

## PHYTOCHEMICAL EVALUATION OF *PROSOPIS CINERARIA*, *CURCUMA AMADA* AND *CITRULLUS COLOCYNTHIS*

Lokesh Kumar Soni<sup>1</sup>, Pradeep Parasher<sup>2</sup> and M.P. Dobhal<sup>\*3</sup>

<sup>1</sup> Natural Products Laboratory, Centre of Advanced Studies, Department of Chemistry, University of Rajasthan, Jaipur, India.

<sup>2</sup> Department of Chemistry, Govt. P.G. College, Jhalawar, Rajasthan, India.

<sup>3</sup> Suresh Gyan Vihar University, Jaipur-302017, Rajasthan, India.

\*Corresponding author Email: mpdobhal@yahoo.co.in, lsoni492@gmail.com

### ABSTRACT

Natural products are the basis of synthetic and traditional herbal medicine. Phytochemicals are compounds that present in plants. There are hundreds of significant drugs and biologically active compounds developed from the traditional medicinal plants. The present study was aimed to investigate the phytochemical screening of *Prosopis cineraria*' bark, *Curcuma amada*' rhizomes, and *Citrullus colocynthis*'s fruits hull. The result of the qualitative phytochemical constituents of these plants extracts showed presence of all the tested phytochemicals alkaloids, terpenoids, flavonoids, carbohydrates and saponins. Thus, the results suggests, the beneficial role of their plant parts and supports their traditional uses and proved to be useful for pharmacological properties. The phytochemical analysis of the plants is very significant commercially and has great interest in pharmaceutical companies for the production of the new drugs for curing of various diseases.

Keywords: Phytochemicals, medicinal plants, *Prosopis cineraria*, *Curcuma amada*, *Citrullus colocynth*.

### INTRODUCTION

The medicinal plants are useful for healing as well as for curing of human diseases due to the presence of bioactive phytochemicals (Nostro et al. 2000). Phytochemicals are naturally occurring in the medicinal plants, leaves, vegetables and roots that have defense mechanism in plants and are also responsible for the treatment of various diseases due to presence of metabolites.. Chlorophyll, proteins and common sugars are primary metabolites terpenoid, alkaloids and phenolic compounds are known as secondary metabolites (Krishnaiah

et al. 2007). *Prosopis cineraria* (L.) belongs to the cosmopolitan genus *Prosopis*, subfamily

Mimosaceae, tribe Leguminosae/ Fabaceae (Rasanen & Lindstrom 2003) and it has common names such as Janti and Chonksa (Delhi), Jhind, Jhand and Jand (Punjab and Haryana), Banni (Karnataka), Sumri (Gujarat), Kandi (Sindh) and Khejri (Sanskrit). It is conjointly referred to as the 'wonder tree' and therefore as the 'king of desert'(Bari et al. 2007; Gupta & Prakash 1975; Kaul 1967; Burdak 1982). Its

flower is powdered and mixed with sugar and used throughout maternity as safeguard against miscarriage. The bark of *Prosopis cineraria* is dry, acrid, bitter with a taste; cooling anthelmintic, tonic, cures infectious disease, dysentery, bronchitis, asthma, leucoderma, piles, tremors of the muscles (Kirtikar & Basu 1984). The bark is employed in rheumatism, cough and colds, diarrhea, worm infestations etc.(Sharma 1993). The bark of the plant offers immediate relief against snake or a scorpion bite (Chopra *et al.* 1956).

*Curcuma amada* Roxb. is commonly known as mango ginger. It is a perennial, rhizomatous, aromatic herb belonging to the family Zingiberaceae. Additional health benefits of *C. amada* rhizome reported were biliousness, itching, skin diseases, asthma and inflammation due to injuries. According to the Unani systems of medicine, it is a diuretic, emollient, expectorant, antipyretic and appetizer. The ability of *C. amada* rhizome's against inflammation in the mouth and ear, gleet, ulcers on the male sex organs, scabies, lumbago and stomatitis have been reported (Kirtikar and Basu 1984; Warriar *et al.* 1994; Hussain *et al.* 1992). Mango ginger has a typical unusual flavour of raw unripe mango. Therefore, it is used as a basic ingredient in pickles, candies, sauces and curries. (Elsayed 2016; Shankaracharya 1982). *Citrullus colocynthis* is a perennial herbaceous vine, belongs to the family Cucurbitaceae (Dane and Liu 2007). The *Citrullus colocynthis* is well known for its therapeutic activity in folklore. The fruits and pulp of this plant are well known natural cathartics since ancient times. The fruit is pungent, cooling purgative, anthelmintic, antipyretic carminative. It is

beneficial in treatment of tumor, leucoderma, ulcer, asthma, bronchitis, urinary troubles, enlargement of spleen, tuberculosis, dyspepsia, constipation, anemia's and throat diseases. The leaves of this herb are used to treat asthma and jaundice, whereas the roots are used traditionally for the treatment for amenorrhea, breast inflammation, arthralgias, seizures, tuberculosis, syphilis, and parasitic infections and ophthalmic diseases. (Blaskovich *et al.* 2003). *C. colocynthis* is used as an antidiabetic agent in developing countries (Errajaji *et al.* 2010; Ziyat *et al.* 1997). In the present study three different medicinal plants each belonging to different families were evaluated for the presence of various class of phytochemicals.

## **MATERIAL AND METHODS**

### **Plant Material**

The fresh rhizomes of *Curcuma amada* were procured from local market, Jaipur, Rajasthan. Bark of *Prosopis cineraria* and fruits of *Citrullus colocynthis* were collected locally and authenticated by Prof. N.J. Sarana Department of Botany, University of Rajasthan, Jaipur, Rajasthan, India.

### **Preparation of crude plant extract**

Shade dried plant materials (100 gm) were powdered and extracted with ethanol separately. Each extraction step was completed in 48 hours. The extracts were filtered hot and solvent was removed under reduced pressure. The concentrated extracts were dried under *vacuo*.

## **PHYTOCHEMICAL ANALYSIS**

The test samples (plant extracts) were subjected to phytochemical analysis in order to find out the

presence of various class of compounds. The colour reactions were employed for the detection of alkaloids, tannins, cardiac glycosides, saponins, flavonoids and terpenoids etc. (Uthayarasa et al. 2010; Trease and Evans 1989; Harborne 1973; Sofowara 1993).

### TEST FOR ALKALOIDS

Ethanollic extracts were dissolved individually in dilute hydrochloric acid in test tubes and filtered.

**Wagne r's te s t:** Filtrates were treated with Wagner's reagent (iodine in potassium iodide). A brown/reddish precipitate formed indicates the presence of alkaloids.

**Maye r's te s t:** Filtrates were treated with Mayer's reagent (potassium mercuric iodide). Formation of a yellow precipitate indicates the presence of alkaloids.

**Drage ndroff te s t:** Filtrates were treated with Dragendorff's reagent (solution of potassium bismuth iodide). Formation of a red precipitate indicates the presence of alkaloids.

**Hage r's te s t:** Filtrates were treated with Hager's reagent (saturated picric acid solution). Formation of yellow colour indicates the presence of alkaloids.

### TEST FOR TANNINS

**Lead test:** Extracts were dissolved in distilled water in separate test tubes and filtered. The filtrate was treated with 3-4 drops of ferric chloride solution, development of blue or green coloration indicated the presence of tannins.

### TEST FOR FLAVONOIDS

**Alkaline reagent test:** Extracts were treated with a few drops of sodium hydroxide solution.

Formation of intense yellow colour, which becomes colorless on the addition of dilute acid, indicates the presence of flavonoids.

**Lead acetate test:** Extracts were treated with a few drops of lead acetate solution. Formation of a yellow color precipitate indicates the presence of flavonoids.

### TEST FOR SAPONIN

**Foam tes t:** Extracts were dissolved with distilled water and shaken vigorously till a stable persistent froth was obtained. The froth was mixed with 3 drops of olive oil and shaken vigorously and then observed for emulsion.

### TEST FOR CARBOHYDRATES

Extracts were dissolved individually in 5 ml distilled water and filtered. The filtrates were used to test the presence of carbohydrates.

**Molis ch's te s t:** Filtrates were treated with 2 drops of alcoholic  $\alpha$ -Naphthol solution in a test tube. A violet ring observed at the junction indicates the presence of carbohydrates.

**B e n e d i c t's te s t:** Filtrates were treated with Benedict's reagent (complex mixture of sodium carbonate, sodium citrate and copper (II) sulfate pentahydrate ) and heated gently. Orange red precipitate indicates the presence of reducing sugars.

**Fehling's tes t:** Filtrates were hydrolyzed with dilute HCl, neutralized with alkali and heated with Fehling's A solution (aqueous solution of copper(II) sulfate) and Fehling's B solutions (aqueous potassium sodium tartrate with sodium hydroxide). Formation of a red precipitate indicates the presence of reducing sugars.

## TEST FOR PHENOL

**Ferric chloride test:** Extracts were treated with 3-4 drops of ferric chloride solution. Formation of bluish black colour indicates the presence of phenol.

## TEST FOR PROTEIN AND AMINO ACID

**Xanthoprote in test:** the extracts were treated with a few drops of conc. Nitric acid. Formation of yellow colour indicates the presence of proteins.

**Ninhydrin Test:** to the extract, 0.25% w/v Ninhydrin reagent was added and boiled for a few minutes. Formation of blue- purple color indicates the presence of amino acid.

**Biuret test:** the extracts were treated with sodium hydroxide solution , 1% CuSO<sub>4</sub> solution and warm the mixture for about 5 minutes. Bluish violet coloration indicates the presence of proteins.

## TEST FOR GLYCOSIDES

Extracts were hydrolyzed with dilute HCl, and then subjected to test for glycosides.

**Modified Borntrage's test:** Extracts were treated with ferric chloride solution and immersed in boiling water for 5 min. The mixture was cooled and extracted with equal volume of benzene. The organic layer was separated and treated with ammonia solution. A rose pink color observed in the ammoniacal layer which indicates the presence of anthranol glycosides

**Test for cardiac glycosides :** 5 ml of each extract was treated with 2 ml of glacial acetic acid, 4-5 drops of ferric chloride solution and then 1ml of conc. sulphuric acid was added. A brown ring at the junction of two layers indicated the presence of cardenolides.

## TEST FOR FIXED OILS AND FATS

**Spot test:** A small quantity of the extract was pressed between two filter papers. Oil stain on the paper indicated the presence of fixed oil. Detection of gum and mucilage: Extract was mixed with 10 ml distilled water and 25 ml of alcohol with constant stirring. White or cloudy precipitate indicated the presence of gum and mucilage.

## TEST FOR PHYTO STEROLS/ TERPENOIDS

**Liebermann Burchard's test:** Extracts were treated with chloroform and filtered. The filtrate was treated with a few drops of acetic anhydride, boiled and cooled. Conc. sulphuric acid was added. The formation of brown ring at the junction of two liquids indicates the presence of phytosterols.

**Salkowski's test:** Extracts were dissolved in chloroform and concentrated sulphuric acid was added to it. A reddish brown discoloration at the interface showed the presence of terpenoids .

**Table 1: Phytochemical constituents of three medicinal plants studied.**

| S.N.                              | Tests                  | <i>Prosopis cineraria'</i> | <i>Curcuma amada'</i><br>rhizome s | <i>Citrullus colocynthis's</i> fruits hull |
|-----------------------------------|------------------------|----------------------------|------------------------------------|--|
| <b>1. Alkaloids</b>               |                        |                            |                                    |  |
|                                   | Mayer's test           | +ve                        | +ve                                | +ve  |
|                                   | Wagner's               | +ve                        | +ve                                | +ve  |
|                                   | Hager' test            | +ve                        | +ve                                | +ve  |
|                                   | Dragendorff's test     | +ve                        | +ve                                | +ve  |
| <b>2. Carbohydrates</b>           |                        |                            |                                    |  |
|                                   | Molisch's test         | +ve                        | +ve                                | +ve  |
|                                   | Fehling's test         | +ve                        | +ve                                | +ve  |
|                                   | Benedict's test        | +ve                        | +ve                                | +ve  |
| <b>3. Flavonoids test</b>         |                        |                            |                                    |  |
|                                   | NaOH                   | +ve                        | +ve                                | +ve  |
|                                   | Lead acetate           | +ve                        | +ve                                | +ve  |
| <b>4. Saponins</b>                |                        |                            |                                    |  |
|                                   | Foam test              | +ve                        | -ve                                | -ve  |
| <b>5. Proteins</b>                |                        |                            |                                    |  |
|                                   | Biurett's test         | +ve                        | +ve                                | +ve  |
|                                   | Ninhydrin's test       | +ve                        | +ve                                | -ve  |
| <b>6. Phytosterols/Terpenoids</b> |                        |                            |                                    |  |
|                                   | Lieberman and Burchard | +ve                        | +ve                                | +ve  |
|                                   | Salkowski's test       | +ve                        | +ve                                | -ve  |
| <b>7. Tannins and phenol</b>      |                        |                            |                                    |  |
|                                   | Lead acetate           | +ve                        | +ve                                | -ve  |
|                                   | Ferric chloride test   | +ve                        | +ve                                | -ve  |
| <b>8. Glycosides</b>              |                        |                            |                                    |  |
|                                   | Borntrager's test      | +ve                        | +ve                                | +ve  |
|                                   | Legal's test           | +ve                        | +ve                                | -ve  |
| <b>9. Fixed oils</b>              |                        |                            |                                    |  |
|                                   | Spot test              | +ve                        | +ve                                | +ve  |
| <b>10. Gums and Mucilage</b>      |                        |                            |                                    |  |
|                                   |                        | +ve                        | +ve                                | -ve  |

## RESULTS AND DISCUSSION

Phytochemical analysis of *Prosopis cineraria*, *Curcuma amada* and *Citrullus colocynthis* plant extracts showed the presence of various constituents which are known to exhibit medicinal as well as physiological activities (Sofowara 1993). *Prosopis cineraria* gives positive result for all constituents where as *Curcuma amada* showed negative result for saponins and positive for all other on the other hand *Citrullus colocynthis* gave positive result for carbohydrates, alkaloids, flavonoids terpenoids etc.

The phytoconstituents i.e. alkaloids and flavonoids are active principles of plants. These active principles provides defensive mechanism of the plants against different pathogens (Hafiza, 2000). The terpenoids have significant pharmacological activities, such as anti-viral, anti-bacterial, anti-malarial, anti-inflammatory, inhibition of cholesterol synthesis and anti-cancer activities (Mahato and Sen,1997). Saponins which are used to stop bleeding and in treating wounds and ulcers as it helps in red blood cell coagulation (Okwu and Josiah, 2006). Further studies will need to isolate and

characterize the bioactive chemical entities of these plants.

## CONCLUSION

Presence of phytochemical constituents in *Prosopis cineraria*' bark, *Curcuma amada*' rhizomes, and *Citrullus colocynthis*'s fruits hull extract supports its traditional uses and may be utilized for different biological activities

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