

## Ethanobotany and qualitative phytochemical analysis of some indian medicinal plants

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### ABSTRACT

Ethanobotany, the study of traditional use of plants, is a field of growing interest to research scientists and pharmaceutical companies looking to develop new and more effective drugs. Phytochemical analysis of medicinal plants has revealed that numerous compounds in plants traditionally used for medicinal purposes have many therapeutical properties. The present investigation deals with the phytochemical studies of different medicinal plants like *Balanites aegyptiaca* (Zygophyllaceae), *Cissus quadrangularis* (Vitaceae), *Curcuma longa* (Zingiberaceae), *Eclipta alba* (Asteraceae), *Embllica officinalis* (Euphorbiaceae), *Madhuca indica* (Sapotaceae), *Withania somnifera* (Solanaceae). Aqueous extracts of these plants have been screened for qualitative determination of different secondary metabolites like tannins, alkaloids, saponins, glycosides, steroids, terpenoids, flavonoids by specific chemical color reaction tests. Our finding provided evidence that extract of these tested plants contain medicinally important bioactive compounds and it justifies their use in the traditional medicines for the treatment of different diseases.

Key words: Ethanobotany, Phytochemical analysis, Medicinal plants, Bioactive compounds.

### 1. INTRODUCTION

The medicinal plants are those that provide people with medicines to treat illness, maintain and promote health. Plants are indispensable sources of medicinal preparations, both preventive and curative<sup>[1]</sup>. The medicinal importance of a plant is due to the presence of chemical constituents like alkaloids, glycosides, resins, volatile oils, gums, tannins etc<sup>[2]</sup>. These compounds are synthesized by primary or rather secondary metabolism of living organisms. Secondary metabolites are chemically and taxonomically extremely diverse compounds with obscure function<sup>[3]</sup>. They are widely used in the human therapy, veterinary, agriculture, scientific research and countless other areas<sup>[4]</sup>. Knowledge of the chemical constituents of plants is desirable not only for the discovery of therapeutic agents, but also because such information may be of value in disclosing new sources of such economic materials for the synthesis of complex chemical substances. In addition, the knowledge of the chemical constituents of plants would further be valuable in discovering the actual value of folkloric remedies<sup>[5]</sup>.

India is a varietal emporium of medicinal plants and is one of the richest countries in the

world in regard to genetic resources of medicinal plants. Considering all these facts in the present investigation, an attempt was made by some chemical tests to study the phytochemicals of some common Indian medicinal plants like *Balanites aegyptiaca* (Zygophyllaceae), *Cissus quadrangularis* (Vitaceae), *Curcuma longa* (Zingiberaceae), *Eclipta alba* (Asteraceae), *Embllica officinalis* (Euphorbiaceae), *Madhuca indica* (Sapotaceae) and *Withania somnifera* (Solanaceae).

### 2. MATERIAL AND METHODS

#### 2.1. Plant material identification and collection

The plant materials was collected and identified by the taxonomist of depts., Department of Botany, University of Rajasthan Jaipur.

#### 2.2. Preparation of plant material

The plants were washed with tap water and cut in to small pieces and air-dried thoroughly under shade (at room temperature) for 2 months to avoid direct loss of phytoconstituents from sunlight. The shade dried materials were powdered using the pulverizer and sieved up to 80 meshes. It was then homogenized to fine

powder and stored in air-tight container for further analysis. This powder material was used for the analysis of physicochemical and phytochemical constituents.

### 2.3. Extract preparation

An aqueous extract was prepared by boiling 10 % wt/wt of the air-dried powdered plant part in sterile distilled water for 10 min and then cooled to room temperature overnight. The aqueous extracts were filtered using a Millipore filters (Millipore 0.2 mm) to remove particulate matter. The final volume of each filtrate was completed to 100 ml with distilled water with to account for the evaporated water during boiling. The aqueous extracts were prepared shortly before application.

### 2.4. Preliminary phytochemical analysis

Qualitative analysis of aqueous extracts of selected medicinal plants was performed for the identification of various classes of active chemical constituents like alkaloids, flavonoids, glycosides, saponins, steroids, tannins and terpenoids using different methods of Harborne<sup>[6]</sup> and Kokate<sup>[7]</sup>.

#### 2.4.1. Test for alkaloid

3 ml aqueous extract was stirred with 3 ml of 1% HCl on steam bath. Mayer and Wagner's reagent was then added to mixture. Turbidity of the resulting precipitate was taken as an evidence for the presence of alkaloid.

#### 2.4.2. Test for flavonoids

To 1 ml of aqueous extract, 1 ml of 10% lead acetate solution was added. The formation of a yellow precipitate was taken as a positive test for flavonoids.

#### 2.4.3. Test for glycosides

Each extract was hydrolyzed with HCl and neutralized with NaOH solution. A few drops of Fehling's solution A and B were added to each mixture. Formation of red precipitate indicates the presence of glycosides.

#### 2.4.4. Test for saponins

5 ml of aqueous extract was shaken vigorously with 5 ml of distilled water in a test tube and warmed. The formation of stable foam was taken as an indication of the presence of saponins.

#### 2.4.5. Test for steroids

Exact 2 ml of acetic anhydride was added to the mixture of 0.5 g of each extract and H<sub>2</sub>SO<sub>4</sub> (2ml). The color change from violet to blue or green in some samples indicates the presence of steroids.

#### 2.4.6. Test for tannins

About 2 ml of the aqueous extract was stirred with 2 ml of distilled water and few drops of FeCl<sub>3</sub> solution were added. Formation of green precipitate was indication of presence of tannins.

#### 2.4.7. Test for terpenoids

2 ml of the organic extract was dissolved in 2 ml of chloroform and evaporated to dryness. 2 ml of concentrated sulphuric acid was then added and heated for about 2 min. Development of a greyish colour indicates the presence of terpenoids.

## 3. RESULT AND DISCUSSION

Ethnobotany is a multidisciplinary science defined as the interaction between plants and people. The relationship between plants and human cultures is not limited shelter but also includes their use for religious ceremonies, ornamentation and health care<sup>[8]</sup>. The ethanobotanical analyses of some medicinal plants tested were summarized in the table 1.

Plants have long been and continue to be the basis of many traditional medicines worldwide. The beneficial medicinal effects of plant materials typically result from the secondary products present in the plant although, it is usually not attributed to a single compound but a combination of the metabolites<sup>[9]</sup>. Phytochemicals are compounds derived from the plants, among which most of them are found to possess several medicinal attributes, though they are non-nutritive. Current study enlists the presence of different secondary metabolites present in seven different plants viz: *Balanites aegyptiaca*, *Cissus quadrangularis*, *Curcuma longa*, *Eclipta alba*, *Embllica officinalis*, *Madhuca indica* and *Withania somnifera*, commonly available in India (Table 2).

Alkaloids are naturally occurring chemical compounds containing basic nitrogen atoms. They are produced by a large variety of organisms, including bacteria, fungi, plants, and animals and are part of the group of natural products. In the present study, maximum plants showed the presence but absent only in the *M. indica* and *W. somnifera*. Many alkaloids are toxic too. They often have pharmacological effects and are used as medications, as recreational drugs, or in entheogenic rituals. Alkaloids produces analgesic, anti-inflammatory, antispasmodic and bactericidal effects<sup>[10,11]</sup>. It is also reported that due to the presence of alkaloid these plants viz: *E. alba*, *C. longa*, *E. officinalis* shows analgesic, anti-inflammatory, bactericidal effects<sup>[12]</sup>.

Glycosides are naturally cardioactive drugs used in the treatment of congestive heart failure and cardiac arrhythmia<sup>[13]</sup>. The presence of glycosides indicates that they may be potent in

Table-1: Ethnobotanical survey of selected plants.

Botanical Name	Family	Classical name	Parts Used	Pharmacological uses
<i>Balanites aegyptiaca</i>	Zygophyllaceae	Desert date	Root and aerial parts	Cardioprotective cum antioxidant Anthelmintic Antivenin Hepatoprotective Anticancer, Anti-inflammatory and analgesic Antiviral, Wound healing Hypocholesterolemic Diuretic (Daya)
<i>Cissus quadrangularis</i>	Vitaceae	Devil's Backbone.	Aerial parts	Antibacterial, antifungal, antioxidant, anthelmintic, antihemorrhoidal and analgesic activities
<i>Curcuma longa</i>	Zingiberaceae	Turmeric	rhizome	Antioxidant Hepatoprotective Anticancer, Anti-inflammatory, analgesic, antimicrobial, Cardiovascular Gastrointestinal
<i>Eclipta alba</i>	Asteraceae	Bhringraj,	Aerial parts	Antiaging, rejuvenate hair, teeth, bone, memory, sight, hearing. antifungal insecticidal properties
<i>Emblica officinalis</i>	Euphorbiaceae	Amla	Fruits	Cardioprotective, Hepatoprotective Anticancer, Anti-ulcer, antioxidative, analgesic, antipyretic Gastroprotective
<i>Madhuca indica</i>	Sapotaceae	<i>Mahua</i>	Aerial, root	Antidiabetic, Antioxidant, Anti-ulcer, epilepsy, Anti-inflammatory, Rheumatism, Antiepileptic,
<i>Withania somnifera</i>	Solanaceae	Ashwagandha	Root	Cardiovascular Protection, Hypothyroidism, Anxiety and Depression, Anti-Aging, antioxidant,

Table -2: Qualitative phytochemical analysis of selected medicinal plants.

Plant species	Alkaloids	Flavonoids	Glycosides	Saponins	Steroids	Tannins	Terpenoids
<i>Balanites aegyptiaca</i>	+ve	+ve	+ve	+ve	-ve	-ve	+ve
<i>Cissus quadrangularis</i>	+ve	-ve	-ve	-ve	-ve	-ve	-ve
<i>Curcuma longa</i>	+ve	+ve	+ve	+ve	-ve	+ve	-ve
<i>Eclipta alba</i>	+ve	+ve	+ve	+ve	+ve	-ve	-ve
<i>Emblica officinalis</i>	+ve	+ve	-ve	-ve	-ve	+ve	+ve
<i>Madhuca indica</i>	-ve	+ve	-ve	-ve	+ve	+ve	+ve
<i>Withania somnifera</i>	-ve	+ve	-ve	+ve	+ve	-ve	-ve

curing cardiac insufficiency, coughs and circulatory problems. Also, they may act as good sedatives and have antispasmodic properties<sup>[14]</sup>. In the selected plant species *B. aegyptiaca*, *C. longa* and *E. alba* showed the presence while in others glycosides are absent.

Flavonoids are the most important groups of secondary metabolites and bioactive compounds in plants<sup>[15]</sup>. In the present study,

almost all plants showed the presence of flavonoids as their constituents except *C. quadrangularis*. Flavonoids are known to act as antioxidant, thereby contributing to a variety of diseases such as cancer, inflammation, heart diseases and aging<sup>[16]</sup>. Flavonoids are also associated with antipyretic (fever-reducing), analgesic (pain-relieving) and spasmolytic (spasm-inhibiting) properties<sup>[17]</sup>.

In the selected plant species more than half of the plants showed the presence of saponins as their constituents. Saponins are widely distributed in plant kingdom approximately 70% of all plants produce them. They have a diverse range of properties which include property of precipitating and coagulating red blood cells [18,19], antimicrobial, insecticidal, and molluscicidal activities [20]. Saponins are also used in hypercholesterolemia, hyperglycemia, antioxidant, anticancer, anti-inflammatory and weight loss etc according to medical field [21].

Steroids were present only in the *E. alba*, *M. indica* and *W. somnifera*. Steroids have been reported to have antibacterial properties [22,23], analgesic properties and act on central nervous activities [24,25].

Tannins have stringent properties widely used as an application to sprains, bruises and superficial wounds. They are also responsible for antidysenteric and anti-diarrheal, antimicrobial and antioxidant activities [26]. Current reports show that tannins may have potential value such as cytotoxic and antineoplastic agents [27]. They are also used as anthelmintics, antimicrobials and antivirals, antioxidants, and to chelate dietary iron [28]. Tannins were present only in the *C. longa*, *E. officinalis* and *M. indica*.

Terpenoids were present only in the *B. aegyptiaca*, *E. officinalis* and *M. indica*. Terpenoids have been found to be useful in the prevention and therapy of several diseases, including cancer, and also to have antimicrobial, antifungal, antiparasitic, antiviral, anti-allergenic, antispasmodic, antihyperglycemic, anti-inflammatory, and immunomodulatory properties [29,30].

The above result indicates that, the plants investigated are rich in alkaloids, flavonoids, steroids, terpenoids. They are known to show medicinal potential and physiological activities [31]. Our results are also in analogy with previous reports of Yadav and Panghal (2010) [32] on *B. aegyptiaca*, Srivastava et al., (2011) [33] on *C. quadrangularis*, Hashemi et al., (2008) [34] on *C. longa*, Raut et al., (2012) [35] on *E. alba*, Meena et al., (2010) [36] on *E. officinalis*, Kumar et al. (2011) [37] on *M. indica* and Wani et al. (2013) [38] on *W. somnifera*. Thus the plants under investigation showed their medicinal potential and can be a source of useful drugs.

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