A STUDY ON THE STANDARDIZATION PARAMETERS OF BAUHINIA VARIEGATA

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ABSTRACT

Objective: In today’s scenario, the herbal medicines are much efficient for the treatment of various disorders as they have minimal side effects in comparison to the allopathic medicines. Bauhinia variegata L. (Mountain Ebony), commonly called Kachnar, belongs to the family Leguminosae. It is a medium-sized tree, mostly found at an altitude of 1300 m in the Himalayas. The objectives of the present study are to investigate various pharmacognostic, phytochemical analysis, and pharmacological properties of B. variegata.

Methods: The powdered drug was used for estimating the loss on drying, ash values, fluorescence studies, chemical tests, and extractive values. Macroscopic and microscopic studies were also performed.

Results: The leaf microscopy revealed the presence of upper and lower epidermis, palisade tissue, well-developed vascular bundle. The fluorescence characteristics of leaf powder were studied both in visible light and ultraviolet light (254 nm and 365 nm) after treatment with various reagents. Kachnar is composed of carbohydrates, tannins, alkaloids, flavonoids, amino acid. It was reported that the total ash value was 8.15%. The acid insoluble ash value was 5.5%.

Conclusion: The main pharmacological activities of B. variegata are anthelmintic, antil ulcer, antitumor, antimicrobial, anti diabetic, anti-inflammatory, anti-goutigogenic, and hepatoprotective. The present investigation provides the information on its pharmacognostic, phytochemical analysis, and pharmacological properties.

Keywords: Flavonoids, Kachnar, Alkaloids, Antioxidant, Leguminosae.

INTRODUCTION

Bauhinia variegata belongs to family leguminosae (caesalpinioideae) and is commonly known as Kachnar (Hindi), Mountain Ebony (English), and Rakta kanchan (Marathi). It is a medium-sized, deciduous tree found throughout India, mostly at 1800 m in the Himalayas. The genus Bauhinia includes about 600 species including shrubs, trees, and vines. It is mostly planted as an ornamental plant. It grows throughout India and China. It is a crucial greenhouse species of the Himalayas [1].

B. variegata Linn. is used for curing bronchitis, leprosy, inflammation, bacterial infection, diarrhea, dysentery, skin disease, intestinal worms, wounds, ulcer, fungal infection, ulcers, and tumors [2-4]. The stem bark is used as astringent, alterative, anti diabetic, antitumor, tonic and anthelmintic, obesity, and washing ulcers [2-4-6].

The flowers of B. variegata are hermaphrodite. The color of the petals is purple/white/yellow. The shape of petal is obovate with 4-6 cm length and 2-3 cm width. It grows well in sandy, loamy, and clay soils [7].

The stem bark of B. variegata is composed of kaempferol-3-glucoside, lupeol, 5,7 dihydroxy and 5,7 dimethoxy flavanone-4-O-

RESUL TS AND DISCUSSION

Macroscopic characters
The bark is light brownish-gray, smooth to slightly fissured, and scaly. Leaves have minute stipules 1-2 mm, 3-4 cm; lamina broadly ovate to circular; often broader than long, 6-16 cm diameter; 11-13 nerved. Flower clusters (racemes) are unbranched at ends of twigs. Pods are dehiscent, strap-shaped, 20-30 by 2-25 cm; long, hard, flat with 10-15 seeds [1].

METHODS

The leaves of B. variegata L. were collected from the College Campus of Shri Ram Murti Smarak (College of Engineering and Technology) Bareilly (Uttar Pradesh) and identified (specimen number- RU/PS/2016/415) by Prof. A.K. Jaitly, Head, Department of Plant Science, Mahatma Jyotiba Phule Rohilkhand University, Bareilly, Uttar Pradesh.

Powdered drug was used for moisture content, ash values, swelling index, and fluorescence studies were carried out by treating 0.5 g of powdered drug with different reagents and observation in color was made in visible light, ultraviolet (UV) light of short (254 nm) and long wavelength (365 nm) under UV chamber. Photomicrography was done using Olympus C7070 camera [10].

RESULTS AND DISCUSSION

Microscopical examination of leaf
The upper and lower epidermis is covered by thin cuticle. Palisade tissue is two layered and the cells are columnar which are loosely arranged and it has well-developed vascular bundle with xylem and
phloem. Most of the cells have calcium oxalate crystals. The vascular bundles are seen to be surrounded by sclerenchymatous tissue.

**Pharmacognostic evaluation of the plant**

The plant material was used for quantitative determination of physicochemical values. Ash values, loss on drying, and extractive values were estimated.

**Phytochemical screening**

The dried leaves were powdered and extracted with petroleum ether, chloroform, ethanol, and water in soxhlet apparatus. The percentage yield was analyzed. The phytochemical tests were performed for the estimation of alkaloids, glycosides, flavonoids, and tannins in various plant extracts and resulted in the presence of carbohydrates, gums, proteins, alkaloid, saponins, flavonoids, and tannins and results are given in Table 1.

**Fluorescent studies of powder drugs**

The fluorescence characteristics of leaf powder were studied both in visible light and UV light (254 nm and 365 nm) after treatment with various reagents and is represented in Table 2 [11–13].

![Fig. 1: Leaves and flowers of Bauhinia variegata](image)

**Table 1: Chemical tests**

| S.No | Phytochemical tests | Petroleum ether | Methanol | Water | Ethanol | Chloroform |
|------|---------------------|----------------|----------|-------|---------|------------|
| 1.   | Carbohydrates       | ++            | ++       | +++   | +       | -          |
|      | Molisch test        | ++            | ++       | +++   | +       | -          |
|      | Fehling’s test      | +             | +        | ++    | +       | -          |
|      | Benedict’s test     | -             | ++       | -     | +       | -          |
|      | Barfoed’s test      | -             | -        | +++   | +       | +          |
| 2.   | Gums                | +             | ++       | +     | +++     | +          |
|      | Solution+HCl+Fehling’s test | + | ++ | + | +++ | + | 
| 3.   | Proteins            | +             | -        | -     | +       | -          |
|      | Biuret test         | -             | -        | ++    | -       | -          |
|      | Millon’s test       | -             | ++       | -     | +       | -          |
|      | Xanthoprotein test  | ++            | -        | +     | -       | -          |
| 4.   | Amino acids         | +             | ++       | +++   | ++      | +          |
|      | Ninhydrin test      | -             | -        | ++    | +       | -          |
|      | Tyrosine test       | -             | -        | +     | ++      | -          |
|      | Cystein test        | -             | -        | +     | ++      | -          |
| 5.   | Fats and oil        | ++            | -        | -     | +       | -          |
|      | CuSO₄+NaOH          | ++            | -        | -     | +       | -          |
| 6.   | Triterpenoid        | -             | -        | -     | -       | -          |
|      | Noller’s test       | -             | -        | -     | -       | -          |
| 7.   | Steroid             | -             | -        | -     | +       | -          |
|      | Salkowski reaction  | -             | -        | -     | +       | -          |
|      | Lieberman–Burchard reaction | - | ++ | - | - | - |
| 8.   | Cardiac glycosides  | +             | +        | ++    | +       | +          |
|      | Baillet’s test      | ++            | ++       | +++   | +       | +          |
|      | Legal’s test        | -             | +        | -     | +       | -          |
|      | Keller–Killiani test| -             | -        | +     | ++      | -          |
| 9.   | Anthraquinone glycosides | + | ++ | + | ++ | + | 
|      | Borntrager’s test   | -             | -        | -     | -       | -          |
|      | Modified Borntrager’s test | - | - | - | - | - |
| 10.  | Saponin glycosides  | +             | ++       | +     | +       | ++         |
|      | Foam test           | +             | ++       | +     | +       | ++         |
| 11.  | Cyanogenic glycosides| +             | +        | ++    | +       | +          |
|      | Na picrate test     | +             | +        | ++    | +       | +          |
| 12.  | Flavonoids          | +             | +        | +++   | +       | +          |
|      | Shinoda test        | +             | ++       | +++   | +       | +          |
|      | Lead acetate        | -             | +        | +++   | +       | +          |
|      | NaOH                | +             | +        | +     | ++      | -          |
| 13.  | Alkaloids           | +             | +        | +     | +       | +          |
|      | Dragendorff’s test  | +             | +        | +     | +       | +          |
|      | Mayer’s test        | -             | +        | +     | +       | +          |
|      | Wagner’s test       | -             | +        | +++   | +       | +          |
|      | Hager’s test        | -             | +        | +     | ++      | -          |
| 14.  | Tannins             | 5% FeCl₃      | +        | +     | +       | -          |
|      | Lead acetate        | +             | +        | ++    | +       | -          |
|      | Dichromate HNO₃     | +             | +        | ++    | +       | -          |
|      | Acetic acid         | +             | +        | +     | +       | -          |

+ Trace, ++: Present, +++: Excess, - Absent
Table 2: Fluorescence activity of B. variegata Linn. leaves

| S.No. | Material/treatment                          | Observation under UV cabinet |
|-------|---------------------------------------------|------------------------------|
|       |                                             | Visible light | Short UV 254 nm | Long UV 365 nm |
| 1.    | Drug powder as such                        | Light green    | Green fluorescent | Light brown  |
| 2.    | Drug powder rubbed on Whatman filter paper  | Dark green     | Dark Green       | Black        |
| 3.    | Powder treated with 1 molar NaOH in water   | Light green    | Green            | Dark green   |
| 4.    | Powder treated with pet ether               | Light green    | Light green      | Brown        |
| 5.    | Powder treated with 5% iodine               | brown green    | Light green      | Brown        |
| 6.    | Powder treated with 5% FeCl₃                | brown green    | Green            | Green        |
| 7.    | Powder treated with dilute ammonia          | Light green    | Fluorescent      | Brown        |
| 8.    | Powder treated with methanol                | Dark green     | Green            | Brown        |
| 9.    | Powder treated with 1 M H₂SO₄               | Light green    | Light green      | Brown        |
| 10.   | Powder treated with picric acid             | Light green    | Green            | Dark Brown   |
| 11.   | Powder treated with chloroform              | Light green    | Light green      | Brown        |

B. variegata: Bauhinia variegata, UV: Ultraviolet

Table 3: Physiochemical parameters

| S.No. | Parameters                      | Values (%) |
|-------|---------------------------------|------------|
| 1.    | Total ash value                 | 8.15       |
| 2.    | Water insoluble ash value       | 6.50       |
| 3.    | Water soluble ash value         | 2.25       |
| 4.    | Acid insoluble ash value        | 5.50       |
| 5.    | Loss on drying                  | 6.66       |

The physiochemical parameters of leaf of B. variegata Linn. are tabulated in Table 3. The loss on drying at 105°C in leaf was found to be 6.66%. Total ash value of leaf represents minerals and earthy materials attached in the plant material. It was reported that the total ash value was 8.15%. The acid insoluble ash value was 5.5%. The water soluble ash value represents the presence of acids, sugar, and inorganic compounds and was found to be 2.25%. The results are given in Table 3.

CONCLUSIONS

The physicochemical and phytochemical investigations of B. variegata were performed in this study. These parameters are necessary for the identification of drugs. The presence of various chemical constituents in B. variegata may be a potential cause of treatment of various disorders. The quality of the plant can be estimated by determining the physical parameters. These investigations are of great importance for carrying out the revalidation and estimation of its other pharmacological activities. It was concluded from the phytochemical study that the ethanolic extract contains flavonoids, glycosides, carbohydrates, and tannins which are responsible for various pharmacological activities such as anti-inflammatory, chemoprotective activity, antioxidant, antidiabetic, antianxiety, and antidepressant.

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