

## Feature Selection for Indian and Bhutan Medicinal Plant Leaf Shape Isolation and Identification of Alkaloids

NEETA GUPTA

Department of Chemistry, N.K.B.M.G. (P.G.) College,  
Chandausi – 244412 (India)

Email:- [satishchandra111960@gmail.com](mailto:satishchandra111960@gmail.com)

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### Abstract

Plants play one of the most important roles in our ecosystem. But the rapid decline in the variety of plants is an issue which demands our immediate attention. The first logical step would be the identification of the plant *Zanthoxylum alatum* Roxb. Manual identification can often be time consuming and inaccurate. Plants also play a major role in ayurvedic and modern forms of medicine. Medicinal plants are used very much in herbalism to study the medicinal properties of the plants. There is an urgent need to identify and classify the medicinal plants. In this study, *Zanthoxylum alatum* Roxb. Indian and Bhutan medicinal plant is identified and classified. This study is important in order to assist local community to utilize the knowledge and application of Indian and Bhutan medicinal plants for future generations.

*Key words:* Indian and Bhutan medicinal plants, leaf shape identification, classification, feature selection, wrapper, image processing.

### Introduction

The highlight of medicinal plants is one type of plants that have medicinal properties recognized by medicine worldwide. For centuries people have used plants with varying success to cure and prevent diseases. Since in the early 1980s the efforts to identify plants from images have attracted various

studies on different techniques for image processing<sup>1-3</sup>.

In this paper, a study is conducted on the genera *Zanthoxylum* which belongs to the natural order Rutaceae. The species *Zanthoxylum alatum* Roxb. is an evergreen or sub-deciduous shrub, occasionally a small tree up to 5m height and stem 20cm diameter. Bark is pale brown, rather deeply furrowed

corky blaze 8-12mm, pale yellowish brown or without paler streaks soft, the whole rapidly darkening on exposure. Leaves imparipinnate 10-20cm long. The lateral smaller, flowers polygamous, yellow, incense pubescent lateral 3-6cm long fruit of 1-3 carpel's 3-4mm. diameter globose shining black.

It is distributed in trans Indus, Punjab, Himachal Pradesh along the foot of the Himalaya from Indus eastward upto 6000ft. Kumaon 6000 to 7000ft. eastward to Bhutan, Khasia hills 2500-3000ft.<sup>4,6</sup>

*Therapeutics :*

The fruit is bitter sweetish hot tasty and digestible, appetizer anthelmintic removes kappa and Vatta pain, tumours abdominal troubles, useful in eye and ear diseases headache, heaviness, leucoderma, asthma, troubles of the spleen.

The seeds are sharp with good taste and smell, tonic very astringent to the bowels and useful in diarrhoea, good in brain diseases and insanity, strengthen the liver purify the blood, remove smell from the mouth.<sup>3</sup>

Seeds and bark are used as an aromatic tonic in fever and cholera, the fruit as well as the branches and thorns are used as a remedy for toothache.<sup>2</sup>

The aromatic seeds are considered stomachic in Indochina. They are given in form of powder for colic worms. The drug is regarded an excellent, carminative and sudorific in Bhutan.

*Presence of Alkaloid :*

The presence of a furoquinoline alkaloid "Dictamnine" from the stem bark of the plant. The plant *Zanthoxylum* species also contain alkaloids of the group other than furoquinoline mainly isoquinoline group. The present research work on the stem bark of the plant with an idea that the plant might contain alkaloids.<sup>6</sup>

*Extraction of Essential Oil :*

The quality of essential oil by determining their chemical composition I proceeded by the method chromatography in gas coupled with a spectroscopy of mass (CPG/SM).

*Present Investigation :*

The stem bark of the plant *Zanthoxylum alatum* Roxb was extracted with ethanol in a soxhlet, A yellow base 'A' a colourless crystalline compound 'B' and a pale yellow crystalline compound 'C' were obtained from the ethanolic extract.<sup>4</sup>

*Identification of Yellow Base 'A' :*

The physico chemical properties and derivatives prepared of the yellow base were in quite agreement with those of yellow base obtained from the plant *Juglans regia* Linn. It is also identified as 'Berberine'.

*Identification of Colourless Crystalline Compound 'B' :*

It give positive test with usual alkaloids reagents. It dissolved to a colourless solution in con. H<sub>2</sub>SO<sub>4</sub>, mixing of a crystal of potassium dichromate gave a green colour due to its reduction to chromic salt.

*Identification of Pale Yellow Compound 'C'*

- i. It gave a yellow solution with con. H<sub>2</sub>SO<sub>4</sub>, with a green fluorescence on addition of potassium chlorate, the solution became reddish brown.
- ii. With formaldehyde and H<sub>2</sub>SO<sub>4</sub>, it gave a yellow colour changing to green on warming
- iii. With con HNO<sub>3</sub> it gave orange red colour.
- iv. With Mandelin's reagent, it gave a greenish-yellow colour.
- v. A potassium bismuth iodide, it gave orange colour. on the basis of colour reaction and derivatives prepared, the pale yellow compound 'C' of the present work is identified as 'Skimmianine'<sup>5</sup>

*Antibacterial and anti Fungal Properties:*

The ethanolic extract and alkaloids obtained from the stem bark of the plant *Zanthoxylum alatum* Roxb. were subjected to observe antibacterial and antifungal activities and the results obtained bacteria or fungi as *Staphylococci.*, *E. Coli*, *Salmohella* typing, *Shigella flexneri*, *Pseudomonas*, *Micro sporum* *Gypseum*, *Trichophyton*, *mentagrophytes* and *Trichophyton rubrum*.

*Isolation of Alkaloids From the Stem Bark of the Plant Zanthoxylum Alatum Raxb:*

The stem bark of the plant *Z. alatum* Roxb was collected from Nainital. After grinding and drying a total of 5kg. of the powdered stem bark was extracted with ethanol in a soxhlet about 50 hours temperatures regulated at 60-70°C and a yellow base 'A' was isolated from the ethanolic extract. After the complete isolation of yellow base

hydrochloride, the filtrate was basified with sodium carbonate and extracted with chloroform. The chloroform extract was concentrated and subjected to chromatographic resolution over alumina column. We follow the evolution of the mass of the material for a fixed temperature. on mixing with chloroform it gave two compounds the first is colourless compound 'B' and a pale yellow compound 'C' after mixing ethanol and recrystallisation these A,B and C subjected form identification.

*Identification of Yellow Base 'A':*

The yellow hydrochloride 'A' was made alkaline with ammonia and extracted with chloroform, extract was submitted to preparative TLC- the greenish yellow fluorescent zone correspond to berberine was eluted with ammonical methanol which was evaporated to dryness, After addition of ammonium chloride this methanol extract, the crude alkaloid berberine hydrochloride was obtained.

*Identification of Colourless Compound 'B':*

It was obtained from the chloroform fraction of the solvent. After recrystallisation from ethanol, it crystallised in prism form at 130°C. Hydrochloride, picrate, picrolonate and phenylhydrazone were prepared by usual methods and after recrystallisation with ethanol. Hemihydrate obtained at 140°C Anhydrous of the compound at 150°C. Benzoyl Isodictamnine at 165°C. Nordictamnine at 260°C.

*Identification of Pale Yellow Compound 'C':*

It was obtained by column Chromatography over alumina with chloroform. After

evaporation of solvent the foregoing yellow hydrochloride was crystallized from water, containing few drops of HCl, Recrystallisation from ethanol, which melted at 170°C. it was obtained 1.8g/Kg of plant material. The compound was identified by preparing the derivatives picrate, phenyl hydrazone and nitrosoderivative by usual method.

### Discussion

The derivatives from the stem bark of the plant 'Zanthoxylum alatum' were isolated and characterized the presence of "Berberine" "Skimmianine". and "Dictamnine". On observing the antibacterial properties of "Berberine" hydrochloride, it can be safely suggested that the compound may be used in dysentery as it is much effective than that of ethanolic extract.

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