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## Physical and Phytochemical Parameters of *Abutilon Indicum* (L), Leaves (Family-Malvaceae)

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### ABSTRACT

India is one of the countries in the world distinguished for immense miscellany amongst plants. Less number of plants is studied for their medicinal values as compared to the total number of different varieties of plants found in the universe. In our present study, the plant *Abutilon indicum* (Family- Malvaceae) was subjected for determination of physico-chemical parameters. The total ash value, acid soluble ash value, alcohol extractive value and water extractive values were determined. The *Abutilon* leaves were also subjected for phytochemical screening. Methanolic, petroleum ether and chloroformic extracts were selected for the present study as this plant possesses several secondary metabolites like alkaloids, glycosides, phenols, steroids, terpenoids, saponins, flavanoids and proteins. The petroleum ether extract confirmed the presence of sterols, terpenoids and alkaloids. The chloroform extract showed the presence of alkaloids, sterols, flavonoids and glycosides while the methanol extract confirmed the presence of carbohydrates, flavonoids, tannins, phenolic compounds, proteins and amino acids.

**Keywords:** *Abutilon indicum*, physico-chemical parameters, ash values, extractive values, phytochemical screening.

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## INTRODUCTION

Medicinal plants constitute important components of flora and are widely distributed in different regions of India. *Abutilon indicum* (Linn.) Family- Malvaceae, commonly known as 'Country mallow', 'Kanghi' or 'Atibala' is found in India, Sri Lanka, tropical regions of America and Malaysia<sup>1</sup>. It is a perennial shrub<sup>2-3</sup>, softly tomentose and up to 3 m in height found as a weed in sub-Himalayan tracts, hills up to 1200 m and in hotter parts of India. Various parts of *A. indicum* such as roots, leaves and seeds are documented to possess various medicinal properties in ethnobotanical surveys and in traditional systems of medicine such as Ayurveda. Our thorough literature search revealed an interesting fact that though the plant is a proper remedy for a variety of ailments and is one of the ingredients in many Ayurvedic formulations (Diabecon), very little efforts have been made to verify its efficacy through scientific screening.

### Traditional Uses

Almost all the parts of *Abutilon indicum* are of medicinal importance and are used traditionally for the treatment of various ailments. Roots of the plant are considered as demulcent, diuretic, used in chest infection and urethritis<sup>4</sup>. Decoction of leaves is used in toothache, tender gums and internally for bladder inflammation. The bark is used as febrifuge, anthelmintic, astringent and diuretic. The seeds are used in piles, laxative<sup>5</sup>, expectorant<sup>6</sup> and in chronic cystitis<sup>7</sup>.

### Ethno-botanical Uses

There are over 400 different tribal and other ethnic groups in India having their own tradition, folk language, beliefs and knowledge about use of natural resources as medicines. Almost all the parts of this plant are documented to be useful in surveys conducted by ethnobotanists. Natives of India, Malaya, Philippine Islands and Indochina use its parts for medicinal purposes such as febrifuge<sup>8</sup>, anthelmintic<sup>9</sup>, anti-inflammatory<sup>10</sup>, in urinary and uterine discharges<sup>11</sup>, piles and lumbago. A leaf paste is taken orally to cure piles and to relieve leg pains<sup>12</sup>. Leaf juice mixed with jaggery is used for the treatment of snakebite as antidote<sup>13</sup>. The fruit is used to treat piles<sup>14</sup>, gonorrhoea and cough<sup>15</sup>. Seed powder is used orally as aphrodisiac<sup>16</sup> and laxative<sup>17</sup>. The plant kingdom still holds many species which contains substance of medicinal values, yet to be discovered<sup>18</sup>. Twenty medicinal plants used extensively by the tribals of Satpuda region in Maharashtra have been screened qualitatively<sup>19</sup> to find out the active principles. Similar work by our coworkers based on phytochemical screening and antimicrobial studies of *Butea monosperma* has been reported on the indigenous plants found in this area<sup>20-22</sup>. This fact prompted us to undertake phytochemical investigation of the *Abutilon indicum* for research. After thorough investigation and literature

search it was observed that less work has been done on this plant especially on its leaves. Based on our continuing interest on the isolation of bioactive secondary metabolites from *Abutilon indicum* leaves for personal care applications we under took the chemical examination of *Abutilon indicum* leaves . In our earlier reports we have reported the antimicrobial studies of *Abutilon indicum* extracts using different solvents<sup>23</sup>. Most of the crude drugs (plant materials) are usually put in quarantine store and they remain there for long time. During storage proper ventilation, humidity controls, suitable temperature and light conditions should be ensured to maintain their original pharmacological action. However it is observed that crude plant materials before being taken for processing, are not analyzed which can lead to changes in original characteristics. To avoid this, the crude drugs should be tested for the following tests as per the USP and Indian Herbal Pharmacopoeia (IHP).

1. Foreign organic matter.
2. Ethanol soluble extractives.
3. Water soluble extractives.
4. Total ash contents.
5. Ash which is insoluble in acid.
6. Ash which is soluble in water.
7. Loss by drying.
8. Percentage moisture content.

The physico-chemical analysis<sup>24,26</sup> was performed on *Abutilon indicum* leaves. Here we report the determination of ash values, total ash content, ethanol soluble extractives, water soluble extractives.

## MATERIALS AND METHODS

### Plant Material

*Abutilon indicum* leaves were collected in the summer season from fields near the village Varul (Shahada), District- Nandurbar (M.S). The plant specimen was identified and authenticated by Dr. S. K. Tayade, Taxonomist, Dept. of Botany, P.S.G.V.P. Mandal's ASC College, Shahada. A voucher specimen (No. 613) was deposited in the Herbarium of the Department.

### A) Physico-chemical investigation

The physico-chemical parameters were done to evaluate the percentage of total ash, water soluble ash, acid insoluble ash as per Indian Pharmacopoeia<sup>27</sup> . Extract of the leaves were prepared with different solvents for the study of extractive values.

### Determination of Alcohol Soluble Extractive Value

10 gm. of the air-dried coarse powder of *Abutilon indicum* leaves were macerated with 100 ml of 90% ethanol for 24 hours. Thereafter it was filtered rapidly. Then 25 ml of the filtrate was evaporated to dryness in a tarred flat bottomed shallow dish, dried at 105<sup>0</sup> C and weighed. The percentage of ethanol soluble extractive value was calculated.



**Figure 1: Abutilon indicum whole plant.**

### Determination of Water Soluble Extractive Value

10 gm. of powdered *Abutilon indicum* leaves were macerated with 100 ml of water in a closed flask for 24 hours with frequent shaking. Then 25 ml of the filtrate was evaporated to dryness in a tarred flat-bottomed shallow dish, dried at 105<sup>0</sup>C and weighed. The percentage of water soluble extractive was calculated.

**Loss on Drying:-** Loss on drying is the loss of mass expressed as per cent w/w. Loss on drying determines both water and volatile matter in the crude drug. Moisture is an inevitable component of crude drug, which must be eliminated as far as possible. About 1.5 gm. of powdered drug was weighed accurately in a porcelain dish which was previously dried and heated at 105<sup>0</sup>C in hot air oven to constant weight and then weighed. From the difference in weight, the percentage loss of drying with reference to the air dried substance was calculated.

### Ash Values

Ash values are helpful in determining the quality and purity of crude drug, especially in the powder form. It usually represents the inorganic salts naturally occurring in the drug and adhering to it. The objective of ashing vegetable drugs is to remove all traces of organic matter, which may otherwise interfere in an analytical determination. Hence an ash determination furnishes a basis for

judging the identity and cleanliness of a drug. Procedure given in Indian Pharmacopoeia was used to determine the different ash values such as total ash, acid insoluble ash, and water soluble ash etc.

**Determination of total ash value:** It is the total amount of material remaining after ignition. This includes both “Physiological ash”, which is derived from the plant tissue itself, and “Non physiological ash” which is residue of the extraneous matter. About 3 grams of air dried *Abutilon indicum* leaves was taken in a tarred silica crucible. It was incinerated by gradually increasing the temperature to make it dull red hot until free from carbon. The crucible was cooled and weighed, repeated for constant value. The percentage of total ash was calculated.

**Determination of acid insoluble ash value:** The ash obtained as directed under total ash value was boiled with 25 ml of 2N HCl for 5 minutes. The insoluble matter was collected on an ash less filter paper, washed with hot water, ignited and weighed. The percentage of acid insoluble ash was calculated.

**Determination of water soluble ash value:** The total ash obtained was boiled with 25 ml of water for 5 minutes. The insoluble matter was collected on an ash less filter paper, washed with hot water and ignited for 15 minutes at a temperature above 25<sup>0</sup>C. The weight of insoluble matter was subtracted from the weight of total ash. The difference in weight represents the water-soluble ash. The percentage of water soluble ash was calculated.

### **Preliminary Phytochemical Analysis**

For phytochemical analysis, the extracts were prepared by weighing 1 kg of the dried powdered *Abutilon indicum* leaves and subjected to hot successive continuous extraction with different solvents such as petroleum ether, chloroform and methanol. The extracts were filtered in each step, concentrated and the solvent was removed by rotary evaporator. The extracts were dried over dessicator and the residues were weighed. The presence or absence of the primary and secondary phytoconstituents was detected by usual prescribed methods<sup>28</sup>

## **RESULTS AND DISCUSSIONS**

### **Physico-chemical Parameters**

The powdered *Abutilon indicum* leaves were evaluated for its physico-chemical parameters like Ash values, Acid Insoluble ash, Water soluble ash, Extractive values (Alcohol and water soluble values) and loss on drying. All the results are tabulated in Table 1. It was clear from the experimental data that the quantitative ash content value suggests the presence of inorganic component in *Abutilon indicum* leaves. The quantitative solubility of ash was checked in dilute

acid solution and water. The solubility of ash in dilute acid solution was found lower than water. The water soluble and alcohol soluble extractives were checked quantitatively. The water soluble extractives were found lower than alcohol soluble extractives. The data obtained from physicochemical test was used to evaluate the possibility of adulteration of leaves quality. The amount of extracts, physical appearance, color and odor was also recorded (Table -2).

**Table 1: Physicochemical Parameters of *Abutilon indicum* Leaves**

Sr. No.	Parameters	Result % (w/w)
1	Water soluble extractive value	7.7
2	Alcohol soluble extractive value	11.7
3	Loss on drying	4.9
4	Total ash value	6.2
5	Acid insoluble ash value	3.0
6	Water soluble ash value	4.1

**Table 2: Nature and percentage of successive extracts.**

Extracts	Yield of powdered drug	Physical appearance	Color	Odor
Petroleum Ether extract	6.8	Syrupy liquid	Dark green	Pungent aromatic
Chloroform extract	18.8	Syrupy mass	Greenish black	Aromatic
Methanol extract	16.8	Syrupy mass	Greenish black	Aromatic

### Preliminary Phytochemical Analysis

Various extracts were subjected to preliminary phytoconstituents analysis for their presence or absence of the constituents. The petroleum ether extract confirmed the presence of sterols, terpenoids and alkaloids. The chloroform extract showed the presence of alkaloids, sterols, flavonoids and glycosides while the methanol extract confirmed the presence of carbohydrates, flavonoids, tannins, phenolic compounds, proteins and amino acids. The results are shown in Table- 3.

**Table 3: Phytochemicals present in extracts of *Abutilon indicum* leaves.**

Sr.No	Chemical Test	Pet. ether extract	Chloroform extract	Methanol extract
1	<b>Test for carbohydrates</b>			
	Molisch test (General test)	-	-	+
	A) Test for reducing sugars			
	a) Fehling's test	-	-	+
	b) Benedict's test	-	-	+
	B) Test for monosaccharide	-	-	-
	Barfold's test			
	C) Test for hexose sugars Cobalt-	-	-	+

	chloride test			
	D) Test for non reducing sugars	-	-	-
	Tannic acid test			
<b>2</b>	<b>Test for proteins</b>			
	a) Biuret test (General test)	-	-	-
	b) Million's test	-	-	-
	c) Xanthoprotein test	-	-	-
	d) Precipitation test			
	i) Absolute alcohol	-	-	-
	ii) 5% HgCl <sub>2</sub> solution	-	-	-
	iii) 5% CuSO <sub>4</sub> Solution	-	-	-
	iv) 5% lead acetate	-	-	-
	v) 5% ammonium sulphate	-	-	-
<b>3</b>	<b>Test for steroids</b>			
	a) Salkowski test	+	+	-
	b) Libermann-Burchard reaction	+	+	-
	c) Libermann reaction	+	+	-
<b>4</b>	<b>Test for amino acids</b>			
	a) Ninhydrin test (General test)	-	-	+
	b) Test for Tyrosine	-	-	-
<b>5</b>	<b>Test for glycosides</b>			
	A) Test for Cardiac glycosides	-	+	-
	a) Balijet's test	-	+	-
	b) Legal's test	-	+	-
	c) Test for deoxysugars	-	+	-
	B) Test for anthraquinone glycosides			
	a) Bontrages test	-	-	-
	b) Modified Bontrages test	-	-	-
	C) Test for saponin glycosides	-	-	-
	Foam test			
<b>6</b>	<b>Test for Flavonoids</b>			
	a) Shinoda test	-	+	-
	b) Lead acetate test	-	+	-
	c) Ferric chloride test	-	+	+
<b>7</b>	<b>Test for alkaloids</b>			
	a) Dragendroff's test	+	+	-
	b) Mayer's test	+	-	-
	c) Wagner's test	+	-	-
<b>8</b>	<b>Test for tannins &amp; phenolic compounds</b>			
	a) 5% FeCl <sub>3</sub> solution	-	-	+
	b) Lead acetate solution	-	-	+
	c) Acetic acid solution	-	-	+
	d) Potassium dichromate solution	-	-	+
	e) Dil.HNO <sub>3</sub> solution	-	-	+
<b>9</b>	<b>Test for carotenoids</b>			

	Carr-Price Test	-	-	-
<b>10</b>	<b>Test for terpenoids</b>			
	Noller's Test	+	-	-

(+) meets the test requirement qualitatively and (-) does not meet the test requirement qualitatively

## CONCLUSION

In the present study of physico-chemical analysis loss on drying, ash values, extractive values etc. were determined for *Abutilon indicum* leaves. The water soluble and alcohol soluble extractive values were checked quantitatively. The water soluble extractive values were found lower than alcohol soluble extractives. The present study carried on the *Abutilon indicum* leaves revealed the presence of medicinally active constituents like alkaloids, carbohydrates, glycosides, phenols, tannins, steroids, terpenoids, saponins, flavanoids, proteins and aminoacids. Quantitative estimation of the percentage crude chemical constituents and the physical parameters of all extracts showed the presence of aromatic compounds. The petroleum ether and chloroform extracts of the plant leaves were positive for steroids. The steroidal components are of importance and interest in pharmacy due to sex hormones<sup>29</sup>. In recent years, ethno-botanical and traditional uses of natural compounds, especially of plant origin received much attention as they are well tested for their efficacy and generally believed to be safe for human use. They obviously deserve scrutiny on modern scientific lines such as phytochemical investigation, biological evaluation, toxicity studies, investigation of molecular mechanism of isolated phyto-principles and their clinical trials. It is best classical approach in the search of new lead molecules for management of various diseases. Thorough screening of literature available on *A. indicum* depicted the fact that it is a popular remedy among the various ethnic groups, vaidyas, hakims and Ayurvedic practitioners for cure of ailments. Following the traditional and folk claims very little efforts have been made by the researchers to explore the therapeutic potential of this plant and there is need to explore this plant very thoroughly.

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