovary globose, 2-carpelled, syncarpous, 4-loculed, the placentaion axile, the ovule one in each locule, the style filiform, the stigma 2-fid. Fruit a drupe, globose. **Seeds:** obovoid or oblong, non-endospermic. **Flowering and fruiting time:** throughout the year. The morphological Characters of *Vitex trifolia* L. (Kyaung-ban) is shown in figure (1).

### Preliminary phytochemical screening of powdered sample of Leaves

In phytochemical screening the presence of alkaloid, glycoside, reducing sugar, steroid, phenolic compound, flavonoid, carbohydrate, tannin, terpenoid, saponin and protein were detected. Cyanogenic glycoside,  $\alpha$ - amino acid, and starch were absent. The results were shown table (1).



Habits



Upper epidermis of leaves



Lower epidermis of leaves



Inflorescence



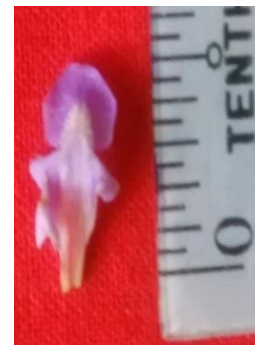
Flower



L.S of flower



Sepals



Petals



Stamens



Carpel



T.S of ovary



Fruits



Seed

Figure (1) Morphological Characters of *Vitex trifolia* L. (Kyaung-ban).

Table (1) Preliminary Phytochemical screening of powdered sample on leaves from *Vitex trifolia* L.

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

(+) = present      (-) = absent

Table (2) Physico-chemical examination of powdered sample leaves of *Vitex trifolia* L.

No.	Physico- chemical characters	Average (%W/W)
1.	Moisture content	11.07
2.	Total ash content	6.86
3.	Acid-insoluble ash matter content	17.53
4.	Water- soluble ash matter content	31.16
5.	Ethanol soluble matter content	8.3
6.	Methanol soluble matter content	11.0
7.	Petroleum ether matter content	3.7
8.	Ethyl -acetate matter content	4.8
9.	Chloroform soluble matter content	5.67
10.	Acetone soluble matter content	8.4
11.	Aqueous soluble matter content	7.2

In this experiment, the percentage of methanol soluble matter was more than other soluble matters but the percentage of petroleum ether matter was found to be the least

Table (3) Elemental analysis of powdered sample of leaves of *Vitex trifolia* L. by using EDXRF.

No	Elements	Average (%W/W)
1	Potassium (K)	0.403
2	Calcium (Ca)	0.306
3	Silver (S)	0.051
4	Iron (Fe)	0.013
5	Manganese (Mn)	0.001
6	Strontium (Sr)	0.001
7	Zinc (Zn)	0.002
8	Rudibium (Rb)	0.000
9	Copper (Cu)	0.001

In this result, Rudibium ( Rb ) was not observed in the powdered sample of leave

Table (4) Elemental analysis of ash sample of leaves of *Vitex trifolia* L. by using ( AAS).

No	Samples	Average (%W/W)
1	Calcium (Ca)	2.300
2	Manganese (Mn)	0.188
3	Magnesium (Mg)	1.796
4	Lead (Pb)	0.005
5	Chronium (Cr)	0.003
6	Cadmium (Cd)	0.010
7	Zinc (Zn)	0.199
8	Copper (Cu)	-0.002

In this research work, the medicinal plant parts were determined by Atomic Absorption Spectrometry ( AAS ) method. Analytical assay of the samples were contained.

Table (5) Nutritional Values of the powdered sample of leaves of *Vitex trifolia* L.

No.	Test Parameter	Test Method	Result
			Leaves
1.	Moisture	AOAC-2000 ( 930.04 )	17.37%
2.	Ash	AOAC-2000 ( 930.05 )	18.42%
3.	Crude protein	AOAC-2000 ( 920.152 ) ( Kjendahl Method)	13.42%
4.	Crude fiber	AOAC-2000 ( 978.10 ) (Fiber cap method)	13.92%
5.	Ether Extract ( Crude fat )	AOAC ( Buchi Soxhlet Method )	5.54%
6.	Carbohydrate	By Difference	50.76%
7.	Energy Value ( kcal/100g )		310

Nutritional values of the powdered leaves were found as shown in the table.

### **.Discission and Conclusion**

In this research, *Vitex trifolia* L. belongs to Verbenaceae Family and all parts of the leaves can be used. As a result, botanical studies and chemical studies were observed.

In this study, *Vitex trifolia* L. is perennial shrubs. Young stems are quadrangular and tomentose freely branched from near the base. Leaves are compound, opposite and decussate or trifoliate, petiolate, exstipulate, laminae middle oblong to obovate, leaflet unequal, uppersurface glabrous and lower tomentose. Inflorescences are paniculate cyme. Flowers are bisexual, zygomorphic, hypogynous, bracteate, pedicellate. Stamens are apostemonous, anther dithecos, ovary superior, globose, axile placentation. Fruits are drupe, globose. Seeds are obovoid or oblong. These morphological characters were in agreement with Hooker (1879).

In the phytochemical tests, the leaves of *Vitex trifolia* L. consists of alkaloid, glycoside, reducing sugar, steroid, saponin, terpenoid, phenolic compound, flavonoid compound, carbohydrate, tannin and protein were present. Cyanogenic glycoside, starch and  $\alpha$ -amino acid were absents. These results were in agreement with those given by Trease & Evans (2009) and Unani Medicine (1987).

In physico-chemical characterization, the yield of water soluble ash more soluble than other soluble matters in the powdered samples of leaves. Pet-ether is less soluble than other soluble matter in powdered sample of leaves. The solubility properties were considered for the preperation of crude drugs in British Pharmacopoeias (1968).

According to the elemental analysis of (EDXRF) Spectrum powdered samples of leaves consist of Potassium (K), Calcium (Ca), Silver (S), Iron (Fe), Maganese (Mn), Strontium (Sr), Zinc (Zn), Rudibium (Rb), and Copper (Cu). These results were analyzed by the University of Research Center (URC). Most industrial application of Potassium exploit the high solubility in water of potassium compounds, such as potassium soaps. Heavy crop production rapidly depletes soils of potassium and this depletion is prevented and remedies with agricultural fertilizers containing potassium. Potassium is essential minerals that help in absorption of digested fat, protein and carbohydrate in the body.

The result of nutritional values of the powdered sample of leaves were found to be moisture, ash, crude protein, crude fiber, crude fat and carbohydrate. These results were according to Food Industries Development Supporting Laboratory (FIDSL).

In addition, the selected medicinal plant *Vitex trifolia* L. can be used for medicines. The leaves of *Vitex trifolia* L. are useful in rheumatic pains and sprains and they are stuffed into the pillow to cure catarrh and headaches. A strong decoction of the leaves are taken internally and a poultice of crushed leaves are applied to the wound. Infusion of leaves or decoction of roots are taken orally for fever and are diapharetic and diuretic, Burkill (1935). This plant should be carried out for further research. It is hoped that further and more detailed study of the aspects will make a great contribution to the improvement of the indigenous medicine.

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