

**RESEARCH STUDIES ON PRIMARY SCREENING AND ANTIMICROBIAL ACTIVITY  
OF HERBAL PLANT (T.GRANDIS)**

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**ABSTRACT**

The plants have valuable bioactive compounds. One of the plant *tectona grandis* have timber value, mostly its available in region of tropical area. This plant local name sagon, which have many traditional medicines. Regeneration of multiple parts from the sample's callus is reported here by plant tissue culture method and further study such as Phytochemical screening, Antimicrobial activity, Antioxidant activity and Anticancer activity. The value was higher than standard compounds used for the study. Our research study showed that primary phytochemical, antimicrobial, antioxidant and anticancer activity using plant tissue culture techniques.

**KEYWORDS:** *Tectona grandis*, Timber, phytochemical screening, antimicrobial, antioxidant, anticancer.

**INTRODUCTION**

Studies on natural products are aimed to determine medicinal values of plants by exploration of existing scientific knowledge, traditional uses and discovery of potential therapeutic agents. *Tectona grandis* is one of the most famous timber plant in the world and is renowned for its, extreme durability, dimensional stability and hard which also resists decay even when unprotected by paints and preservatives. It belongs to the family Verbenaceae. The common name of the plant is teak and locally known as sagon, sagwan. There have been significant advances in the intensive silvicultural management of teak focused on the production of high-quality timber. Teak is cultivated in many Asian, African and South American countries for timber production. However, natural teak available only in few countries like India, Myanmar, Laos People's Democratic Republic and Thailand. The productivity and quality of teak timber varies depending upon the site and environmental conditions. Teak wood is moderately heavy, strong and tough, straight grained, coarse textured and ring porous with specific gravity. The extracts prepared from various parts of teak are found to be effective against biliousness, bronchitis, diabetes, leprosy, anthelmintic, astringent etc., and thus shows expectorant, anti-inflammatory, anthelmintic properties.



**Fig. 1: Tectona grandis.**

These waste leaves can be used in various ways and we can get wealth from waste material. Flavonoids in teak leaves are responsible for its medicinal properties such as antibacterial, antioxidant, cytotoxic, antifungal, hypoglycemic, anti-inflammatory, diuretic, antiasthmatic, anti-bronchitis, analgesic, anti-pyretic, anti-diabetic, anthelmintic and many more. Its growing demand as the world's premium hardwood has initiated several countries lying in the tropical belt to grow them in huge plantations. Consequently, the proportion of foliage that forms the refuse of the timber industry is enormous, making it an ideal resource for the green synthesis of AgNps. Natural products played a very important role in health care and prevention of disease. Natural products are superior to manmade drug because they are always associated with natural and biological entities like proteins, lipids, carbohydrates etc. According to recent studies conducted by World Health Organization (WHO) about 80% of the world population relies on traditional medicine. The methanolic and petroleum ether extracts of *Tectona grandis* seeds were evaluated for anti-inflammatory activity using

paracetamol. Here, the anticancer, antimicrobial, phytochemical screening and antioxidant activities of *Tectona grandis* medicinal plant and of some of their isolated compounds are evaluated.

## MATERIALS AND METHODS

### Sample collection

The plant of *tectona grandis* collected from herbal shop, shanthi nagar, chrompet, chennai. Tamilnadu. These plants brought to lab and sterilized using disinfection with 0.08% (v/v) mercuric chloride for 15 min; Using MS medium, Maintenance of plant extract (Murashige and Skoog 1962) devoid of any growth regulator but supplemented with 30g L<sup>-1</sup> Sucrose. Based on the Indian standard protocol. "Each treatment was replicated six times and experiment repeated thrice. After four-five weeks the growth of the callus is bit initiated.

Hot continuous extraction (soxhlet): In this method, the finely ground crude drug is placed in a porous bag or "thimble" made of strong filter paper, which is placed in chamber E of the Soxhlet apparatus.

Phytochemical Qualitative Analysis: The primary phytochemicals like saponins, flavonoids, terpenoids, glycosides, alkaloids, carbohydrates and phenols.

Were estimated using Indian standard method. (Singleton and Rossi, 1965):

### Quantitative Analysis

Total Antioxidant Assay: Extracts in different concentration ranging from 10 to 100 µg/mL were added to each test tube individually containing 1 ml of distilled

water and 1 ml of Molybdate reagent solution, 1mL of Sodium phosphate and 1 mL of Sulphuric acid were added separately. These tubes were kept incubated at 95 °C for 90 min. After incubation, these tubes were normalized to room temperature for 20-30 min and the absorbance of the reaction mixture was measured at 695 nm. The values were recorded.<sup>[17]</sup>

Antimicrobial Activity: Control – 100% DMSO was used. Antimicrobial assay of different samples was performed by agar well diffusion method in Mueller Hinton Agar (MHA) plates. The test organisms were inoculated in Nutrient broth and incubated overnight at 37°C to adjust the turbidity to 0.5 McFarland standards giving a final inoculum of 1.5 × 10<sup>8</sup> CFU/ml. MHA plates was cultured with standardized microbial culture broth. Each well was filled with varying concentrations from 100, 125, 150 µg/ml of the samples with positive control as streptomycin 25 mcg and negative/solvent control as DMSO, respectively]. The plate was allowed to diffuse for about 30 minutes at room temperature and incubated for 18-24 hours at 37°C. After incubation, plates were observed for the formation of a clear zone around the well which corresponds to the antimicrobial activity of the tested samples. The zone of inhibition (ZOI) was observed and measured in mm.

## RESULTS AND DISCUSSION

Callus Induction by PTC: Plant Tissue culture is the process where the whole process begins *Tectona grandis* is subcultured every 4-5 weeks. Growth of the callus induction from leaf explant and from nodal explant, The results are photographed and displayed below.



Fig. 2: Plant Tissue Culture.

### Phytochemical Screening

Based on the primary phytochemical analysis the plant extract of *tectona grandis* has all primary metabolites.

### Phytochemical Screening

(+) – Positive (-) - Negative

Phytochemical Test	Observation
Alkaloids	+
Carbohydrate	–
Glycoside	–
SaponinS	+
Protein	–
Amino Acids	–
Phenolic compounds	–
Fixed oil	+
Terpenoids	–

### Quantitative Analysis

The ethanol plant extract analysis of quantitative and its absorbance are recorded.

The sample contains 0.319 total phenol and 0.245 total flavonoid.

Table 2: Quantitative analysis of *Tectona grandis*.

S.No.	Quantitative analysis	Absorbance
1.	Total phenolic Compound	0.319
2.	Total flavanoids	0.245

### Antioxidant assay

Total antioxidant activity: The plant extract of the *Tectona grandis* showed total antioxidant activity the

activities are tremendously increased with the concentration of the sample from 10µg/ml to 100µg/ml shows the absorbance of 0.059nm to 0.202nm. The reducing capacity of various concentrations of crude extract at different concentrations of sample along with the standard (Ascorbic acid) showed significant reduction capabilities results are presented. The reducing capabilities were increased with concentration of the sample.

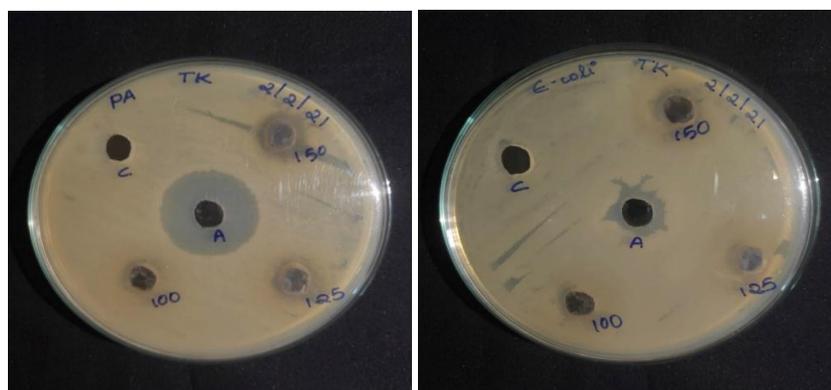
Antimicrobial Activity: The zone of inhibition is clearly seen in the plates and the picture clearly defines and the calculation is noted.

**Table 3: Total antioxidant assay.**

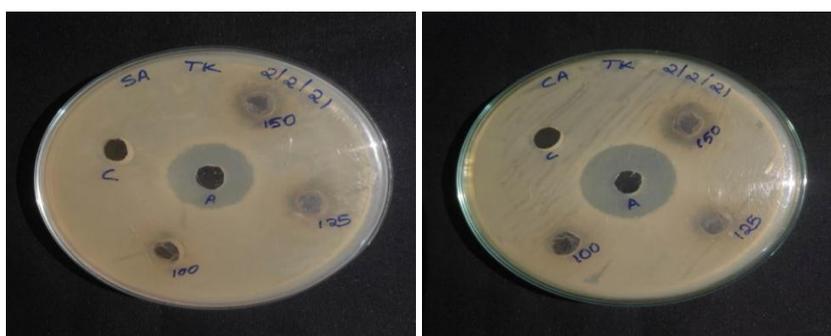
Concentration (µg/ml)	Absorbance at 695nm
10	0.059
20	0.061
30	0.083
40	0.102
50	0.138
60	0.144
70	0.159
80	0.174
90	0.188
100	0.202

**Table 4: Antimicrobial activity.**

S. No.	Organisms	Zone of Inhibition			Antibiotic (streptomycin)
		100 µg	125 µg	150 µg	
1	<i>Pseudomonas aureus</i>	0.3mm	0.6mm	0.8mm	11mm
2	<i>Escherichia coli</i>	0.7mm	0.91mm	0.98mm	0.7mm
3	<i>Staphylococcus aureus</i>	0.2mm	0.5mm	0.7mm	11mm
4	<i>Candida albicans</i>	0.1mm	0.4mm	0.65mm	10mm
5	MRSA	0.3mm	0.6mm	0.74mm	10mm



**Fig. 3: Pseudomonas Fig.4.Escherichia coli.**



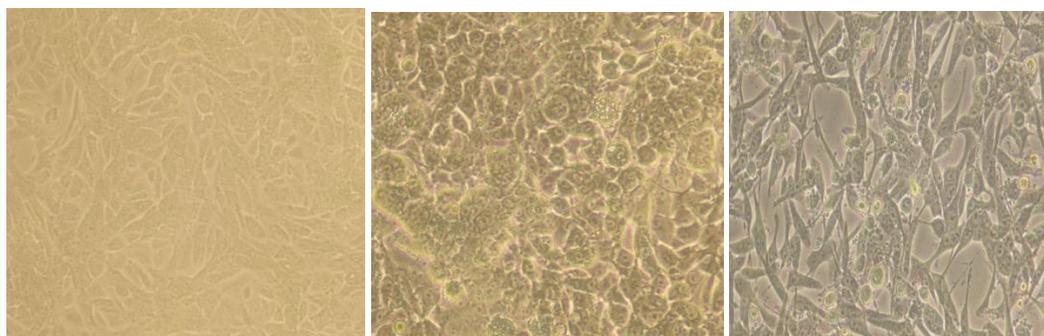
**Fig. 5: Staphylococcus aureus Fig.6.Candida albicans.**



**Fig. 7: MRSA.**

#### Anticancer Activity

Anticancer activity- HepG2 cells



**Fig. 8: (a)Control cells Fig.9(b) 10µg/ml Fig.10.(c) 50µg/ml.**

#### CONCLUSION

*T. grandis* an important ornamental and timber-yielding tree. A further study is needed to isolate and identify the active compounds that are responsible for the antimicrobial potency of *T. grandis*. Due to lack of the plant tissue culture techniques, and its important in this technique related to the plant *T. Grandis*, Need to conduct the research experiments on this plant related to the plant tissue culture techniques. We conducted experiments related to the explant of the *T. Grandis*, using shoot tips. The explant of this plant was first sterilized and raised seedling via shoot tips, and the efficient shoot regeneration was achieved in media supplemented with comparatively low concentrations of growth regulators in the initial culture. Our investigations proved that MS medium augmented with 2.5 IM TDZ proved to be the best for shoot initiation and multiplication. After fourth week this plant culture was observed the growth rate. Using this investigations, possible to produce a large number of plants.

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