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# Qualitative Phytochemical Analysis of Different extracts of Nyctanthes arbor-tristis, Butea monosperma, Melia azedarach, Erythrina stricta, Ficus hispida Leaves

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**ABSTRACT**
The present study was an attempt to evaluate different extracts of Nyctanthes arbor-tristis, Butea monosperma, Melia azedarach, Erythrina stricta, Ficus hispida leaves. Phytochemical analysis of ethanolic, hydroethanolic and aqueous extracts of N. arbor-tristis, B. monosperma, M. azedarach, E. stricta, and F. hispida revealed the presence of steroids, alkaloids, phenolic compounds, tannins, flavonoids, glycosides and triterpenes.
**Keywords** : Different types of plants, extracts, phytochemical screening .

## I. INTRODUCTION

Medicinal plants have long been used to treat specific ailments. According to Samuelson, the use of plants as a source of medicine began more than 1000 years ago (Samuelsson, 2004). The World Health Organization estimates that more than 80% of the population use medicinal plants. Medicinal plants contain active molecules that are a source of healing. From ancient civilization various parts of the plant were used to relieve pain, to control suffering, and to fight diseases. Most of the herbs used in ancient medicine were derived from plants and are the original and primary source of medicine. Medicinal plants contain some organic compounds which provide definite physiological action on the human and animal body as well as their physiological activities due to the presence of bioactive substance include tannins, alkaloids, carbohydrates, terpenoids, steroids and flavonoids .

Nyctanthes arbor-tristis ( family : Oleaceae) is commonly known as Harsinghar, Night jasmine or Parijat. Flowers of N.arbor-tristis start falling after midnight and by the crack of dawn, the plant appears sombre. The generic name 'Nyctanthes' has been coined from two Greek words 'Nykhta' (Night) and 'anthos' ( flower). Thus, during the day the plant loses all its brightness and hence is called " Tree of sadness" (arbor-tristis).

Butea monosperma (Palas), belongs to family Leguminosae-Papilioneae and it is popularly known as 'Flame of the Forest, Bastard Teak, Parrot Tree (Eng.), Chichra tesu, desuka jhad, dhak, palas, chalcha, kankrei (Hindi), Palashpapra (Urdu), Muthuga (Can.), Palas, Polashi (Beng.), Porasum, Parasu (Tam.), Muriku, Shamata (Mal.), Modugu (Tel.), Khakda (Guj.), Kela (Sinh.). It is a a medium-sized deciduous tree and useful plant in many ways. Its leaves are essential for various religious rituals in Hindu homes. These are also used as cheap leaf plates and cups for rural feasts.

Melia is a small genus of 2 species i.e. azedarach and azadirachta and it is a small to medium, perennial, deciduous tree belongs to the family Meliaceae. It has derived its name from the classical Greek word melia for the manna ash or flowering ash, referring to the similarity of the leaves to that plant and azedarach from the name of an ancient poisonous tree, Azadaracht, now unknown. It is native to upper Burmah region (Nahak & Sahu et al., 2010). It is commonly known as Bakain, Ramyaka, Drek, Dharek, Karmuka, Keshamushti, Khammaga,Ghoranim, Kalo neem, Bakan Limado, Bakai Nimbu , Neem (Rishi & Singh., 2003; Yogender et al., 2009; Lungu et al., 2011).

E. suberosa belongs to the genus Erythryna which comprises more than 100 species: according to Da Silva et al., **2**013, the Erythryna genus includes 120 species distributed in Tropical and Subtropical regions. It belongs to the family Fabaceae and native of Punjab region and called "Pangra" (Chauhan & Saxena,1987) , it is widely used as an ornamental tree in Pakistan and India.

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The genus Ficus is an important group of trees which has various chemical constituents of promisive medicinal value. It is a sacred tree of Hindus and Buddhists. Ficus racemosa is also known as F. Glomerata. Ficus racemosa has various synonyms like Udumbara (Udumbara is considered sacred to God Dattaguru), yajnanga, yajniya, yajnayoga, yajnyasara, gular, Cluster Fig tree, Country fig tree etc. The present study was aimed to analysis phytochemical constitutent of different extracts of Nyctanthes arbor-tristis, Butea monosperma, Melia azedarach, Erythrina stricta, Ficus hispida leaves.

**FIG.1 Nyctanthes arbor- tristis**

**FIG.2 Butea monosperma**

**FIG. 3 Ficus hispida**

**FIG. 4 Melia azedarach**

**FIG .5 Erythrina stricta**

## II. MATERIALS AND METHODS

### Plant material

The fresh leaves of Nyctanthes arbor-tristis, Butea monosperma, Melia azedarach, Erythrina stricta, Ficus hispida will be collected from in an around Khanapara campus in the month of July to September for pharmacological experimental purpose. Leaves were identified and authenticated by Botanical Survey of India ( BSI), Eastern Regional Centre, Shillong.

### Processing of Plant Materials

After identification and characterisation by BSI, leaves were further collected. The collected leaves were gently washed with fresh water to remove soil and dust particles. Leaves were then shade dried at room temperature for about 7-10 days.They were regularly turned over, to prevent fermentation and rot. Dried leaves were then grounded or pulverised to powder by Laboratory Willey Mill and kept at room

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temperature in air tight containers after proper labelling until preparation of extracts.

**Preparation of Ethanolic, Hydroethanolic and Aqueous Extracts**

Powdered plant materials were extracted with ethanol, hydroethanol (1:1) and distilled water respectively as per the procedure of Prasad (1965). Finely powdered plant powders were soaked with individually for 72 hours, three times, with intermittent agtitation. The extracts were then double filtered using muslin cloth and Whatman No.1 filter paper. The filtrate obtained was concentrated in rotary evaporator and completely dried over regulated water bath maintained at 50ºC. The extracts were refrigerated at 4ºC until the experiments for screening was done. Standard procedures (Lateef et al., (2003;2006); Sujon et al. (2008) were used with a few modifications.

**Phytochemical Analysis of Extracts**

The ethanolic, hydroethanolic and aqueous extracts of all the fifteen extracts were subjected to phytochemical analysis for the presence of various active principles namely steroids, alkaloids, phenolic compounds, tannins, flavonoids, glycosides, triterpenes and saponins as per the procedure quoted by Harborne (1991).

**Tests for detection of steroids**

**Salkowski test**

About 5 mg of the extract was dissolved in 3 ml of chloroform and then shaken with about 3 ml concentrated sulphuric acid. Development of red colour indicates the presence of steroids.

**Tests for detection of alkaloids**

About 5 mg of extract was dissolved in 5 ml of ammonia and then extracted with equal volume of chloroform. To this, 5 ml dilute hydrochloric acid was added. The acid layer obtained was used for chemical tests for the alkaloids.

**Mayer's test**

To 1 ml of acid extract in a test tube, few drops of Mayer's reagent ( 1.358g of mercuric chloride dissolved in 60 ml of water and poured into a solution of 5 g of potassium iodide in 10 ml of water and then made up the volume to 100 ml with distilled water) were added. Development of a creamy white precipitate indicates the presence of alkaloids.

**Wagner's test**

Few drops of Wagner's reagent ( 2 g of iodine and 6 g of potassium iodide dissolved in 100 ml of distilled water) were added to 1 ml of of the acid extract. Development of reddish brown precipitate indicates the presence of alkaloids.

**Hager's test**

To 1 ml acid extract, few drops of Hager's reagent ( 1 g of picric acid dissolved in 100 ml of distilled water) were added. Development of yellow precipitate indicates the presence of alkaloids.

**Dragendroff's test**

Few drops of Dragendroff's reagent (stock solution no.1): 0.6 grams of bismuth subnitrate was dissolved in 2 ml of concentrated hydrochloric acid and 10 ml of water was added. Stock solution no.2 : Six grams of potassium iodide was dissolved in 10 ml of water. Then both the stock solutions (1) and (2) were mixed together and then it was mixed with 7 ml of concentrated hydrochloric acid and 15 ml of water . Sufficient amount of distilled water was added to the mixture to make up the volume to 400 ml) was mixed with 1 ml of acid extract. Development of reddish brown precipitate indicates the presence of alkaloids.

**Tests for detection of phenolic compounds**

About 5 mg of the extract was dissolved in 1 ml of water and five drops of ten percent ferric chloride was added to it. Development of dark blue colour indicates the presence of phenolic compounds.

**Tests for detection of tannins**

**Ferric chloride test**

Two milligram of the extract was mixed with 3 ml of one percent ferric chloride solution. Development of a blue, green, or brownish colour indicates the presence of tannins.

**Gelatin test**

About 0.5 g of the extract was mixed with few drops of one percent solution of gelatine containing ten percent sodium chloride. Development of a white precipitate indicates the presence of tannins.

**Tests for the detection of flavonoids**

**Ferric chloride test**

To 2 ml of alcoholic solution of the extract (0.5 g extract in 10 ml methanol), few drops of neutral ferric chloride solution was mixed. Development of green colour indicates the presence of flavonoids.

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**Lead acetate test**
To 2 ml of alcoholic solution of the extract ( 0.5 g extract in 10 ml methanol), few drops of neutral ten percent lead acetate was mixed. Development of a yellow precipitate indicates the presence of flavonoids.

**Tests for detection of glycosides/glucosides**
**Benedict's test**
To about 1 ml of the extract (0.5 g extract in 1 ml of water), 5 ml of Benedict's reagent was added. The mixture was boiled for two minutes. Development of brown to red colour indicates the presence of glycosides.

**Sodium hydroxide test**
Dissolved a small amount of the extract ( about 5 mg) in 1 ml water and added 5-6 drops of sodium hydroxide solution (10%) . Development of a yellow colour indicates the presence of glycosides.

**Tests for the detection of diterpenes**
About 5 mg of the extract was dissolved in 3 ml of copper acetate solution (5%). Development of green colour indicates the presence of diterpenes.

**Tests for the detections of triterpenes**
**Salkowski test**
About 5 mg of the extract was dissolved in 3 ml of chloroform and then shaken with about 3 ml concentrated sulphuric acid. Development of yellow colour in lower layer on standing indicates the presence of Triterpenes.

**Liberman Burchardt test**
Few drops of acetic acid and 1 ml concentrated sulphuric acid were added to 3 ml of chloroform solution of the extract (about 3 mg extract in 3 ml chloroform). Development of deep red ring at the junction of two layers indicates the presence of Triterpenes.

**Tests for the detection of saponins**
**Foam test**
A small amount of the extract (about 5 mg) was shaken with 3 ml of water. Development of the foam that persists for 10 minutes indicates the presence of saponins.

## III. RESULT

Various phytochemical tests were done using ethanolic, hydroethanolic & aqueous extracts of Nyctanthes arbor-tristis, Butea monosperma, Melia azedarach, Erythrina stricta, Ficus hispida leaves.They were subjected to phytochemical analysis for the presence of various active principles or phytochemical constituents namely steroids, alkaloids, phenolic compounds, tannins, flavonoids, glycosides, triterpenes, diterpenes and saponins.

**Percentage Yield of extracts of Plants Under Study After Ethanolic, Hydroethanolic and Aqueous Extraction**

During the present study, different extracts of the leaves of Nyctanthes arbor-tristis, Butea monosperma, Melia azedarach, Erythrina stricta, and Ficus hispida were prepared using different solvents i.e. ethanol, hydroethanol (1:1) and distilled water. Percent yield values of different types of leaf extracts were calculated. The percentage yield obtained during the extraction of the leaf extracts is depicted in Table 1.

**TABLE 1. PERCENTAGE YIELD OF PLANTS (LEAVES) UNDER STUDY AFTER ETHANOLIC, HYDROETHANOLIC AND AQUEOUS EXTRACTION**

| Plants under study | Type of Extract | % Yield |
|---|---|---|
| Nyctanthes arbor-tristis | Ethanolic | 14.56 |
| | Hydroethanolic | 17.0 |
| | Aqueous | 27.56 |
| Butea monosperma | Ethanolic | 12.50 |
| | Hydroethanolic | 8.3 |
| | Aqueous | 14.48 |
| Melia azaderach | Ethanolic | 16.84 |
| | Hydroethanolic | 38.90 |
| | Aqueous | 27.26 |
| Erythrina stricta | Ethanolic | 13.16 |
| | Hydroethanolic | 10.56 |
| | Aqueous | 47.62 |
| Ficus hispida | Ethanolic | 5.84 |
| | Hydroethanolic | 9.62 |
| | Aqueous | 19.24 |

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**Phytochemical Analysis of Nyctanthes arbor-tristis Extracts**

Ethanolic extract of Nyctanthes arbor-tristis leaves showed presence of steroids, alkaloids, phenolic compounds,glycosides, flavonoids, diterpenes , triterpenes and absence of tannins and saponins. The hydroethanolic extract of Nyctanthes arbor-tristis leaves showed presence of steroids, alkaloids, phenolic compounds, glycosides, flavonoids,tannin, diterpenes, triterpenes and saponins.The aqueous extract of Nyctanthes arbor-tristis leaves showed presence of steroids, alkaloids, phenolic compounds, flavonoids, glycosides, diterpenes , triterpenes and saponins and absence of tannins.

**Phytochemical Analysis of Butea monosperma Extracts**

Ethanolic, hydroethanolic and aqueous extracts of Butea monosperma were positive for the presence of steroids, alkaloids, phenolic compounds, tannins, flavonoids, glycosides, triterpenes and saponins. Tests for alkaloids with hydroethanolic extract were negative.

**Phytochemical Analysis of Melia azedarach Extracts**

Melia azedarach, on phytochemical analysis, was positive for the presence of steroids, alkaloids, phenolic compounds, tannins, flavonoids, glycosides and triterpenes but saponins was found to be absent.

**Phytochemical Analysis of Erythrina stricta Extracts**

Almost all the tests done on the three extracts of Erythrina stricta were positive for the presence of steroids, alkaloids, phenolic compounds, flavonoids, glycosides, and triterpenes except tests for alkaloids which were negative with hydroethanolic extract. Ferric Chloride test for tannins were negative with both ethanolic and hydroethanolic aqueous extract.

**Phytochemical Analysis of Ficus hispida Extracts**

Ethanolic, hydroethanolic and aqueous extracts of Ficus hispida were positive for the presence of steroids, alkaloids, phenolic compounds, tannins, flavonoids, glycosides, triterpenes and saponins.

The phytochemical results are presented in Table 2, 3, 4,5 and 6 respectively.

**TABLE 2.PHYTOCHEMICAL SCREENING OF ETHANOLIC, HYDROETHANOLIC AND AQUEOUS LEAF EXTRACTS OF Nyctanthes arbor-tristis**

| Phytoconstituents | Tests | Extracts of Nyctanthes arbor-tristis | | |
|---|---|---|---|---|
| | | Ethanolic | Hydroethanolic | Aqueous |
| Steroid | Salkowski Test | + | + | + |
| Alkaloids | Mayer's Test | - | + | + |
| | Wagner's Test | - | - | - |
| | Hager's Test | + | - | - |
| | Dragendroff's Test | - | - | - |
| Phenolic compounds | Phenolic compounds | + | + | + |
| Tannins | Ferric chloride test | - | + | - |
| | Gelatin tests | - | - | - |
| Flavonoids | Ferric chloride test | + | + | + |
| | Lead acetate test | + | + | + |
| Glycosides | Sodium hydroxide test | + | + | + |
| | Benedict's test | + | + | + |

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| | | | | |
|---|---|---|---|---|
| Diterpenes | | + | + | + |
| Triterpenes | Salkowski test | + | + | + |
| | Liberman Burchardt test | + | + | + |
| Foam test | Saponins | - | + | + |

**TABLE 3. PHYTOCHEMICAL SCREENING OF ETHANOLIC, HYDROETHANOLIC AND EXTRACTS of Butea monosperma**

| **Phytoconstituents** | **Tests** | **Extracts of Butea monosperma** | | |
|---|---|---|---|---|
| | | **Ethanolic** | **Hydroethanolic** | **Aqueous** |
| Steroid | Salkowski Test | + | + | + |
| Alkaloids | Mayer's Test | + | - | + |
| | Wagner's Test | + | - | + |
| | Hager's Test | + | - | + |
| | Dragendroff's Test | + | - | + |
| Phenolic Compounds | | + | + | + |
| Tannins | Ferric Chloride Test | + | + | + |
| Flavonoids | Ferric Chloride Test | + | + | + |
| Glycosides | Sodium Hydroxide Test | + | + | + |
| | Benedict's Test | + | + | + |
| Triterpenes | Salkowski Test | + | + | - |
| Saponins | Foam Test | + | + | + |

**TABLE 4. PHYTOCHEMICAL SCREENING OF ETHANOLIC, HYDROETHANOLIC AND AQUEOUS EXTRACTS of Melia azaderach**

| **Phytoconstituents** | **Tests** | **Extracts of Melia azaderach** | | |
|---|---|---|---|---|
| | | **Ethanolic** | **Hydroethanolic** | **Aqueous** |
| Steroid | Salkowski Test | + | + | + |
| Alkaloids | Mayer's Test | + | + | + |
| | Wagner's Test | + | + | + |
| | Hager's Test | + | + | + |
| | Dragendroff's Test | + | + | + |
| Phenolic Compounds | | + | - | + |
| Tannins | Ferric Chloride Test | + | + | + |
| Flavonoids | Ferric Chloride Test | + | + | + |
| Glycosides | Sodium Hydroxide Test | + | + | + |
| | Benedict's Test | + | + | + |
| Triterpenes | Salkowski Test | + | - | + |
| Saponins | Foam Test | - | - | - |

**TABLE 5. PHYTOCHEMICAL SCREENING OF ETHANOLIC, HYDROETHANOLIC AND AQUEOUS EXTRACTS OF Erythrina stricta**

| **Phytoconstituents** | **Tests** | **Extracts of Erythrina stricta** | | |
|---|---|---|---|---|
| | | **Ethanolic** | **Hydroethanolic** | **Aqueous** |
| Steroid | Salkowski Test | + | + | + |
| Alkaloids | Mayer's Test | + | - | + |

| | | | | |
|---|---|---|---|---|
| | Wagner's Test | + | - | + |
| | Hager's Test | + | - | + |
| | Dragendroff's Test | + | - | + |
| Phenolic Compounds | | + | + | + |
| Tannins | Ferric Chloride Test | - | - | + |
| Flavonoids | Ferric Chloride Test | + | + | + |
| Glycosides | Sodium Hydroxide Test | + | + | + |
| | Benedict's Test | + | + | + |
| Triterpenes | Salkowski Test | + | + | - |
| Saponins | Foam Test | - | - | - |

**TABLE 6. PHYTOCHEMICAL SCREENING OF OF ETHANOLIC, HYDROETHANOLIC AND AQUEOUS EXTRACTS OF Ficus hispida**

| **Phytoconstituents** | **Tests** | **Extracts of Ficus hispida** | | |
|---|---|---|---|---|
| | | **Ethanolic** | **Hydroethanolic** | **Aqueous** |
| Steroid | Salkowski Test | + | + | + |
| Alkaloids | Mayer's Test | + | + | + |
| | Wagner's Test | + | + | + |
| | Hager's Test | + | + | + |
| | Dragendroff's Test | + | + | + |
| Phenolic Compounds | | + | + | + |
| Tannins | Ferric Chloride Test | + | - | + |
| Flavonoids | Ferric Chloride Test | + | + | + |
| Glycosides | Sodium Hydroxide Test | + | + | + |
| | Benedict's Test | + | + | + |
| Triterpenes | Salkowski Test | + | + | + |
| Saponins | Foam Test | + | + | + |

## IV. DISCUSSION

Plants are known to synthesise many chemical compounds that posses as many biological activities (Klocke 1989). Some of the compounds exhibit specific and unique properties that have long been exploited in animal and human medical systems. By influencing metabolic pathways, natural plant compounds remain the major source of medicines for management of animal and human health. The percentage yield of ethanolic extracts of Nyctanthes arbor-tristis, Butea monosperma, Melia azedarach, Erythrina stricta, and Ficus hispida were found to be 14.56, 12.50, 16.84, 13.16 and 5.84 percent (w/w) respectively, for hydroethanolic extract the percentage yield was found to be 17.0, 8.3, 38.90,10.56 and 9.62 percent (w/w) respectively. The percentage yield of aqueous extracts of Nyctanthes arbor-tristis, Butea monosperma, Melia azedarach, Erythrina stricta, and Ficus hispida were found to be 27.56, 14.48, 27.26, 47.62 and 19.24 percent (w/w) respectively. The percentage yield was found to be 9.99 (Ficus benghalensis). Sawarkar, et.al., (2011) found the percentage yield of aqueous extracts of fruits of Ficus benghalensis, F.carica and F. religiosa to be

5.46% ,6.5% and 10.24% respectively. Aswar, et al (2008) found the percentage yield of aqueous root extracts of Ficus benghalensis to be 9.99. The ethanolic extract of leaves, barks, seeds and flowers had yield values of 14%, 12.5%, 26.5% and 13% respectively as per Sanjita Das et al.(2010). The percentage yield of methanol, chloroform and petroleum ether extracts of Ficus benghalensis was found to be 1.908 %, 0.558 % and 0. 43 % respectively. A variety of constituents belonging to different chemical classes such as terpenes, steroids, glycosides, flavonoids and alkaloids have been found to be positive from the leaves of N. arbor-trisitis. Phytochemical analysis of ethanolic extract showed the presence of typical plant constituents such as alkaloids, steroids, tannins, flavonoids, reducing sugars, saponins, and terpenoids.The hydroalcoholic extract of the leaves of B. monosperma showed the presence of carbohydrates, flavonoids, steroids, saponins, amino acids and polyphenolic compounds which may contribute in various pharmacological activities of this plant. Chemical analysis of the extracts from the M. azedarach fruits revealed the presence of tannins, phenolic compounds and steroids. Preliminary phytochemical analysis showed the presence of carbohydrates, ß flavonoids, aminoacids, steroids, saponins and tannins like phytoconstituents in the extracts of Ficus benghalensis. Some of these phytoconstituents may be responsible to show a potent anthelmintic activity. Phytochemical results in the present study indicate that the plants contain various chemical compounds including retonoids, sesquiterpene lactones, glycosides, anthracenes and tannins. Some of these compounds especially sesquiterpene lactones and rotenoids (Bizimana and Scherecke 1996, Klocke 1989) have been reported elsewhere to have biological activities against helminth.

## V. CONCLUSION

We can conclude that the selected leaf extracts were showing many secondary metabolites are present. Phytochemical analysis of Nyctanthes arbortristis, Butea monosperma, Melia azedarach, Erythrina stricta, Ficus hispida leaves extracts was done by using the extracts which were obtained by cold extraction method . The screening of phytochemical constituents of plants extracts indicated the presence of different metabolite which is responsible for medicinal properties of plant.

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**Conflict of interest**
The author declared no conflict of interest.

**Author's contributions**
All the authors read and approved the final manuscript.

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