ALPINIA SPECIOSA: A GOLD ORNAMENTAL PLANT – A REVIEW

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ABSTRACT

For many centuries, several health disorders have been treated by using plant extracts from medicinal plants. In the last decade, the study of plant extract has attracted attention in curing various challenging diseases. *Alpinia speciosa* is widely used in the indigenous system of medicine. 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 major chemical constituent flavonoids. 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 spasmylytic activity had been reported in different plant extracts. Based on many scientific researches this article is reviewed to reveal the therapeutic aspects of the herb for the beneficial for further research.

KEYWORDS: *Alpinia speciosa*, traditional medicine, flavonoids, antioxidant, liver tonic.

INTRODUCTION

Medicinal plants play a key role in human health care. About 80% of the world population relies on the use of traditional medicine, which is predominately plant material. Plant has been the source of survival and good health. On earth of the 2, 50, 000 higher plant species more than 80,000 are medicinal plants. Plants are able to perform its function because they have many important chemical substances such as alkaloids, carbon compounds, nitrogen, glycosides essential oils, fatty oils, resins mucilage, tannins; gums etc., potent bioactive compounds that are found in medicinal plant parts which can be used for therapeutic purposes.
or which are precursors for the synthesis of useful drugs. 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 aim of the study is to highlight the exhaustive pharmacological information and promising therapeutic uses of the plant *Alpinia speciosa*.

**Geographical Distribution**

*Alpinia speciosa* or *alpinia zerumbet* is a native of China, Japan, Indo-China, Cambodia, Thailand, Taiwan, Vietnam and Malaysia[3, 4]. It is widely cultivated and distributed in most tropical and semi-tropical areas including Brazil, Peru and South America[5,6,7,8]. In Brazil it is popularly known as “Colonial”[9]. *Alpinia speciosa* or *Alpinia nutans* is known as “colony” in tropical America[10].

**About The Plant**

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 its individual shell pink flowers, particularly when in bud, resembles sea shells. Its flowers droop from the ends of leafy stems rather than rise directly from plant rhizomes. This is a distinguished from other members of the ginger family. The fragrant flowers are waxy; light pink flower buds open to tubular flowers with yellow inside lips and red throats. The plant produces lance-shaped green leaves to 2’ long and 5” wide with fringed borders[11].

**Taxonomy / Botanical Classification**

**Synonyms:** *Alpinia zerumbet, Alpinia nutans, Costus zerumbet*

**Common names:** Shell flower, Shell ginger, Light galangal

**Family:** Zingiberaceae

**Parts Used:** Rhizome and leaves

**Traditional Uses of Various Parts Of Plant**

In the indigenous system of medicine *Alpinia speciosa* is used as an ornamental plant. It is economically important since most of these are used as spices, food additives and flavoring agents[5]. It is also used for food and herbal medicine. Even though the plant used as digestive, spleen, and liver tonic, various *Alpinia* species were also used in the treatment of dyspepsia, gastralgia, sea sickness and for abdominal colic pains. Its leaves are used for food wrapping,
rhizomes for food preparation and seeds for health maintenance. In Northeast Brazil in the form of tea decoction is used for diuretics. Their rhizomes are useful in rheumatism and catarrhal afflictions. In addition the rhizomes also possess ulcer curing property [12].

In Brazilian herbal medicine the essential oil of the leaf is used for high blood pressure and as a heart tonic. The essential oils of Alpinia were also useful in the treatment of respiratory illnesses and have been used as a flavoring agent for beverages. It has also profound use as myorelaxant and antispasmodic actions in rat ileum [5]. In other parts of the world, the plant is considered balsamic, stomachic and traditionally used for cold, flu, fevers, intestinal disorders, flatulence, stomach problems and indigestion [8]. The essential oil from its leaves and the flowers and seeds of the plant possessed antioxidant activity.

The essential oil from the leaves of Alpinia speciosa is used for neuropsychiatric symptoms, such as depression, stress and anxiety and chronic problems that are associated with reproductive hormone imbalances in women [13].

In folk medicine it is used for its anti inflammatory, bacteriostatic and fungistic properties. The plant is used as antinociceptive, anxiolytic, antipsychotic and antioxidant property.

*Alpinia species* were also shown to possess several pharmacological activities viz, analgesic, antibacterial, anticandidal, antifungal, anti-inflammatory, antimycobacterial, antioxidant, antiparasitic, antiplatelet, antispasmodic, antiulcer activity, diuretic, hypotensive, insecticidal, muscle relaxant and uterine stimulant.

**Phytochemical Constituents of Alpinia Speciosa**

The rhizome was found to contain phenolic compounds such as cardomonin and alpinietin [14]. The plant had been characterized by a wide range of volatile compounds and had been the subject of numerous phytochemical studies. Reports from different origins revealed the presence of 1, 8-cineole, terpinen–4-ol, camphor, terpineol, methyl cinnamate, camphene, α and β– pinene and endo-fenchyl acetate as the major constituents in their essential oil [11]. Phytochemical analysis of the leaves demonstrated the presence of catechuic tannins, phenols and alkaloids and also some essential oils [9]. The flower oil of Alpinia speciosa found to contain oxygenated monoterpenoids (68.9%), terpinen-4-ol (26.0%), 1, 8-cineole (24.4%) and linalool (6.1%) along with the monoterpane hydrocarbon, sabinene (40.1%). The root oil of Alpinia speciosa has endo-fenchyl acetate (40.1%) 1, 8 cineole (11.8 %), camphene
(7.8%), bornyl acetate (6.9%) and borneol (5.8%)\textsuperscript{[5]}. Assay guided isolation gave three antioxidants from the rhizomes, an important food of Japan. The two new compounds revealed them to be new glucoside esters of ferulic acid \textsuperscript{[15]}. Five major compounds, p-cymene (28+/−5.0%), 1, 8-cineole (17.9+/−4.2%), terpinen-4-ol (11.9+/−6.3), limonene (6.3+/−2.2%) and camphor (5.2+/−2.1%) were identified \textsuperscript{[13]}.

**Physico Chemical Constants Determination**

The physico chemical analyses of rhizome powder were determined.

**Ash Value**

The physicochemical analysis includes ash values (total ash, acid insoluble ash, water soluble ash and sulphated ash. The total cash value was found to be 3.98 %w/w indicating the considerable presence of inorganic radicals. The acid insoluble ash, water soluble ash and sulphated ash values were found to be 0.40% w/w, 2.80 %w/w and 3.68 % w/w respectively \textsuperscript{[16]}.

**Extractive Value**

The extractive values (water soluble and alcohol soluble extractive value) were determined. The water soluble and alcohol soluble extractive values were found to be 12.43%w/w and 7.32%w/w respectively.

**Phytochemical Studies of Distilled Volatile Oil**

**Physical Parameters of Volatile Oil**

The rhizomes of *Alpinia speciosa* showed solubility character and less variation in specific gravity, optical rotation, refractive index and boiling point.

**Thin Layer Chromatography**

In toluene: ethyl acetate (93.7%) solvent system, the volatile oil gave 9 colored spots. By using benzene: ethyl acetate solvent system (95.5), the volatile oil again showed 9 colored spots \textsuperscript{[14]}.

**Acute Oral Toxicity Test**

According to the OECD guidelines 423 by acute toxic class method were carried out. 3 animals were used for each step. The dose range of 5mg/kg was used. 50mg/kg, 300mg/kg and 2000 mg/kg were used to test toxicity on animals as per guidelines \textsuperscript{[3]}. Toxicity in acute and sub acute models were carried out \textsuperscript{[9]}. 
Pharmacological Activities of *Alpinia Speciosa*

*Alpinia speciosa* is one of the widely used medicinal plants in many parts of the world including India in the management of various conditions. It has numerous pharmacological activities. The main activities of the plant are cardiovascular, analgesic, antipyretic, and anti-inflammatory, myorelaxant and antispasmodic, anti-microbial and antioxidant activity.

**Analgesic and Anti-Inflammatory Activity**

Volatile oil of *Alpinia speciosa* rhizomes possessed analgesic, antipyretic and anti-inflammatory activity against the standard drug, indomethacin. The ethanol extract of *Alpinia speciosa* also possessed the above-said activities may be due to the presence of flavonoids\(^{[14]}\). The essential oil of *Alpinia speciosa* proved antinociceptive effects on mice by three different evaluations, righting reflex, hot plate and formalin test\(^{[17]}\).

**Cardio Depressive Activity**

Essential oil of *Alpinia speciosa* and its main constituent, 1, 8-cineole exhibited diuretic activity was due to the presence of 1, 8-cineole\(^{[17]}\). *Alpinia speciosa* has a mild lowering effect on systolic, diastolic mean blood pressure in clinical studies\(^{[18]}\).

**Nootropic Activity**

The essential oil of *Alpinia speciosa* is very active on excitable tissues, such as smooth muscle, and it results verified that it has a potential action on the rat sciatic nerve\(^{[19]}\). By using the essential oil of *Alpinia speciosa* the behavioral alternations in mice were examined by behavioral observations and an elevated plus-maze task, widely used method for evaluating anxiolytic-like behaviors showed a good response when compared to the standard Fluoxetine\(^{[13]}\).

**Myorelaxant and Antispasmodic Activity**

Sub maximal contractions induced by acetylcholine were concentration dependently inhibited by essential oil of *Alpinia speciosa*\(^{[20]}\).

**Antiplatelet Activity**

The rhizomes contain 5, 6-dehydrokawain and dihydrokawain to inhibit the aggregation of ATP release from rabbit platelets induced by arachidonic acid and collagen\(^{[12, 21]}\).
Other Pharmacological Activities

Genetic toxicology evaluation of essential oil of *Alpinia speciosa* and its chemoprotective effects against hydrogen peroxide DNA damage in cultured human leukocytes \(^9\). In the acetone seed extract, the rhizomes, stems, leaves, flowers, pericarps and seeds of *Alpinia speciosa* exhibited antiatherogenic property.

Antioxidant and Dermatological Activities

The rhizome aqueous extract found to have greater inhibitory effects against collagenase, catalase, hyluronidase and tyrosinase enzymatic activities. Antioxidant assays like radical scavenging activity assay, total antioxidant activity assay, superoxide – radical scavenging assay, total phenolic contents were carried out in *Alpinia speciosa* rhizome extract \(^8\). Very recently the presence of phenolic compounds in rhizomes has been reported in tea preparations as a source of natural antioxidant or in food products such as meat, dairy and bakery\(^{12}\).

Table I: Illustrations of Works Carried Out for *Alpinia Speciosa* Plant Extract

<table>
<thead>
<tr>
<th>S. No</th>
<th>Part of the plant</th>
<th>Extract</th>
<th>Pharmacological Activity</th>
<th>Author &amp; Year</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Rhizome – Volatile oil</td>
<td>Ethanol</td>
<td>Anti inflammatory, Analgesic &amp; Antipyretic</td>
<td>Thenmozhi et al., 2013</td>
</tr>
<tr>
<td>2.</td>
<td>Rhizome Stems Leaves Flowers Pericarp Seeds</td>
<td>Aqueous &amp; Ethanol</td>
<td>Skin diseases &amp; Antioxidant</td>
<td>Chompoo et al., 2012a</td>
</tr>
<tr>
<td>3.</td>
<td>Seed</td>
<td>Acetone</td>
<td>Antiatherogenic property</td>
<td>Chompoo et al., 2012b</td>
</tr>
<tr>
<td>4.</td>
<td>Leaves (Essential oil)</td>
<td>Ethanol</td>
<td>Genetic toxicology</td>
<td>Cavalcanti et al., 2012.</td>
</tr>
<tr>
<td>5.</td>
<td>Rhizome</td>
<td>Ethanol</td>
<td>Analgesic &amp; Anti inflammatory</td>
<td>Thenmozhi et al., 2011</td>
</tr>
<tr>
<td>6.</td>
<td>Essential oil</td>
<td></td>
<td>Antimicrobial activity</td>
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<tr>
<td>7.</td>
<td>Seeds Leaves</td>
<td>Methanol Aqueous</td>
<td>Chemical composition of essential oil</td>
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<td>8.</td>
<td>Leaf Flower</td>
<td>Essential oil</td>
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<td></td>
<td>Nutritive value</td>
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</table>
CONCLUSION

*Alpinia speciosa* belongs to the family Zingiberaceae commonly grown as an ornamental plant. It is highly beneficial herb since many long years. *Alpinia speciosa* has been therapeutically ethnopharmacologically used as a therapeutic agent for a variety of diseases as seen in this article. It is believed that the information as presented in this review on its phytochemistry and various biological properties of the extracts and the constituents might provide incentive for proper evaluation of the plant in medicine. Plant’s various extracts have traditional claim for their pharmacological activities. These findings can from the scientific basis to explore other potential activities of the plant.

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