

**Preliminary Phytochemical Screening, Physicochemical and Fluorescence Analysis of  
*Nyctanthes Arbor-Tritis* and *Syzygium Cumini* Leaves**

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## Abstract

*In traditional system of medicines plant based therapy has been widely used for treating various kinds of ailments. The present study is carried out on two traditional medicinal plants Nyctanthes arbor-tritis and Syzygium cumini. Globally several medicinal plants have been evaluated for their efficacy and safety. The present study was conducted to investigate the morphological, physicochemical, phytochemical, fluorescence and pH profile of Nyctanthes arbor-tritis and Syzygium cumini leaves. The physicochemical parameters such as ash value, extractive values, loss on drying, foreign organic matter were determined for Nyctanthes arbor-tritis and for Syzygium cumini leaves respectively. The qualitative phytochemical analysis showed the presence terpenoids, carbohydrates, alkaloids, tannins, steroids, flavonoids etc. The powder of both leaves showed characteristic fluorescence with various chemical reagents in daylight and in ultraviolet-light (254 nm and 365 nm). The percentage extractive yield of Nyctanthes arbor-tritis and Syzygium cumini dried leaf extract was found to be 29.8 % and 22.22 % respectively. It can be concluded from the present study that the leaves of Nyctanthes arbor-tritis and Syzygium cumini contains various phytochemical constituents which may be used as phyto medicines. The result obtained from present investigation could help in identification, standardization and in carrying out further research in Nyctanthes arbor-tritis and Syzygium cumini leaf based herbal drugs.*

## Keywords

*Nyctanthes arbor-tritis, Syzygium cumini, Phytochemical, Physicochemical constant, Fluorescence*

## 1. Introduction

According to World Health Organization, approx 80% population in developed countries relies on traditional medicines, which has compounds derived from medicinal plants. Different traditional systems of medicines in India including Siddha, Ayurveda and Unani utilize a large number of medicinal plants for treating animal and human diseases [1]. Phytoconstituent can be derived from different part of plants including, seeds leaves, flowers, barks, roots, fruits etc. Knowledge of the chemical constituents of plants is desirable because such information will be value for synthesis of complex chemical substances [2].

*Syzygium cumini*, commonly known as jamun, black plum, Indian black berry and duhat is an large evergreen, widely grown tree distributed in the forest of India, Australia, Bangladesh Malaysia and Srilanka belongs to the family Myrtaceae [3,4]. This plant has been traditionally

used as a medicinal plant [5]. Almost all parts of jamun tree including leaves, seeds, fruit pulp, kernels and stem bark possess therapeutic efficacy [3]. Phytoconstituents including glucoside, anthocyanins, ellagic acid, jambosine, glycoside antimellin or jambolin are the major phytoconstituents of jamun tree. Leaves of jamun tree contains abundant amount of acylated flavonol glycosides, myricetin, quercetin, myricitin, esterase, 3-O-4-acetyl-L-rhamnopyranosidetrimerpenoids, tannins and galloyl carboxylase [6]. Generally all parts of jamun tree have anti-microbial, astringent, antidiarrheal, and anti-inflammatory properties. Jamun leaves have been used traditionally as a remedy for diabetes mellitus, for strengthening gums and teeth, to treat fever, leucorrhoea, gastropathy, dermatopathy, to inhibit blood discharges in the faeces and to treat constipation [7,8]. The fruit is oblong and ovoid in shape, immature fruits are green in colour while mature fruits are black in colour. Fruiting begins in the May upto July. Jamun fruits are rich in minerals like calcium, potassium, and vitamins like vitamin B-complex, vitamin C and free sugar like mannose, glucose, sucrose [1,9].

*Nyctanthes arbor-tristis* Linn commonly known as parijat in Sanskrit, harsinghar in Hindi and night jasmine in English belongs to family Oleaceae have high medicinal value in Ayurveda. The plant is native to Southern Asia and is geographically distributed widely throughout through Northern India, Northern Pakistan, Thailand and other parts of the World. The plant is planted throughout India in different locations moreover as a decorative plant due to its fragrant blossoms including Rajasthan, Assam, Madhya Pradesh, Central India and South to the Godavari. The flowers of the plants bloom in the evening and fade in the morning. Leaves, bark, flowers, seeds and fruits of the plants possess enormous medicinal value. The entire plant and individual parts of the plants are used as herbal medicine for the treatment of malaria, arthritis, sciatica, spleen enlargement, as a laxative, tonic etc [10,11]. The plant is used widely as anthelmintic, immunomodulatory, wound healer, anti-amoebic, larvicidal etc [9]. Leaves of harsinghar contains various phytoconstituents including triterpenoids oleanolic acid and nyctanthic acid, flavanol glycosides nicotiflorin, hentriacontane,  $\beta$ -amyrin  $\beta$ -sitosterol,, astragaline, iridoid glucoside arborside, iridoid glycosides arborside A, B, C, D, alkaloid nyctanthine, mannitol [9,11]. Leaves also contains 12-16% of light yellow brown fixed oil, which comprises of glucosides of oleic, linoleic, palmitic, stearic and lignoceric acids [10,11].

Evaluation of herbal drugs in Ayurveda is about the whole drug rather than active phytoconstituents. Pharmacognostic study includes parameters which help in identifying adulteration of drug in powdered form also. This is necessary as once the plant is converted into powder form, it loses its morphological identity, thus easily prone to adulteration. Pharmacognostic studies ensure plant identity, since substitution and adulteration have become a major problem due to the absence of standards relating to genuineness of herbal drug. Keeping this in view the leaves of *Nyctanthes arbor-tritis* and *Syzygium cumini* was standardized according to WHO guidelines available for herbal drugs. This type of studies can help in determining the authenticity of the plants and will ensure reproducible quality of herbal products which is essential for efficacy and safety of natural products. The present study reveals the morphological features, physicochemical constants and qualitative phytochemical study of leaves extract of *Nyctanthes arbor-tritis* and *Syzygium cumini*.

## **2. Materials and Methods**

### **2.1 Plant Material**

Fresh leaves of *Nyctanthes arbor-tritis* and *Syzygium cumini* were collected from the local areas of Rudrapur, Uttarakhand from an altitude of 28.98° N and longitude 79.40°E and were authenticated by Dr Lalit M.Tewari, Professor, Botany department at D.S.B campus, Kumaun University, Nainital, Uttarakhand.

### **2.2 Reagent and Chemicals**

All the chemicals and reagents used were of analytical grade, purchased from Microlab Pvt. Ltd (Baddi, Himachal Pradesh, India).

### **2.3 Preparation of extract**

Fifty gram coarse powder of both leaves was extracted separately by cold maceration using hydroalcoholic solvent in the ratio 70:30. The extract was filtered by using muslin cloth and Whatman grade 1 filter paper and the marc was re-extracted for the second and third time by adding another fresh solvent. The fluid extracts were combined and concentrated in a rotary evaporator under reduced pressure at 40°C. The percentage extractive yields of both leaves extract were calculated [12].

## 2.4 Macroscopic characteristics

Macroscopical studies of the *Nyctanthes arbor-tritis* and *Syzygium cumini* leaves were carried out and observed for the various parameters including size, color, shape, taste, surface characteristic and texture [13].

## 2.5 Fluorescence analysis

The fluorescence nature of powdered leaves of both plants was analyzed after suspending the powder with various reagents. The powder of leaves was prepared after passing it through mesh 40 and its fluorescence character was studied both in daylight and in UV light (254 and 366 nm) using different solvents like acetic acid, hydrochloric acid, sulphuric acid, ferric chloride etc [14].

## 2.6 Determination of pH

**pH 1% solution:** An accurately weighed 1.0 g of powdered drug was dissolved in 100 ml of distilled water and filtered. Then by using standardized glass electrode the pH of the filtrate was recorded [14].

**pH 10% solution:** An accurately weighed 10 gm of powdered drug was dissolved in 100 ml of distilled water and then filtered. Then with the help of pH meter, the pH of filtrate was recorded [14].

## 2.7 Physicochemical evaluation

Shade dried powder of leaves were used for determining physicochemical parameters like foreign matter, water soluble extractive value, alcohol soluble extractive value, loss on drying, swelling index and foaming index as per WHO guidelines [15].

## 2.8 Preliminary Phytochemical screening

Phytochemical analysis was done in *Nyctanthes arbor-tritis* and *Syzygium cumini* leaf extracts to assess various phytoconstituents present in them like alkaloids, glycosides, carbohydrates, phenolics, tannins, proteins, amino acids, saponins, flavonoids, resins, steroids and terpenoids using reported methods [16,17,18].

### 3. Results

#### 3.1 Extractive yield

The hydroalcoholic extracts of leaves was obtained by cold maceration method and percent yield of *Nyctanthes arbor-tritis* and *Syzygium cumini* dried leaf extract was found to be 29.8 % and 22.22 % respectively.

#### 3.2 Macroscopic characteristics

The morphological characters of both leaves were observed and reported in Table 1 and Figure 1 and 2.

**Table 1. Morphological character of *Nyctanthes arbor-tritis* and *Syzygium cumini* leaf**

S.No	Leaf feature	Observation ( <i>Nyctanthes arbo-tritis</i> )	Observation ( <i>Syzygium cumini</i> )
1	Colour	Upper surface-Dark green Lower surface: Light green	Upper surface-Dark green Lower surface: Light green
2	Taste	Bitter and Astringent	Slightly astringent
3	Odour	Indistinct	Turpentine like
4	Apex	Acute to Acuminate	Blunt or tapering to a point
5	Shape	Oblong, ovate	Oblong-oval or elliptical
6	Size	Length 6-12 cm Width 3-7 cm	Length 6-18 cm Width 2.5-7 cm
7	Venation	Reticulate	Pinnate
8	Surface texture	Rough, Pubescent Surface	Leathery and glossy
9	Margin	Entire or Distantly Tooth	Entire
10	Base	Cuneate to sub cordate	Slightly unequal



**Fig 1. Leaves of *Syzygium cumini***



**Fig 2. Leaves of *Nyctanthes arbor-tritis***

### 3.3 Determination of pH

The mean pH value of 1% solution and 10% solution of *Nyctanthes arbor-tritis* was found to be  $6 \pm 0.04$  and  $6.3 \pm 0.14$  and for *Syzygium cumini* it was found to be  $5.3 \pm 0.32$  and  $6.4 \pm 0.95$  respectively.

### 3.4 Determination of foaming index

The foaming index for *Nyctanthes arbor-tritis* leaf powder was found to be less than 100 and foaming index for *Syzygium cumini* was found to be  $200 \pm 0.02$ .

### 3.5 Determination of swelling index

The swelling index for *Nyctanthes arbor-tritis* leaf powder was found to be  $1.08 \pm 0.35$  and swelling index for *Syzygium cumini* leaf powder was found to be  $5 \pm 0.35$  respectively.

### 3.6 Fluorescence analysis

The powdered leaves of *Nyctanthes arbor-tritis* and *Syzygium cumini* (mesh size 40) was examined under day light and UV light. The recorded observation is given in Table 2.

**Table 2. Fluorescence analysis of *Nyctanthes arbor-tritis* and *Syzygium cumini* leaf powder**

S.No	Test	<i>Nyctanthes arbortritis</i>			<i>Syzygium cumini</i>		
		Day light	UV 254 nm	UV 366 nm	Day light	UV 254 nm	UV 366 nm
1	Powder treated with ferric chloride (5%)	Light yellow	Bright yellow	Dark green	Dull green	Brown	Reddish brown (wine)
2	Powder treated with Acetic acid	Brown	Dark green	Black	Yellow	Orange	Buff colour
3	Powder treated with HCl	Dark Green	Light yellow	Greenish black	Buff	Brownish black	Black
4	Powder treated with HNO <sub>3</sub>	Reddish brown	Dark Green	Black	Orange	Dark green	Black
5	Powder treated with conc. H <sub>2</sub> SO <sub>4</sub>	Brown	Greenish brown	Greenish black	Dark orange	Reddish brown	Dark red
6	Powder treated with NaOH (1N)	Greenish yellow	Dark Green	Dark green	Light orange	Dark brown	Violet
7	Powder treated with Iodine	Red	Brown	Yellowish brown	Green	Dark purple	Reddish brown
8	Powder treated with KOH (1%)	Pale yellow	Green	Dark green	Orange	Dark red	Reddish brown

### 3.7 Extractive values

The extractive values were studied on dried leaf powders as mentioned in methodology. All the values were taken in triplicate and the mean average was taken (Table 3).

**Table 3. Extractive values of *Nyctanthes arbor-tritis* and *Syzygium cumini* leaf**

S.No.	Extractive values	<i>Nyctanthes arbor-tritis</i>	<i>Syzygium cumini</i>
1	Water soluble	22.08±0.06%	18.25±0.07%
2	Alcohol Soluble	22.5±0.05%	39±0.15%



### 3.8 Ash values

The total ash, acid insoluble ash, water soluble ash and sulphated ash were determined for both *Nyctanthes arbor-tritis* and *Syzygium cumini* leaf powder. The result was recorded and given in Table 4.

**Table 4. Ash value of *Nyctanthes arbor-tritis* and *Syzygium cumini* leaf**

S.No.	Drug	Total ash (% w/w)	Acid insoluble ash (% w/w)	Water soluble ash (% w/w)	Sulphated ash (% w/w)
1	<i>Nyctanthes arbortritis</i>	12.30±0.28	3.25±0.13	8.65±0.24	14.0±0.10
2	<i>Syzygium cumini</i>	9.50±0.07	1.9 ±0.42	5.3 ±0.12	13.0±0.13

### 3.9 Loss on drying

The loss on drying was found to be 7.2±0.83 w/w and 4.2±1.58 is done to determine the moisture as well volatile component in the crude drug.

### 3.10 Foreign organic matter

The % foreign organic matter in *Nyctanthes arbor-tritis* and *Syzygium cumini* was found to be 0.42 ±0.28% w/w and 0.01±0.03 % w/w respectively.

### 3.11 Preliminary phytochemical screening

The results obtained reveal the presence of the compounds like carbohydrate, alkaloids, gums, mucilage, tannins, phenolic, steroids and terpenoids, saponins etc leaves of both plants viz *Nyctanthes arbor-tritis* and *Syzygium cumini* while extract of *Syzygium cumini* leaves showed absence of anthraquinone glycosides (Table 5).

**Table 5. Qualitative Phytochemical screening of *Nyctanthes arbor-tritis* and *Syzygium cumini* leaf**

S.No.	Phytochemicals	<i>Nyctanthes arbor-tritis</i>	<i>Syzygium cumini</i>
1	Carbohydrate	Positive	Positive
2	Alkaloids	Positive	Positive
3	Gums and mucilage	Positive	Positive
4	Proteins and aminoacid	Negative	Negative
5	Tannins	Positive	Positive
6	Phenolic compounds	Positive	Positive
7	Steroids and terpenoids	Positive	Positive
8	Saponins	Positive	Positive
9	Flavonoids	Positive	Positive
10	Anthraquinone glycosides	Positive	Negative
11	Resins	Positive	Positive

+ present, - = absent

#### 4. Conclusion

The present work was taken up with a view to lay down standards, which could be useful to establish the authenticity of these two medicinally useful plants. In the present study, we have found that most of the biologically active phytochemicals were present in the extract of *Nyctanthes arbor-tritis* and *Syzygium cumini*. Phytochemical studies on *Nyctanthes arbor-tritis* and *Syzygium cumini* leaves indicate that these plants can be used as an important ingredient of herbal formulations.

#### Conflict of Interest

The authors declare no potential conflicts of interest with respect to research, authorship and/or publication of this article.

#### Source of Interest

None

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