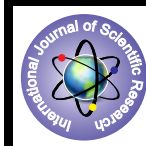


Potential of *Sphaeranthus Indicus* Linn. Against Wood Destroying White And Brown Rot Fungi



Science

KEYWORDS : Wood destroying fungi,
Plant.

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ABSTRACT

Sphaeranthus indicus belonging to the family Asteraceae is known world wide as an aromatic medicinal plant. It grows in rice fields, cultivated lands in tropical parts of India. The present study mainly aimed to investigate the efficacy of *Sphaeranthus indicus* extracts against wood destroying white and brown rot fungi. Results revealed that ethanolic extract upto 2% concentration level 0% growth was observed for *Trametes versicolor* whereas in case of *Polyporus meliae* at 6% , growth observed was 9% which the same extract could not show efficacy. A growth of almost 100% with the difference of 10% at the concentration level of 6% was observed for *Polyporus meliae*. *Trametes versicolor* showed 10% growth at concentration of 1%. It was 0% at 3% of concentration. Qualitative analysis of the ethanolic and water extracts revealed presence of high amounts of alkaloids, flavanoids, glycosides appreciable amount of carbohydrate in the ethanolic extract.

INTRODUCTION :

Availability of durable wood species in the market now a days becoming shortage. This ultimately resulted in the increase in use of plantation grown timber species. Most of the plantation grown wood species being non-durable easily falls prey to wood destroying agencies. In order to increase durability of the plantation grown wood species preservative treatment has become necessary. Over the past few years the use of conventional proprietary wood preservatives such as CCA (Copper-Chrome-Arsenate), PCP (Penta Chloro Phenol), CCB (Copper-Chrome-Boron) etc. are under scrutiny due to environmental reasons (Onuorah, 2000). Therefore in our study much attention is now paid towards the development of eco-friendly formulations from natural resources such as plants. Plants are known to be the storehouse of various biologically active microbes and insects (Tripathi et.al. 1978; Bhaskaran, 1990). Some of the eco-friendly formulations that have been developed and tested against wood destroying agencies are CNSL (Cashew nut shell liquor), BNSL (Bhilwan nut shell liquor), Cu-lignin complexes (Shukla et.al. 1972 ; Tripathi et.al. 2003). Weedy species *Lantana camera* (Sadhana et. al. 2009) The present study mainly aimed to develop eco-friendly formulation from natural resources. In this direction *Sphaeranthus indicus* was chosen for study.

Sphaeranthus indicus belonging to family Asteraceae is a spreading aromatic herb, medicinal plant widely used in Indian traditional system of medicine for curing various ailments (Kirtikar and Basu, 1981). It grows in rice fields, dry waste places and cultivated lands in tropical parts of India. It is distributed throughout India, Srilanka, Africa and Australia from sea level to 1200m altitude (Chatterjee and Pakrashi 2003) whole plant, seeds, flowers and roots are used in Ayurvedic preparations. The whole herb is used in bronchitis, Spleen disease, anaemia, leukoderma (Kirtikar and Basu, 1981) leaves are used in chronic skin diseases as an antisyphilitic and a nervine tonic (Nadkarni, 2007) Hot water extract used as an anthelmintic, as a fish poison (Chopra et. al. 1996) flowers are tonic, cooling, alternative and used in conjunctivitis (Chopra et. al. 1996). The plant is traditionally used for diarrhea (Girach et.al. 1994). The entire plant is used as an emmenagogue (Saha et.al. 1961) hot water extract of the entire plant is used for glandular swelling of the neck and for jaundice. Several flavanoids, alkaloids, glycosides, steroids, terpenoids, essential oils isolated from *Sphaeranthus indicus* are known to exert biological activities including cytotoxic properties (Varsha et. al 2012). *Sphaeranthus indicus* has showed a wide spectrum of antimicrobial activity (Shaikh et.al. 1986; Singh et.al. 1988) antibacterial and antifungal activities (Vijaya and Anathan 1997) antiviral activity (Vimalanathan et.al. 2009). However a very little is known about the activity of *Sphaeranthus indicus* against wood destroying agencies. There-

fore, the present study was carried out to investigate the efficacy of the plant against wood destroying fungi in laboratory.

Material and Methods:

Collection of plant material : Fresh and healthy plants of *Sphaeranthus indicus* were collected in the month of May from the rice fields of Vizianagaram district. (lat. 18° 07'N, long. 83° 27'E) Andhra Pradesh, India, various parts of the plant i.e. roots, leaves and stems were shade dried and ground to 40-60 mesh size.

Chemical extraction: 300mg of shade dried plant material was used for extraction in a Soxhlet apparatus with ethanol (AR grade) for 30hrs. followed by extraction in hot water over a water bath. After completion of each extraction the solvent was recovered by distillation. The extractions obtained were subjected to qualitative analysis to determine the presence of major functional groups in extracts. The extracts were further subjected to wood destroying fungi by malt-agar bioassay.

Malt-Agar Bioassay : 200ml of 2% malt-agar medium was added to each flask. Control with solvent was prepared by adding 10ml of ethanol to 200ml of malt-agar medium while the control were prepared by adding only 2% of malt-agar medium in the conical flasks. 1%, 2%, 3%, 4%, 5%, 6% of hot water extract was prepared by adding 2ml, 4ml, 6ml, 8ml , 10ml and 12ml of the extract in 200ml of 2% malt-agar medium. Similarly ethanol extracts were prepared. The malt -agar medium with and without extractive was sterilized in an autoclave maintained at a temperature of 120°C and 15 pound pressure (Datar, 1995) 30ml of autoclaved medium along with extracts was then poured into each sterilized petri plate. The plate were inoculated with the test fungi i.e. *Trametes versicolor* (white rot) and *Polyporus meliae* (brown rot) two control sets were prepared one with malt-agar medium (C) and other malt-agar medium along with solvent alone (CS). For each concentrations of the extract and control three replicates were prepared. The plates were incubated in B.O.D. incubator maintained at a temperature of 25± 2°C and 70± 4 relative humidity.

The results were recorded after a time interval of 15 days in terms of percent surface covered by the test fungi over the malt-agar medium.

RESULTS AND DISCUSSIONS:

Qualitative analysis : Ethanolic extract of *Sphaeranthus indicus* revealed the presence of substantial amounts of alkaloids, Terpenoids, flavanoids, glycoside, carbohydrate, volatile oils. On the other hand, Hot water extract, revealed the presence of high amount of carbohydrate, alkaloids, flavanoids and trace

amounts of terpenoids in it (Table.1)

Malt Agar Bioassay: Malt-Agar bioassay results in terms of surface covered by the test fungi over malt-agar medium in Fig.1 and Fig.2 respectively. From the results it was observed that the ethanol extract of *Sphaeranthus indicus* in control solvent 78% and for remaining concentrations 2%, 3%, 4%, 5% and 6% growth of *Trametes versicolor* (white rot) was 0% and for *Polyporus meliae* (brown rot) in CS it was 89% whereas at 1%, 2%, 3%, 4%, 5%, 6% concentrations growth of the fungi was observed 64%, 34%, 22%, 12%, 10.5%, 9% was observed. A protection of 22% and 11% in control with solvent was attributed to alcohol only. It is interesting to note that the ethanol extract of *Sphaeranthus indicus* along with malt has suppressed growth tremendously upto 100% at 2% concentration whereas at 1% concentration only 28% surface cover was observed in case of *Trametes versicolor* (white rot) in turn for *Polyporus meliae* (brown rot) same concentration levels 64%, 34%, 22%, 12%, 10.5%, 9% surface cover was observed which suggests it is more potential to *Trametes versicolor* compared to *Polyporus meliae* as wood preservative. The marked potential of ethanol extract against *Trametes versicolor* may be anticipated than *Polyporus meliae* due to the extraction of substantial amounts of alkaloids, Flavanoids, Glycosides in it and these compounds are known to provide durability to wood species against fungi and termites. The same extract did not show efficacy against *Polyporus meliae* this needs further study.

Hot water extract of *Sphaeranthus indicus* was found ineffective against *Polyporus meliae* fungi, whereas in case of *Trametes versicolor* it was observed only 9%, 4% surface coverage at 2%, 3% concentration respectively. With this it is evident that even hot water extract got efficacy against *Trametes versicolor* and *Polyporus meliae* inefficacy of hot water may be due to high amount of carbohydrate which act as a nutrient medium for the test fungi. Similar findings were reported by Kennedy (1956), where the presence of carbohydrate in hot water extract of Douglas fir heart wood and *Lantana camera* respectively had promoted fungus growth.

CONCLUSIONS:

The preliminary study of *Sphaeranthus indicus* against wood destroying fungi revealed marked efficacy of ethanol extract at the concentration of 2% for *Trametes versicolor*. It suggests use of this aromatic medicinal plant for the protection of wood against fungi. The same extract was found ineffective for *Polyporus meliae*. The hot water extract did not show remarkable efficacy against both the test fungi. This need further detailed studies to explore the potential of *Sphaeranthus indicus* as a wood preservative. Thus the present study will help us in recommending for the utilization of eco-friendly preservative in appropriate quantity for specialized end use.

Table.1

Phytochemical group	Hot water extract	Ethanol extract
Alkaloid	++++	++++
Terpenoids	+	++
Flavanoids	++++	++++
Glycoside	++	++++
Carbohydrate	++++	+++

(+), (++) , (+++) , (++++) show intensity of colour exhibiting different functional groups.

Fig.1

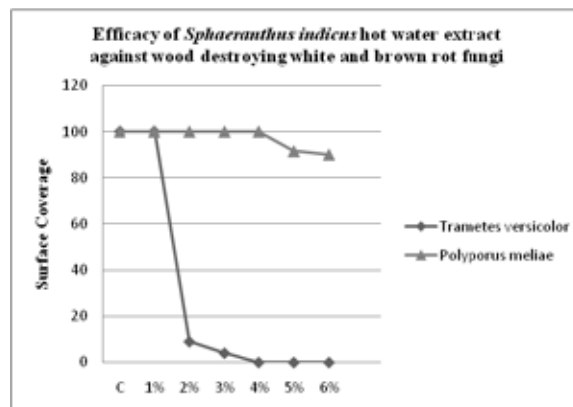
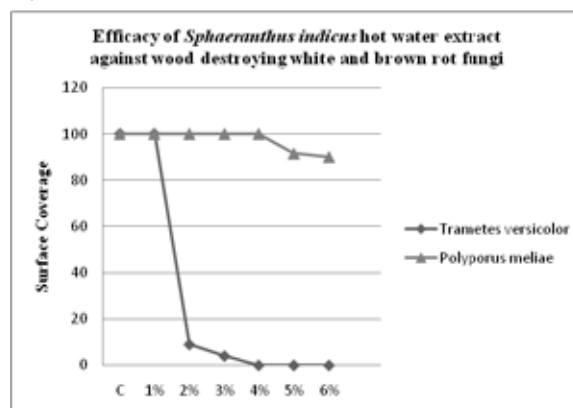


Fig.2



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