

# PHYTOCHEMICAL SCREENING OF *SOLANUM XANTHOCARPUM* AND *ALPINIA OFFICINARUM* INDIAN MEDICINAL PLANTS

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## Abstract

Natural remedies are more acceptable in the belief that they are safer with fewer side effects than the synthetic ones. Herbal formulations have growing demand in the world market. *Solanum xanthocarpum* and *Alpinia officinarum* herb is highly used by the rural and tribal people in curing various disorders. The aim of the current investigation is phytochemical screening of *solanum xanthocarpum* fruits extract and *Alpinia officinarum* rhizome extract. Secondary metabolites provide defense to plants against pests and pathogens and also form the backbone of modern system of medicines. The results showed that the alcoholic fruits extract of *Solanum xanthocarpum* revealed the presence alkaloids, tannins, terpenoids, carbohydrates, glycosides, saponins, protein and mucilage & gum while Phyto chemical analysis of *Alpinia officinarum* with different solvents showed the presence of various constituents such as alkaloids, carbohydrates, saponins, tannins, protein and amino acids, glycosides, flavonoids etc. Maximum total phenol and flavonoid content were present in Methanolic extract of *Alpinia officinarum*.

**Keyword** : Natural remedies, extract, Secondary metabolites, alkaloids, glycosides etc.

## Introduction

Medicines derived from plant sources are widely used in traditional cultures globally and now-a-days they are getting popular as natural alternatives to synthetic chemicals. In the last few decades the use of herbal medicine has increased exponentially. Recently it is getting popular in developing and developed countries owing to its natural origin and lesser side effects.

*Solanum xanthocarpum* (Solanaceae) and *Alpinia officinarum* (Zingiberaceae) is an important medicinal herb in Ayurvedic medicine. Various studies indicated that *S. xanthocarpum* possesses antiasthmatic, hypoglycemic, hepatoprotective, antibacterial, analgesic and insect repellent properties. Although the results are very encouraging and indicated that some of the constituents of the plant like solasodine and diosgenin are important therapeutically, the herb should be studied more extensively to confirm these results and reveal other potential

therapeutic effects. In India it is largely found in UP, Punjab, Bihar, Bengal, Uttaranchal, & other north east states. It grows generally in March- April and produce fruits in May- June. It can grows on any type of soil but hot and dry region is more suitable. Various traditional claims like immunomodulation, anti-inflammatory, antiallergic, antianaphylactic and antitumor effects of the plant are still remain to be validated scientifically while *Alpinia officinarum* belong to the ginger family and commonly used for its anti-inflammatory, antihyperlipidemic bioactivity, anticancer, dysmenorrhea, osteoblast, anti-influenza virus activity, antibiotic resistance, antimicrobial effect.<sup>1-4</sup>

## Material & Methods

### Collection of plant material

The plant *Solanum xanthocarpum* and *Alpinia officinarum* were collected from Bhopal and was authenticated by Dr. S. N. Dwivedi, Prof. & Head, Department of Botany, Janata PG College, APS, University, Rewa, M.P.

### Preparation of plant powder

The plant were dried under shade and then powdered with a mechanical grinder. The powder was passed through sieve No. 40 and stored in an airtight container for further use.

### Preparation of extracts

About 250 gm of *S.xanthocarpum* dried fruit and 250 gm of *A. officinarum* dried rhizome powder of plant was subjected to Soxhlet extraction. It was first defatted with petroleum ether then exhaustively extracted with solvent in a Soxhlet apparatus for 36 hours. The temperature was maintained at 40-50 degree centigrade. Ethanol solvent is used for *S.xanthocarpum* extraction and methanol solvent for *A. officinarum*. The solvents were removed by distillation under reduced pressure and the resulting semisolid mass was vacuum dried using rotary flash evaporator to obtain the extract.<sup>5-6</sup>

### Phytochemical Screening<sup>7-12</sup>:

The various extract obtained after extraction were subjected for phytochemical screening to determine the presence of following various phytochemical present in the extracts.

### Tests for carbohydrates and glycosides

#### Molisch's test

Sample was treated with 2-3 drops of 1% alcoholic - naphthol solution and 2 ml of conc. sulphuric acid was added along the sides of the test tube. Appearance of violet ring at the junction of two liquids shows the presence of glycoside.

#### Legal's test

To the sample 1 ml of pyridine and few drops of sodium nitroprusside solutions was added and then it was made alkaline with sodium hydroxide solution. Appearance of pink to red colour shows the presence of glycosides.

#### Borntrager's test

Sample was treated with chloroform and then the chloroform layer was separated. To this equal quantity of dilute ammonia solution was added. Ammonia layer acquires pink color, showing the presence of glycosides.

### **Keller-Killani Test**

Glacial acetic acid was added into 2 ml. extract and one drop 5% FeCl<sub>3</sub> and conc. H<sub>2</sub>SO<sub>4</sub>. Reddish brown colour appears at the junction of the two liquid layers and the upper layer of bluish green indicates the presence of glycosides.

### **2 Test for alkaloids**

A small portion of the sample was stirred separately with few drops of dilute hydrochloric acid and was tested with various reagents for the presence of alkaloids. The reagents are

- Dragendroff's reagent - Reddish brown ppt
- Wagner's reagent - Reddish brown ppt
- Mayer's reagent - Cream color ppt
- Hager's reagent - Yellow color ppt

### **3 Test for proteins and free amino acids**

Small quantities of the sample was dissolved in few ml of water and treated with following reagents.

- Million's reagent: Appearance of red color shows the presence of protein and free amino acid.
- Ninhydrin reagent: Appearance of purple color shows the presence of Proteins and free amino acids
- Biuret's test: Equal volumes of 5% sodium hydroxide solution & 1% copper sulphate solution was added. Appearance of pink or purple color shows the presence of proteins and amino acids.

### **4 Test for tannins**

**Ferric chloride test** : A small quantity of the sample was taken separately in water and test for the presence of phenol compounds and tannins was carried out with the following reagents.

- Dilute Ferric chloride solution (5%) - Violet color.

**Lead acetate test**: Few drops of 10% lead acetate solution were added into 5 ml of extract. Formation of yellow or red precipitate indicates the presence of tannins

### **5 Test for flavonoids**

#### **Alkaline reagent test**

To the test solution add few drops of magnesium hydroxide solution, intense yellow colour is formed which turns to colourless on addition of few drops of dilute acid indicates presence of flavonoids.

#### **Shinoda's test**

Small quantities of the sample was dissolved in alcohol, to this piece of magnesium followed by concentrated hydrochloric acid drop wise added and heated. Appearance of magenta color shows the presence of flavonoids.

### **6 Tests for fixed oils and fats Spot test**

- A small quantity of sample was separately pressed between two filter papers. Appearance of oil stain on the paper indicates the presence of fixed oil.

- Few drops of 0.5 N alcoholic potassium hydroxide were added to a small quantity of sample along with a drop of phenolphthalein, the mixture was heated on a water bath for 1-2 hours, formation of soap or partial neutralization of alkali indicates the presence of fixed oils and fats.

## 7. Tests for steroids and triterpenoids

### Libermann-burchard test

Sample was treated with few drops of acetic anhydride, boils and cooled. Then concentrated sulphuric acid was added from the side of test tube, brown ring was formed at the junction two layers and upper layer turns green which shows presence of steroids and formation of deep red colour indicates presence of triterpenoid.

### Salkowski test

Sample was treated with few drop of concentrated sulphuric acid, red colour at lower layer indicates presence of steroids and formation of yellow coloured lower layer indicates presence of triterpenoids.

### 8 Test for mucilages and gums

Small quantities of sample was added separately to 25 ml. of absolute alcohol with constant stirring and filtered. The precipitates was dried in oil and examined for its swelling property for the presence of gum and mucilage.

### 9 Test for waxes

To the test solution alcoholic alkali solution was added, the waxes get saponified.

## Results and conclusion

### Extractive value

The dried powder of plant was extracted with solvents i.e., Ethanol solvent for *S. xanthocarpum* fruits and methanol solvent for *A. officinarum* rhizome. The solvents were removed by distillation under reduced pressure and the resulting semisolid mass was vacuum dried using rotary flash evaporator to obtain the extract. The percentage yields of various extract was presented in Table 1.

## Preliminary phytochemical studies

### *Solanum xanthocarpum* :

The results of the phytochemical screening of fruits extract of *Solanum xanthocarpum* were present in Table-3. Preliminary phytochemical screening was useful in prediction of nature of drugs and also useful for the detection of several constituents present in different polarity solvent. Different types of secondary metabolites such as alkaloids, tannins, terpenoids, carbohydrates, glycosides, saponins, protein and mucilage & gum were presented in *Solanum xanthocarpum* fruits extract.

### *Alpiniaofficinarum* :

The results of the phytochemical screening of rhizome extract of *Alpinia officinarum* were present in Table-4. Phyto chemical analysis of *Alpinia officinarum* with different solvents showed the presence of various

constituents such as alkaloids, carbohydrates, saponins, tannins, protein and amino acids, glycosides, flavonoids etc. Maximum total phenol and flavonol content were present in Methanolic extract of *Alpinia galanga*. The results for both qualitative and quantitative Phyto chemical analysis were tabulated in table no

**Table1: Extractive values of *Solanum xanthocarpum* fruit.**

Fruts fruits

Sr.No.	Solvents	Extractive values(%w/w)
1.	Pet-ether	2.62
2.	Water	17.2
3.	Chloroform	6.9
4.	Ethanol	15.5
5.	Methanol	14.5

**Table2: Extractive values of *A.officinarum* rhizome.**

Sr.No.	Solvents	Extractive values(%w/w)
1.	Pet-ether	0.60
2.	Water	1.6
3.	Chloroform	1.2
4.	Ethanol	1.8
5.	Methanol	2.7

Table 3: Preliminary phytochemical screening of different extract of *Solanum xanthocarpum*

S/No.	Constituents	Test	Aqueous Extract	Ethanollic Extract	Methanol	Petroleum ether Extract	Chloroform Extract
1.	Alkaloids	Mayer's test	-	-	-	-	-
		Dragendroff <sup>o</sup> test	+	+	+	-	+
		Hager's test	-	-	-	-	-
		Wagner's test	-	-	-	-	-
2.	Carbohydrates	Molisch's test	-	+	+	-	-
		Fehling's test	-	-	-	-	-
3.	Glycosides	<b>Molisch's test</b>	+	+	+	-	-
		Legal's test	-	+	+	-	+
		Keller-Killani Test	+	+	+	+	+
5.	Tannins	FeCl <sub>3</sub>	-	+	+	-	-
		Lead acetate test	-	+	+	-	-
		Alkaline reagent	-	-	-	-	-
6.	Protein and amino acid	Million's test	+	-	-	-	-
		Ninhydrin test	+	-	-	-	-
		Biuret test	-	-	-	-	-
7.	Flavanoids	With NaOH	-	-	-	-	-
		Shinoda test	-	-	-	-	-
8.	Steroids and triterpenoids	Libermann's Burchard test	-	+	+	+	+
		Salkowski's test	-	+	+	+	+
9.	Mucilage and gum	With 90% alcohol	+	-	-	-	-
10.	Waxes	With alc. KOH	-	-	-	-	-

(+ Present, - Absent)

**Table 4: Preliminary phytochemical screening of different extract of *A.officinarum***

S/No.	Constituents	Test	Aqueous Extract	Ethanolic Extract	Methanol	Petroleum ether Extract	Chloroform Extract
1.	Alkaloids	Mayer's test	-	+	+	+	-
		Dragendroff's test	+	+	+	-	+
		Hager's test	-	-	-	-	-
		Wagner's test	-	+	+	+	-
2.	Carbohydrates	Molisch's test	-	-	-	-	-
		Fehling's test	-	-	-	-	-
3.	Glycosides	Molisch's test	+	+	+	-	-
		Legal's test	+	+	+	-	+
		Keller-Killani Test	+	+	+	+	+
5.	Tannins	FeCl <sub>3</sub>	-	-	-	-	-
		Lead acetate test	+	+	+	+	+
6.	Protein and amino acid	Million's test	-	-	-	-	-
		Ninhydrin test	-	-	-	-	-
		Biuret test	-	-	+	-	-
7.	Flavanoids	With NaOH	-	-	-	-	-
		Shinoda test	+	+	+	-	+
8.	Steroids and triterpenoids	Libermann's Burchard test	-	-	-	-	-
		Salkowski's test	-	-	-	-	-
9.	Mucilage and gum	With 90% alcohol	-	-	-	-	-

( + Present, - Absent)

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