



**PRELIMINARY SCREENING OF PHYTOCONSTITUENTS OF  
VARIOUS EXTRACTS OF *Alpinia speciosa* RHIZOME**

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**ABSTRACT**

For the treatment of various diseases, globally herbal medicines have been used traditionally. In the last decade, the study of plant extract has attracted attention in curing various challenging diseases. In the indigenous system of medicine *Alpinia speciosa* is one of the plants that is used for many centuries. It is also known as *Alpinia zerumbet*. Different parts of the plant root, rhizome, seed and flower have medicinal values. The flower of the plant is specifically used as an ornamental plant. The therapeutic action of the plant is due to presence of phytochemical constituents that are present in the plant. The herb is

beneficial in treating digestive, spleen, liver and abdominal pains. Many pharmacological activities viz., antiulcer, myorelaxant, antispasmodic, anti inflammatory, anti emetic, antioxidant, and cytoprotective and spasmolytic activity had been reported in different plant extracts. Based on many scientific researches this article is reviewed to reveal the preliminary phytochemical constituents aspects of the herb for the beneficial potential that might be useful for further research.

**KEYWORDS:** *Alpinia speciosa*, Zingiberaceae, volatile oils, ethanolic extract.

## INTRODUCTION

For hundreds of years the medicinal plants have been used in traditional medicine for with reputation as efficacious remedies. In modern pharmaceutical industry large numbers of these plants are of great importance as a source of survival and good health (Akah *et al.*, 1998). For the manufacturer of traditional and modern medicines the phytoconstituents present in the plant serve as therapeutic agents. It has now been established that the plants curative ability in therapeutic purposes may be due to the presence of some secondary metabolites like alkaloids, glycosides, tannins, volatile oils etc that may possess a great potential for biological activity (Tiwari *et al.*, 2011). Active natural products are the important source of plants that differ widely in terms of structures, biological properties and mechanisms of actions. Phytochemical are the bioactive compounds found in plants. It may be flower, leaves or shoots. These bioactive compounds work as defense system against disease. Flavonoids, tannins, terpenoids, saponins, phenolic compounds are some of the most important phytochemical constituents (Amari *et al.*, 2014). One such plant that is being used as a medicinal plant since long period is *Alpinia speciosa*. The genus *Alpinia*, comprising more than 230 species, belongs to the family, Zingiberaceae (Ginger family). The plant is an evergreen tropical perennial that can grow up to 8-10 feet height with a 3-5 foot spread having thick rootstocks. It produces fleshy rhizomes resembling ginger like smell. It is called as shell ginger because their individuals shell pink flowers. *Alpinia speciosa* is used as an ornamental plant. It is used in the treatment of dyspepsia, ulcer curing property, gastralgia, sea sickness and decoction is used for diuretics. In folk medicine it is used for its anti inflammatory, bacteriostatic and fungistatic properties. The plant is used as antinociceptive, anxiolytic, antipsychotic and antioxidant property (Bell *et al.*, 1980, Bezerra *et al.*, 2000, Cardoso *et al.*, 2004, Cavalvante *et al.*, 2012, Padijala *et al.*, 2010, Thenmozhi *et al.*, 2011, Indrayan *et al.*, 2009).

The present study is designed to explore the preliminary phytochemical constituents of *Alpinia speciosa*, which is responsible for the pharmacological activities.

## MATERIAL AND METHODS

### Plant material

The plant material used for this study consists of dried rhizomes of *Alpinia speciosa* belonging to the family Zingiberaceae.

### Collection and authentication of plant

The rhizomes of *Alpinia speciosa* used for this study were collected from Salem district, Tamil Nadu and Bangalore, Karnataka, India, during the month of February. The plant was identified and authenticated by Dr. Palanisamy, Scientist, Botanical Survey of India, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India.

### Preparation of plant extracts

*Alpinia speciosa* roots were dried under shade separately powdered in mechanical grinder. The powdered plant materials were then passed through a sieve No. 22 and stored in an air tight container until the time of use.

### Method of extraction for *Alpinia speciosa*

Extraction of the rhizomes of *Alpinia speciosa* was carried out by using ethanol soxhlet extraction technique. About 200 grams of coarsely powdered rhizomes were sequentially extracted in a soxhlet extractor using 1500 ml of petroluem ether, chloroform, ethyl acetate and ethanol. The extraction time was four hours for each solvent. The resulting extracts were evaporated using rotary evaporator. The filtrates were then combined, concentrated to dryness under controlled temperature and pressure.

**Identification of phytochemical constituents:** Phytochemicals are naturally occurring chemical compounds obtained from plants (from the Greek word phyto, meaning plant) are biologically active, that provide health benefits for humans further than those attributed to macronutrients and micronutrients (Valan *et al.*, 2010). In other words, the plant chemicals that protect the plant cells environmental hazards such as pollution, stress, UV exposure and pathogenic attack are called as phytochemicals. These phytochemicals are the secondary metabolites (Subramaniam *et al.*, 2011). They also protect plants from disease and damage and contribute to the plant's color, aroma and flavor (Saxena *et al.*, 2013). These phytoconstituents act as reservoirs of potential agents that serve as newer leads and clues for modern drug design. One of the most important of bioactive constituents of plants are alkaloids, flavonoids, tannins and phenolic compounds. To treat various health ailments and chronic diseases, correlation between phytoconstituents and the bioactivity of plant it is essential to know for the synthesis of compounds with specific activities (Yadav *et al.*, 2014).  
Exploration.

Thus, by considering the above facts, the plant *Alpinia speciosa* which contain a large amount of chemical constituents had been selected for the biological or pharmacological activity (Panday *et al.*, 2014). To determine the biological activity it is necessary to evaluate the nature of extract. The plant *Alpinia speciosa* which contain large number of chemical constituents had been selected for the pharmacological activity. Hence for this purpose, qualitatively, it is necessary to perform the preliminary tests to evaluate chemical nature of extracts.

**The following are the reagents used for the phytochemical screening:**

**Mayer's reagent:** An amount of 1.36gm of mercuric iodide in 60ml of water mixed with a solution, which contains 5 gm of potassium iodide in 20 ml of water.

**Libermann-burchard's reagent:** about 5 gm of acetic anhydride was carefully mixed under cooling with 5 ml of concentrated sulfuric acid; this mixture was added continuously to 50 ml of absolute ethanol with cooling.

**Dragendroff's reagent:** Accurately 1.7 gm basic bismuth nitrate and 20 gm tartaric acid are dissolved in 80 ml of water. This solution was mixed with a solution containing 16 gm potassium iodide and 40 ml of water.

**Fehling's solution A:** A weight of 34.64 gm copper sulphate was dissolved in a mixture of 0.5 ml of sulphuric acid and sufficient water to produce 500 ml.

**Fehling's solution B:** A weight of 176gm of sodium potassium tartarate and 77 gm of NaOH are dissolved in sufficient water to produce 500 ml. equal volumes of above solutions was mixed at the time of use.

**Benedict's reagent:** Approximately 1.73 gm of cupric sulphate, 1.73gm of sodium citrate and 10 gm anhydrous sodium carbonate are dissolved in water and the volume was made up to 100 ml with water.

**Molish's reagent:** About 2.5gm of pure  $\alpha$ -naphthol was dissolved in 25 ml of ethanol (Kokate. 1994).

## RESULT

Table I: Preliminary phytochemical evaluation for the plant extracts

S. No.	Phytoconstituents	Test / Reagents used	Inference
1.	<b>Alkaloids</b> Dragendroff's test Mayer's test Wagner's test Hager's test	Extract + Dil. Hcl Filtrate + Dragendroff's reagent Filtrate + Mayer's reagent Extract + dil. Hcl + Wagner's reagent Extract + dil. Hcl + Hager's reagent	Brown precipitate Cream precipitate Reddish brown precipitate Yellowish precipitate
2.	<b>Flavonoids</b>	Extract + Conc. Sulphuric acid extract + 10% lead acetate	Yellow colour disappeared on standing Yellow colour
3.	<b>Glycosides</b>	Extract + Fehling's soln. A and B, heated in a water bath	Brick red colour
	<b>Cardiac glycosides</b>	Extract + distilled water + gl. acetic acid + 1 drop of ferric chloride + Conc. Sulphuric acid	Brown ring at the interface (Presence of deoxy sugar) Violet ring also exists.
4.	<b>Reducing sugars</b>	Extract + Fehling's soln. boiled for 5 minutes	Brick red colour
		Extract + Benedict's soln. boiled for few minutes	Brick red colour
5.	<b>Steroids</b> Salkowski test	Conc. Sulphuric acid + extract in chloroform	Reddish blue colour in Chloroform layer and green fluorescence in acid layer
6.	<b>Saponins</b>	Extract + distilled water – shaken thoroughly	Formation of an emulsion
7.	<b>Terpenoids</b>	Extract + chloroform + Conc. Sulphuric acid – carefully added Extract + 10% NaOH	Reddish brown precipitate Yellow colour
8.	<b>Tannins and Phenolics</b>      <b>Phlobotannins</b>	Extract + 5% ferric chloride Extract + 10% aq. Pot. Dichromate  Extract + 10% lead acetate  Extract + 1% gelatin soln. containing NaCl  Extract + water- filtrate boiled with 2% Hcl	Greenish black Yellowish brown precipitate Yellow precipitate  White precipitate  Red precipitate
	<b>Amino acid</b>	Extract + Ninhydrin (pH – 4-8)	Purple colour
	<b>Aromatic amino acid</b>	Extract + Conc. Nitric acid	White precipitate (boiled and cooled) + 20% NaOH or

			Ammonia – orange colour
12.	<b>Essential oil / Volatile oil</b>	Small piece of crude drug kept between the thumb and forefinger – examine for the presence of odour	Smell
13.	<b>Coumarins</b>	Extract + 10% NaOH	Yellow colour
14.	<b>Quinones</b>	Extract + Conc. Sulphuric acid	Red colour fluorescence

**Table II: Preliminary Phytochemical screening of the various extracts of *Alpinia speciosa* (AS)**

S. No	Constituents	ASPEE	ASCE	ASEAE	ASEE
1.	<b>Alkaloids</b> Dragendorff's test Hagner's test Wagner's test Mayer's test	- - - -	- - - -	- - - -	- - - -
2.	<b>Flavonoids</b> Conc. Sulphuric acid test 10% lead acetate test	- -	- -	- -	- -
3.	<b>Glycosides</b> Fehling's test Cardiac glycosides	- -	- -	- -	- -
4.	<b>Reducingsugar/carbohydrates</b> Benedict's test Fehling's test	- -	- -	- -	- -
5.	<b>Steroids</b> Salkowsky test	-	-	-	-
6.	<b>Saponins</b> Foam test Distilled water	-	-	-	-
7.	<b>Terpenoids</b> Conc. Sulphuric acid 10% Sodium hydroxide	+ -	+ +	- -	+ +
8.	<b>Tannins and Phenolics</b> Ferric chloride test Lead acetate Gelatin test Phlabotannins	+ + -	+ + +	+ + +	+ - -

		-	-	-	-
9.	<b>Amino acids</b> Ninhydrin test		-	-	-
	<b>Aromatic amino acid</b> Conc. Nitric acid	-	-	-	-
	<b>Coumarins</b> NaOH	-	-	-	-
		+	-	-	-

**ASPEE** – *Alpinia speciosa* petroleum ether extract

**ASCE** – *Alpinia speciosa* chloroform extract

**ASEAE** – *Alpinia speciosa* ethyl acetate extract

**ASEE** – *Alpinia speciosa* ethanolic extract

The table I shows the standard preliminary phytochemical screening of plant extracts. The data shown in Table II illustrates the screening of various extracts of *Alpinia speciosa* based on phytochemical tests. The test reveals the presence of various bioactive secondary metabolites which might be responsible for their medicinal attributes. The observations and inferences made in the phytochemical tests are presents as follows.

**Alkaloids:** In all the extracts, absence of brown, cream, reddish brown and yellowish precipitate indicates the absence of alkaloids in the extracts of *Alpinia speciosa*.

**Flavonoids:** Disappearance of yellow colour and the yellow colour was absent indicating the absence of flavonoids in all the four different extracts.

**Glycosides:** Absence of brick red colour indicating for the absence of glycosides in ethanol, ethyl acetate, chloroform and ethanol extracts.

**Reducing sugar:** Red brick colour was absent in the extracts indicating for the absence of reducing sugars.

**Steroids:** Reddish blue colour in chloroform layer and green fluorescence in acid layer was absent in all the extracts.

**Saponins:** There was no foam indicating for the absence of saponins.

**Terpenoids:** On addition of conc. Sulphuric acid and chloroform a reddish brown precipitate was obtained in all the extracts except ethyl acetate extract indicating for the presence of terpenoids.

**Tannins and Phenolics:** When treated with 10% ferric chloride a greenish black colour was obtained in all the extracts showed the presence of tannins and phenolics. This evidenced for the presence of tannins and phenolics in *Alpinia speciosa*. Presence of yellow precipitate confirmed for the presence of tannins and when treated with 10% lead acetate in all the extracts except ethanol extract. Presence of white precipitate in chloroform and ethyl acetate extract.

**Amino acids:** Absence of purple colour.

**Aromatic amino acid:** Absence of white precipitate.

**Coumarins:** Presence of yellow colour was observed only in petroleum extract of *Alpinia speciosa* and was absent in all the other extracts.

## DISCUSSION

All the four extracts, viz, petroleum ether, chloroform, ethyl acetate and ethanol of *Alpinia speciosa* screening of phytoconstituents were found to possess tannins, phenolics and terpenoids as a major constituent except for the ethyl acetate extract for terpenoids. Tannins have amazing astringent properties (Ramprashod *et al.*, 2012). They are known to hasten the healing of inflamed mucous (Yadav *et al.*, 2013, Kumar *et al.*, 2013). Tannins are plant polyphenols, which have ability to form complexes with metal ions and with macromolecules such as proteins and polysaccharides. The phytochemicals found in the ethyl acetate extract had been implicated in having much medicinal and toxicological importance. Tannins are popular for their protective effect on skin. They are also known to be anti-HIV, antibacterial and antiparasitic (Tijjani *et al.*, 2013, Lydia *et al.*, 2012). A number of terpenoids exhibit cytotoxicity against a variety of tumour cells. Terpenoids behave as potential chemopreventive and therapeutic agents in liver cancer (Lydia *et al.*, 2012). Terpenoids are reported to have anti-inflammatory, anti-viral, anti-malarial, inhibition of cholesterol synthesis and anti-bacterial (Wadood *et al.*, 2013).

## CONCLUSION

The plant was selected based on the traditional uses and literature review of earlier studies. The preliminary phytochemical and physicochemical evaluation of studies on *Alpinia speciosa* was carried out. The phytochemical constituents were extracted by ethanol solvent extraction and identified by various chemical tests. These tests showed the presence of various phytochemical constituents like tannins, phenolic compounds and terpenoids.

The present study on the evaluation of *Alpinia speciosa* for the preliminary phytochemical screening could be used as the diagnostic tool for the standardization of medicinal plant. Thus our study is an important landmark in correct identification of *Alpinia speciosa*.

## REFERENCES

1. Akah PA. Antidiarrhoeal activity of *Kigelia africana* in experimental animals. Journal Herbs Sp. Med. Pl., 1998; 31-38.
2. Tiwari P, Kumar B, Kaur M, Gurpeet K and Kaur H. Phytochemical screening and extraction: A review. Internationale Pharmaceutica science 2011; 1(1): 98-106.
3. Amari NO, Bouzouina M, Berkani A, Lotmani B. Phytochemical screening and antioxidant capacity of the aerial parts of *Thymelaea hirsuta* L. Asian Pacific Journal of Tropical Disease journal 2014; 4(2): 104-109.
4. Bell. The vascular pattern of a rhizomatous Ginger L. zingiberaceae. The aerial axis and its development Ann Bot 1980; 46: 203-212
5. Bezerra MA, Leal-Cardoso JH, Coelho-DC- Souza AN, Criddle DN, Fonteles MC. Phytotherapy Research 2000; 14 (7): 549-51
6. Leal-Cardoso JH, RMoreira M, da cruz GM, Morais SM, Lahlou MS, Coelho-de-souza AN. Effects of essential oil of *Alpinia zerumbet* on the compound action potential of the rat sciatic nerve .Phytomedicine, 2004 ; 11: 549-553.
7. Cavalcante BC, Jose Ferreiran R O, Igor O. Cabral. Genetic toxicology and its chemopreventive effects against H<sub>2</sub>O<sub>2</sub> – induced DNA damage in cultured human leukocytes. Food cheml Toxi. 2012; 4051-4061.
8. Padalia RC, Chanotiya CS and Sundaresan V. Compositional variability in essential oil from different parts of *Alpinia speciosa* from India. Nat. prod. Comm. 2010; 5(2): 279-282.

9. Thenmozhi S, Chaturvedi M, Dwivedi S and Subasini U. Investigation of anti inflammatory, analgesic and antipyretic rhizome volatile oil of *Alpinia speciosa*. Asian Journal Medical and Pharmaceutical Researchers 2013; 3(3): 82 – 84.
10. Indrayan AK, Agrawal P, Rathi AK, Shatru A, Nitin K Agrawal NK, Durvesh K Tyagi. Nutritive value of some indigenous plant rhizomes resembling ginger. Nat prod Rad 2009; 8(5): 507-513.
11. Valan M F, John De Britto and Venkataraman R. Phytoconstituents with hepatoprotective activity. Int. J. Chem. Sci 2010; 8(3): 1421-1432.
12. Subramaniam V, Suja S. Phytochemical Screening of *Alpinia Purpurata* (Vieill). Research Journal of Pharmaceutical, Biological and Chemical Sciences 2011; 2 (3): 866 – 871.
13. Saxena M, Saxena J, Nema R, Singh D and Gupta A. Phytochemistry of medicinal plants Journal of Pharmacy and Phytochemistry. 2013; 1(6): 168 - 82.
14. Yadav M, Chatterji S, Gupta S K and Watal G (2014). Preliminary phytochemical screening of six medicinal plants used in traditional medicine International Journal of Pharmacy and Pharmaceutical Sciences 2014; 6(5): 539-542.
15. Pandey A, Tripathi S. Concept of standardization, extraction and pre phytochemical screening strategies for herbal drug Journal of Pharmacognosy and Phytochemistry 2014; 2 (5): 115-119.
16. Kokate C K, Purohit A. P, Gokhale S B. 32 nd edition, Pharmacognosy.
17. Ramprashod S, Afroz T, Mondal B , Khan R and Ahmed S. Screening of phytochemical and pharmacological activities of leaves of medicinal plant *plumeria rubra* Intl j of res.pharm chem.. 2012; 2(4): 1000-100.
18. Kumar S and Pandey AK. Chemistry and Biological Activities of Flavonoids: An Overview 2013: 162750-66.
19. Tijjani MA, Abdurahaman F I, Abba YS, Idris M, Baburo BSI, Mala GA, Dungus MHM, Aji B M and Abubakar KI. Evaluation of proximate and phytochemical composition of leaves of *Annona senegalensis Pers.* Journal of Pharmaceutical and scientific innovation 2013; 2(1): 7-9.
20. Lydia J and Sudarsanam D. phytoconstituents of *Cyperus rotundus* L. that attribute to its medicinal value and antioxidant property. International Journal of Pharmaceutical sciences and research 2012; 3(9): 3304-3308.

21. Wadood A, Ghufran M, Jamal SB, Naeem M, Khan A, Ghaffar R and Asnad. Phytochemical analysis of medicinal plants occurring in local area of Mardan. *Biochemistry & Analytical Biochemistry* 2013; 2(4): 100-114.