

## Phytochemical studies in leaf drug *adhatoda vasica* nees.

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### Abstract

*Adhatoda vasica* Nees. is an evergreen, perennial shrub with terete glabrous stem belonging to family Acanthaceae. Its leaves are medicinally exploited to treat several diseases and disorders. Being an important ayurvedic drug it is deliberately adulterated. Phytochemical studies in this leafy drug are carried out to standardize and detect the adulteration in it. The phytochemical studies include details of characters of leaf powder like colour, odour, taste, Alkaloids, Anthraquinone, Iridoids, Saponins, Steroids, Tannins (Qualitative) and dry matter, bulk density, nitrogen, Water soluble nitrogen, crude protein, crude fat, crude fiber, total ash, acid insoluble ash, acid soluble ash, water insoluble ash, water soluble ash, calcium, reducing sugar, total sugar, non-reducing sugar, cellulose, gross energy, phosphorus, extractive values in 10 solvents (Quantitative). The above parameters can be applied to standardize this leaf drug.

**Keywords-** Phytochemical studies, *Adhatoda vasica* Nees., adulterations.

### Introduction

*Adhatoda vasica* Nees. Is an evergreen, perennial 1-2m tall shrub with terete glabrous stem branches and simple, exstipulate, leathery leaves. Leaves are medicinally exploited to treat several diseases and disorders like or as Anthrax pustules, Asthma, Antibiotic, Antispasmodic, Antitubercular, Anti-tumor, Bronchodilatory, Bronchitis, Catarrh, Cough, Expectorant, Eye diseases, Girth galls in horses, Inflammation of tubercular glands, Inflammatory swellings on fresh wounds, Neuralgia, Rheumatic joints, Saddle sores [1],

Diarrhea, Dysentery, Emmenagogue, Glandular tumor [2, 3], Fever, Skin diseases [4], Insecticide, Nose bleeding [5], Poultice on the swelling parts [6], Throat infection [3]. Being a famous drug there are very chances of adulterations in drug. The adulterations may be deliberate or happened unknowingly. During present investigation an attempt was made to standardize the leaves of *Adhatoda vasica* Nees. by using some phytochemical parameters.

## Methodology

The leaf samples were collected from the medium sized authentically identified plant species from different localities of Marathwada. The leaves were removed carefully by hand pricking without damaging the plants. The leaves were collected in polythene bags and brought to the laboratory within 2-5 hours. The leaves were initially dried in shade and later in oven at 60°C till constant weight, then made in to fine powder and stored in sealed plastic container for further analysis [7]. The phytochemical analysis was carried out using standard procedures. The phytochemical parameters obtained from studies are useful to know the adulterations in leaf drug *Adhatoda vasica* Nees. The phytochemical studies include details of characters of leaf powder like colour, odour, taste, dry matter, nitrogen, crude fat, crude fiber, total ash, acid insoluble

ash, acid soluble ash, calcium, reducing sugar, total sugar, non-reducing sugar, cellulose, extractive values etc.

## Results and Discussions

All above mentioned characters were found to be diagnostic to find adulteration in the leaf drug *Adhatoda vasica* Nees. The parameters like deep green colour, sweet characteristic odour, bitter taste, presence of Alkaloids, Anthraquinones, Iridoids, Saponins, Steroids and Tannins give preliminary idea about authenticity of drug (Tables 1 & 2) while quantitative chemical parameters like dry matter 30.56 %, bulk density 0.332 mg/cm<sup>3</sup>, Nitrogen 2.58 %, 1.5 % water soluble nitrogen, crude proteins 16.12 %, crude fats 5.4 %, crude fibers 17.05 %, total ash 11.3 %, acid insoluble ash 1 %, acid soluble ash 2.88 %, water insoluble ash 4.3 %, water soluble ash 7.0 %, Calcium 3.494 %, reducing sugar 1.585 %, non-reducing sugar 1.334 %, total sugar 2.919 %, cellulose 21 %, gross energy 3.76 K cal/ gm, Phosphorous 0.46 % (Table 3) together can be exploited for making certain that raw material is genuine for predicting quantum of adulteration. The extractive values in Water 3.4 %, Acetone 0.4 %, Butanol 3.4 %, Chloroform 3.4 %, Diethyl Ether 1.8 %, Ethyl alcohol 5.2 %, Methanol 14.8 %, Petroleum ether 1.2 %, Propanol 1.4 %, Toluene 1.6 % are conclusive parameters (Table 4).

### Phytochemical characters of leaf powder

Table 1 Physical characters

| Sr. No. | Character | Expression     |
|---------|-----------|----------------|
| 1       | Colour    | Deep Green     |
| 2       | Odour     | Characteristic |
| 3       | Taste     | Bitter         |

Table 2 Qualitative phytochemical characters

| Sr. No. | Character     | Expression |
|---------|---------------|------------|
| 1       | Alkaloids     | +          |
| 2       | Anthraquinone | +          |
| 3       | Iridoids      | +          |
| 4       | Saponins      | +          |
| 5       | Steroids      | +          |
| 6       | Tannins       | +          |

**Table 3 Quantitative phytochemical characters**

| Sr. No. | Character                    | Expression               |
|---------|------------------------------|--------------------------|
| 01      | Dry Matter (DM)              | 30.56                    |
| 02      | Bulk Density                 | 0.332 mg/cm <sup>3</sup> |
| 03      | Nitrogen (N)                 | 02.58                    |
| 04      | Water Soluble Nitrogen (WSN) | 1.500                    |
| 05      | Crude Protein (CP)           | 16.12                    |
| 06      | Crude Fat (CFat)             | 05.40                    |
| 07      | Crude Fibre (CF)             | 17.05                    |
| 08      | Total Ash (TA)               | 11.30                    |
| 09      | Acid Insoluble Ash (AIA)     | 01.00                    |
| 10      | Acid Soluble Ash (ASA)       | 02.88                    |
| 11      | Water Insoluble Ash (WIA)    | 04.30                    |
| 12      | Water Soluble Ash (WSA)      | 07.00                    |
| 13      | Calcium (Ca)                 | 3.494                    |
| 14      | Reducing Sugars              | 1.585                    |
| 15      | Non Reducing Sugars          | 1.334                    |
| 16      | Total Sugars                 | 2.919                    |
| 17      | Cellulose                    | 21.00                    |
| 18      | Gross Energy (GE)            | 3.76 Kcal/gm             |
| 19      | Phosphorus (P)               | 0.460                    |

**Table 4 Extractive values**

| Sr. No | Solvent                             | Extractive Value |
|--------|-------------------------------------|------------------|
| 01.    | Extractive value in Water           | 03.40            |
| 02.    | Extractive value in Acetone         | 00.40            |
| 03.    | Extractive value in Butanol         | 03.40            |
| 04.    | Extractive value in Chloroform      | 03.40            |
| 05.    | Extractive value in Diethyl Ether   | 01.80            |
| 06.    | Extractive value in Ethyl Alcohol   | 05.20            |
| 07.    | Extractive value in Methanol        | 14.80            |
| 08.    | Extractive value in Petroleum Ether | 01.20            |
| 09.    | Extractive value in Propanol        | 01.40            |
| 10     | Extractive value in Toluene         | 01.60            |

**Conflicts of interest:** The authors stated that no conflicts of interest.

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