ISSN 0975-6299 Vol.1/Issue-3/Jul-Sep.2010

International Journal of Pharma and Bio Sciences

PHYTOCHEMICAL EVALUATION AND QUANTIFICATION OF PRIMARY METABOLITES OF *ALANGIUM SALVIIFOLIUM*

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ABSTRACT

The use of traditional medicines and medicinal plants in most developing countries, as a normative basis for the maintenance of good health, has been widely observed. Laboratory evolutions were made to assess the phytochemical screening and quantification of primary metabolites in *Alangium salviifolium*. It contains higher soluble sugars in leaves, starch in stem, lipid in stem, phenol in leaves as compared to other parts of the plant. Maximum extractive value (4.130%) was found in water extract among test solvents. All the metabolites were qualitatively present in water and ethanolic extracts.

KEY WORDS

Alangium salviifolium, Phytochemical, Primary metabolites, Medicinal plants.

INTRODUCTION

There are hundreds of medicinal plants that have a long history of curative properties against various diseases and aliments. Furthermore, an increasing reliance on the use of medicinal plants in the industrialized societies has been traced to the extraction and development of several drugs and chemotherapeutics from these plants as well as from traditionally used rural herbal remedies[1]. Medicinal plants are of great interest to the researchers in the field of biotechnology as most of the drug industries depend, in part, on plants for the production of pharmaceutical compounds[2]. Plants have formed the basis of sophisticated traditional medicine systems among which are Ayurvedic, Unani, and Chinese. These systems of medicine have given rise to some important drugs which are still in use[3-4]. Some medicinal plants have investigated for their primary metabolites[5].

Alangium salviifolium Linn. (Akoul) is a deciduous, rambling shrub or a tree, up to 10m in height with a maximum girth of 1.2m, which grows in the wild throughout the hotter parts of India[6]. It belongs to Alangiaceae family. *Alangium salviifolium* has various medicinal properties and used as laxative, astringent, pungent, purgative, alleviates spasms, anthelmintic, emetic, antiprotozoa, hypoglycemic. It has been reported that it used to cure skin disease[7, 8] and sexual diseases and as contraceptives for pigs and cattle rearing by the tribes in the Malayalies [9, 10, 11]. In Ayurveda the roots and the fruits are used for

treatment of rheumatism, and hemorrhoid. Externally it is used for the treatment of bites of rabbits, rats, and dogs. The fruits (mucosa) of the plant are useful in treating burning sensation and haemorrhages[12].

Phytochemicals are naturally occurring biochemicals in plants that give plants their color, flavor, smell and texture. Preliminary phytochemical screening of medicinal plants is a useful method for qualitatively determination of different metabolite in **crude** sample. Many primary metabolites lie in their impact as precursors or pharmacologically active metabolites in pharmaceutical compounds such as antipsycohotic drugs[13, 14].

MATERIALS AND METHODS

Collection of plant material: Plant material collected from Narayani Dham in Alwar district of Rajasthan. Plant material was authenticated by Herbarium, Department of Botany, Rajasthan University, Jaipur, Rajasthan, India.

Preparation of extracts: [15]The stem, leaf and roots of *Alangium salviifolium* L. was cut into small pieces, dried and powdered. The resultant was then subjected for successive extraction with petroleum ether, benzene, chloroform, ethanol and water with soxhlet apparatus. The extracts were then concentrated in vacuum under reduced pressure using rotary flash evaporator and dried in desiccators. These extracts were then subjected to preliminary phytochemical screening for the detection of various plant constituents. Each of these extracts was processed further to evaluate the presence of carbohydrates, proteins, tannins, flavonoids and alkaloids following the established protocols[16]. The powder was treated with acids like 1N HCl, H_2SO_4, HNO_3, Acetic acid and alkaline solutions like 1N NaOH and ammonia. Root, stem and leaf parts of *Alangium salviifolium* L. were evaluated quantitatively to estimate the total levels of soluble sugars, starch, proteins, lipids and phenols following the established methods for the sugars, starch[17], lipid[18], protein[19]and phenol [20]. All experiments were repeated five times for precision and values were expressed in mean ± standard deviation in terms of air dried material. (Table 4)

RESULT

Phytochemical screening:The shade dried plant material subjected to sequential extraction in petroleum ether, benzene, chloroform, ethanol and water. Maximum yield were found in ethanol extract (4.130%). Total extractive values are shown in table 1.

Table 1.
Successive solvent extraction of air dried plant material of *Alangium salviifolium* L.

S. No.	Solvent	Color and Consistency	Extractive value **(%w/w)**
1	Petroleum ether	Yellowish green viscous	0.637
2	Benzene	Yellowish green sticky	0.935
3	Chloroform	Yellowish green viscous	0.795
4	Ethanol	Yellowish green sticky	2.805
5	Aqueous	Brownish powder	4.130

Preliminary phytochemical investigation revealed that petroleum ether extract contains steroids, saponins and tanins, benzene extract contains alkaloids and steroids, chloroform extract contains protein, alkaloids and steroids, ethanol extract contains alkaloids, steroids, tannins, flavonoids carbohydrates and proteins, aqueous extract contains alkaloids, tannins, flavonoids carbohydrates and proteins. (Table 2)

Table 2.
Preliminary Phytochemical Test for Different Extracts of Alangium salviifolium L. (Obtained by Successive Solvent Extraction)

S.No	Test	Petroleum ether	Benzene	Chloroform	Ethyl alcohol	Aqueous
1	**Proteins**	-	_	+	++	++
2	**Carbohydrates**	_	_	_	+	++
3	**Tannins**	+	_	_	+	++
4	**Flavonoids**	_	_	+	++	++
5	**Alkaloids**	_	+	+	+	++
6	**Steroids**	+	+	_	+	_

+, ++ Relative intensities
- No reaction

The powdered material of *Alangium salviifolium* treated with different acids, bases and other chemicals. After treatment powder observed and fluorescence were tabulated in table 3.

Table 3.
Fluorescence Analysis of Drug Powder of Alangium salviifolium L.

S.no	Test	Color
1	Powder + HNO_3	DA-RD
2	Powder+ Acetic Acid	GY-YW
3	Powder+5% Iodine solution	GN-YW
4	Powder+5% $FeCl_3$	DA-GY
5	Powder+ Diluted NH_4+ $K_4Fe(CN)_4$	BL-GY
6	Powder+40% NaOH + few drops of Lead Acetate	YW-OR
7	Powder+10% NaOH+$CuSO_4$	GY-YW
8	Powder+ Acetic Acid +H_2SO_4	BK-Gy
9	Powder+ conc. HNO_3+excess NH_3	YW-RD
10	Powder+ Acetic Acid +H_2SO_4	Gy-OR

GY- gray, YW- yellow, GN- green, OR- orange, RD- red, BL- blue, BN- brown, BK- black

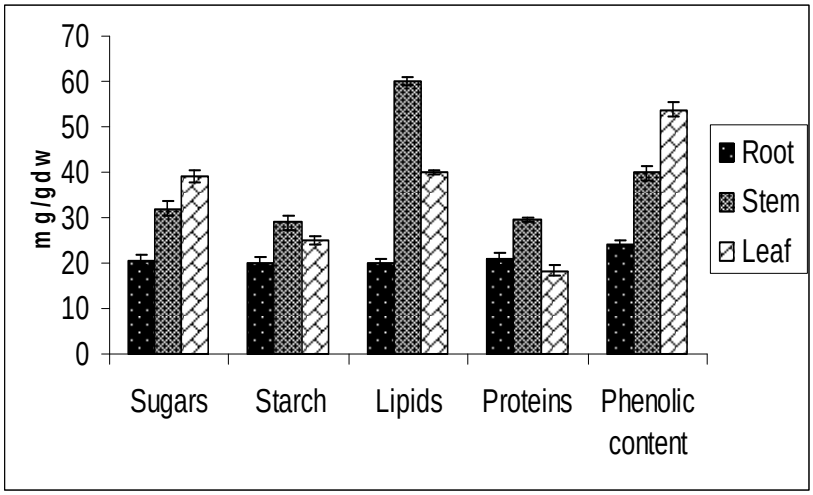
Primary metabolite quantification

Primary metabolites proteins, lipid, soluble sugar, starch and total phenolic contents are quantified in different plant parts (root, stem and leaves) and shown in table 4.

Table 4.
Concentration of primary metabolites in Alangium salviifolium L. (mg/gdw)*

Experiments	Root	Stem	Leaf
Sugars	20.6±1.14	32±1.58	39±1.41
Starch	20±1.30	29±1.64	25±1.09
Lipids	20±0.71	60±0.84	40±0.45
Proteins	21±1.41	29.6±0.49	18.4±1.02
Phenolic contents	24.2±0.75	39.8±1.67	53.8±1.60

*mg/ gdw- milligram per gram dry weight
Data are presented as mean ± S.E.M.



Data are presented as mean ± S.E.M.

Figure 1
Concentration of primary metabolites in Alangium salviifolium L. (mg/gdw)

Total levels of soluble sugars (39±1.41mg/gdw) in leaves, starch (29±1.64mg/gdw) in stem, protein (29.6±0.49mg/gdw) in stem, lipid (60±0.84mg/gdw) in stem and leaves had shown maximum phenolic contents (53.8±1.60mg/gdw) as compared to its root and stem. (Shown in table 4 and graph 1)

DISCUSSION

Preliminary phytochemical screening of plant is very useful for determination of the active constituents in different solvents and their yields. Most of the active principles are found in alcoholic and aqueous extracts. Our results were in agreement of previous reported results. Many primary metabolites lie in their impact as precursors or pharmacologically active metabolites in pharmaceutical compounds. Plant synthesizes primary metabolites (lipid, protein, starch, sugars, phenol etc.) for the normal growth and development of itself. Many polysaccharides purified from Chinese medicinal herbs and phenols are bioactive and possess immuno-modulating, anti-tumor and antibacterial activities[22].

CONCLUSIONS

In present investigation we found maximum extractive value (4.130%) found in water extract among test solvents. All the metabolites were qualitatively present in water and ethanolic extracts. Total levels of soluble sugars (39±1.41mg/gdw) in leaves, starch (29±1.64mg/gdw) in stem, protein (29.6±0.49mg/gdw) in stem, lipid (60±0.84mg/gdw) in stem and leaves had shown maximum phenolic contents (53.8±1.60mg/gdw) as compared to its root and stem. These primary metabolites further used for biosynthesis of secondary metabolites or bioactive compounds.

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