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Antimicrobial Sensitivity of Leaf, Bark and Fruit Pericarp Extracts of *Terminalia bellerica* Roxb.

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The phytochemicals of leaf, bark and fruit pericarp of *Terminalia bellerica* Roxb. was extracted and tested against 5 strains of bacteria and fungi. All the three extracts showed comparable activity with the standards and more pronounced activity was against the bacterial strains. Fruit pericarp extract showed high sensitivity against all the fungal and bacterial strains.

Key words: *Terminalia bellerica* extract, Antibacterial & Antifungal sensitivity.

Terminalia bellerica Roxb., Thanni in Malayalam (Combretaceae), a large deciduous tree, is one of the most commonly used plants in Indian System of Medicine[1]. The fruits are highly medicinal and one of the constituent of Triphala, the most common formula used in traditional Ayurvedic medicine. Several constituents were isolated from the fruits viz. Thannilignin, Termilignin, Anolignin, Gallic acid, Arjungenin, Belleric acid etc[2-6]. The aerial parts were documented at the herbarium of University College (Voucher No. 10005).

MATERIAL AND METHODS

Leaves, bark and fruit pericarp were used for the study. The materials were shade dried for one week and were powdered. 30g of the dry powder and 350ml of Methanol were used for the phytochemical extraction by using Soxhlet apparatus. The crude extract was used for further studies.

Antifungal and antibacterial studies were done with disc diffusion method [7]. All the glassware used was washed and autoclaved at 121°C for 15 minutes. For antifungal studies Sabouraud Dextrose Agar medium was used. It was prepared by dissolving SDA (65g/L) and agar (10g/L) in distilled water. The medium was boiled and then autoclaved at 121°C for 15 min. Then the medium was poured into the Petri plates under aseptic condition. Pure cultures of industrially important

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fungi were used for antifungal studies. The fungal strains used were *Rhizactonia solanii, Colletotrichum graminicola, Rhizopus nigricans*, *Mucor hiemalis*, *Fusarium oxysporum* obtained from the pathology laboratory of Kerala Agricultural University, Thiruvananthapuram.

Discs of 4mm diameter were cut out from Whatmann No. 42 filter paper and sterilized by autoclave. The extracts of leaf, bark and fruit pericarp were taken in different concentrations such as 1mg/ml, 2mg/ml and 3mg/ml and the discs were immersed in the tube containing extracts. It was kept for 1hr. The control discs were prepared soaking in methanol and standard by soaking in Griseofulvin. The discs were placed in petridishes containing fungal inoculums. All the petridishes were carefully closed and kept for incubation.

For antibacterial studies, pure cultures of *Staphylococcus aureus, Klebsiella pneumoniae, Salmonella typhi, Escherichia coli* and *Pseudomonas aeruginosa* obtained from Kerala Agricultural University, Trivandrum were inoculated into the peptone water. It was prepared by adding 13.6g of peptone in 1000ml distilled water. The medium used for culturing bacteria was prepared by adding (28g/L) nutrient agar in distilled water. Then it was boiled and autoclaved at 121°C for 15 minutes. Required volume of the molten medium was poured into the sterile petridishes under aseptic conditions.

The pure cultures of bacteria from the peptone water were transferred into the petridishes containing nutrient agar medium. Discs of different concentrations of leaf, bark and fruit pericarp extracts were placed into the petridishes. Control disc with methanol and a standard disc with Streptomycin were also placed on the petridishes. It was kept for incubation.

Table 1. Antifungal activity of Leaf extract

Fungal strain	1µg/ml	2µg/ml	3µg/ml	Standard(mm)	Control
Rhizactonia solanii	5	6	8	15	-
Colletotrichum graminicola	4	7	9	17	-
Rhizopus nigricans	6	7	10	15	-
Mucor hiemalis	5	6	10	15	-
Fusarium oxysporum	4	5	8	16	-

Table 2. Antifungal activity of Fruit pericarp extract

Fungal strain	1µg/ml	2µg/ml	3µg/ml	Standard(mm)	Control
Rhizactonia solanii	10	12	13	15	-
Colletotrichum graminicola	8	13	15	17	-
Rhizopus nigricans	12	13	16	15	-
Mucor hiemalis	13	13	15	15	-
Fusarium oxysporum	14	16	17	16	-

Table 3. Antifungal activity of Bark extract

Fungal strain	1µg/ml	2µg/ml	3µg/ml	Standard(mm)	Control
Rhizactonia solanii	4	5	7	15	-
Colletotrichum graminicola	4	6	7	17	-
Rhizopus nigricans	5	7	8	15	-
Mucor hiemalis	3	5	6	15	-
Fusarium oxysporum	5	8	9	16	-

Table 4. Antibacterial activity of Leaf extract

Fungal strain	1µg/ml	2µg/ml	3µg/ml	Standard(mm)	Control
RStaphylococcus aureus	10	15	17	19	-
Klebsiella pneumoniae	9	12	19	20	-
Salmonella typhii	12	16	20	20	-
Escherichia coli	8	9	11	15	-
Pseudomonas aeruginosa	7	10	12	16	-

Table 5. Antibacterial activity of Fruit pericarp extract

Fungal strain	1µg/ml	2µg/ml	3µg/ml	Standard(mm)	Control
Staphylococcus aureus	10	16	18	19	-
Klebsiella pneumoniae	3	15	18	20	-
Salmonella typhii	9	11	20	20	-
Escherichia coli	7	11	13	13	-
Pseudomonas aeruginosa	12	14	17	17	-

Table 6. Antibacterial activity of Bark extract

Fungal strain	1µg/ml	2µg/ml	3µg/ml	Standard(mm)	Control
Staphylococcus aureus	10	12	15	19	-
Klebsiella pneumoniae	18	17	20	20	-
Salmonella typhii	10	15	16	20	-
Escherichia coli	10	12	13	13	-
Pseudomonas aeruginosa	4	4	9	18	-

RESULTS AND DISCUSSION

All the three types of extracts at different concentrations showed high activity by producing zone of inhibition. Among the three extracts, fruit pericarp extract showed high activity against bacteria and fungi. Leaf extract showed least antibacterial activity when compared to bark and fruit pericarp extracts. But in the case of antifungal studies, least activity was shown by bark extract (Table 1-6).

CONCLUSION

The leaf, bark and fruit pericarp extracts of *Terminalia bellerica* inhibited the growth of the tested strains of bacteria and fungi. More activity was shown against bacterial strain than the fungi. The antimicrobial sensitivity studies on the extracts of *Terminalia bellerica* seem to be a fresh report.

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