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Antifungal Activity of Aqueous Extract of *Mimusops elengi* (Pulp and Seed) Against Phytopathogenic Fungi

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ABSTRACT
India is one of the world's biodiversity hotspots and reports confirm that a great variety of fruiting trees are indigenous to this region of the world. Mimusops elengi Linn (family Sapotaceae) commonly known as Bakul is one such tree native to the Western Ghat region of the peninsular India. However, today this tree is also found growing in other parts of the tropical and subtropical regions of the world. The tree is of religious importance to the Hindus and finds mention in various mythological texts. The stem, barks, leaves and fruits are used in various Ayurvedic and folk medications to treat various ailments. In the prehistoric days the ripe fruits were an important source of diet but today no one knows of its dietary use as it is seldom used. Preclinical studies in the past five years have shown that the extracts prepared from Bakul possess antibacterial, antifungal, anticariogenic, free radical scavenging, antihyperglycemic, antineoplastic, gastroprotective, antinociceptive and diuretic effects, thus lending pharmacological support to the tree's ethnomedicinal uses in Ayurveda. Studies suggest the tree contains the fruit part such as seed and pulp extracts shows antifungal activities against Phytopathogenic fungi (Alternaria solanii and Fusarium oxysporum). In this research shows the Antifungal activity of Mimusops elengi against Phytopathogenic fungi.

KEYWORDS: *Mimusops elengi, Alternaria solanii, Antifungal, Bakul, Spanish Cherry.*

INTRODUCTION

Fungi, which make up a substantial group and have over 250,00 species, are important opportunistic human diseases as well as important agricultural plant infections (Odds, 2000). An estimated 10% to 15% of the world's major crops are lost to plant diseases each year, with direct financial losses reaching the hundreds of billions of dollars (Chatterjee *et al.,* 2016). Seventy to eighty percent of these illnesses are brought on by pathogenic fungus. Plant-pathogenic fungi negatively impact agricultural productivity and growth (Li *et al.,* 2017).Some of these fungi are also documented as opportunist human pathogens that can cause infections in immunocompromised individuals (Felix *et al.,* 2018). The toxins produced by phytopathogenic fungi can have a detrimental impact on the host plants by contributing to the emergence of plant diseases (Soyer *et al.,* 2015).

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Several extracts from the bark, fruits, and leaves of *M. elengi* were investigated for their antifungal properties against a variety of pathogenic fungi. These extracts included petroleum ether, ethyl acetate, and methanol. Compared to extracts made from *M. elengi's* bark and leaves, fruit extracts were less effective against the majority of the examined species and inert against the fungus *Trichoderma viride*. Leaf extracts, on the other hand, showed good effectiveness against *Trichoderma viride* (Ali *et al*., 2008).

The bark has cooling, cardiotonic, alexipharmic, stomachic, anthelmintic, and astringent properties. It is both pleasant and acrid (Basavaraj, 2010; Kirtikar, 1849). This tree's twig is chewed for lengthy periods of time to strengthen teeth and is used for tooth brushing. It is a common ingredient in gargles for bleeding gums, irritation, and odontopathy (Mistry *et al.,* 2017). Along with other ingredients high in tannins, it is a crucial component of several herbal tooth powders. In "Mahakhadiradivati," a herbal cure for halitosis, spongy gums, pharyngeal issues, and stomatitis, it is the primary ingredient. Commercial dyes are also made with it. Gargling with "Kawath" of the bark, pepper, honey, and ghee strengthens the loose teeth and lessens pain. (Gami *et al.,* 2012). Seed powder is used to fix loose teeth. Decoction of root bark taken with milk in the morning for 3 days could strengthen the teeth of even an old person. Chewing bark for a long period strengthens the teeth like anything (Mitra, 1981).

Preclinical research has demonstrated the bark's anti-inflammatory, analgesic, antipyretic, antihyperlipidemic, anti-inflammatory, antioxidant, cytotoxic, antidiabetic, diuretic, and hypotensive properties (Baliga *et al.,* 2011). *M. elengi* fruit has an astringent quality. It is well known that the young fruits guard the loosened teeth. Teeth that come loose can also be fixed with a hot water extract of dried seeds. *M. elengi* root also possesses astringent, diuretic, and aphrodisiac qualities (Mariyam *et al.,* 2015). It has been shown that *M. elengi's* fruits and roots work well to treat periodontitis. Teeth that are movable can be treated with unripe fruit and seeds. Plant metabolites with antibacterial properties include saponins, alkaloids, and tannins. (Sagbo *et al.,* 2017). The surface-active substances called saponins that are found in bark have the ability to function as surfactants (Kregiel *et al.,* 2017). Powdered dried flowers can also be used to clean teeth. Flavonoids found in *M. elengi* have the important anti-inflammatory property of inhibiting the formation of eicosanoids. As the end products of the cyclooxygenase and lipoxygenase pathways, prostaglandins are eicosanoids that are implicated in several immune responses (Sankari, *et al.,* 2014). It has been demonstrated that the ointment made from *M. elengi* extract is beneficial for ulcers and wound healing. The wound healing process consists of different phases such as contraction, epithelization, granulation, collagenation, collagen maturation, and scar maturation which are concurrent but independent of each other (Gupta and Jain, 2011).

MATERIAL AND METHOD

Mimusops elengi (Pulp and Seed) plant species were collected in during the period February and May 2024 in their natural habitat from village Mullana. The collected plants were identified at the Department of Bio-Sciences and Technology, MMDU Mullana, Ambala, Haryana, India. Whole plant collected in an open bag and carried in laboratory then washed under tap water then distilled water. Fresh 10grams Pulp and Seed were taken in 100 ml of distilled water separately and grind with the help of mortar pestle and filter by muslin cloth and centrifuged at 10,000 rpm for 15 minutes, then supernatant taken in conical flask and autoclave at 121°C at 15 lbs. Pour plating method applied to check antifungal activity against phytopathogenic fungi. *Alternaria solani* fungus isolated from potato leaf (Pandey & Tripathi, 2014), and *Fusarium oxysporum* fungus isolated from soil.

Antifungal Activity assay *Alternaria solani* and *Fusarium oxysporum* fungal strains were plated independently in triplicate using 1 ml, of fresh plant extracts in PDA agar medium respectively. Using the food poisoning method, which counts colony forming units (CFU), antifungal assay was determined. Although control plates were utilized without extracts, fresh water extract of both pulp and seed was applied to the media. Six mm diameter agar discs containing fungal mycelia were cut from the edges of the pure cultures that were still growing after a day using a sterilized cork-borer. The center of the petri dish

was then aseptically inoculated with these discs (Srivastava et al., 2011; Salhi et al., 2017). The 1 ml of fresh extract of pulp and seed was used in PDA for *A. solani* or 1 ml of fresh extract of pulp and seed was used in PDA for *F. oxysporum* and the petri plates were incubated for 144 hours at 28°C

RESULTS

Antifungal assay against *A. solani* and *F. oxysporum*: Antifungal activity of *Mimusops elengi* (Pulp and Seed) extract having tendency to inhibit growth of *A. solani* and *F. oxysporum* fungi (Fig. 1, 2). The results of antifungal activity of Pulp and Seed extracts of *Mimusops elengi* in distilled water best result observed (Table 5-6. Seed part show high antifungal activity (4.2 cm) as compared to control (7.5 cm) followed by Pulp part (6.1 cm) Zone of inhibition as compare to control in case of *A. solani*. Similarly, Seed part show high antifungal activity (5.2 cm) as compared to control (7 cm) followed by Pulp part (6.2 cm) Zone of inhibition as compare to control in case of *F. oxysporum (*Table 1-4). Table 5-6 revealed the Zone of Inhibitions (ZOI) of fresh distilled water extract of *Mimusops elengi* (Pulp and Seed) against *A. solani* or *F. oxysporum* in cm. *Mimusops elengi* seed part found higher antifungal as compared as pulp part in case of both fungi *i.e. A. solani* or *F. oxysporum*

Table 1: Antifungal activity of *Mimusops elengi* pulp fresh Distilled water extract (1 ml) against *Alternaria solani*, (Colony diameter in cm)

Sample	3rd Day	Control	5th Day	Control	7th Day	Control
R1	4.1	4.5	5.6	6.4	6.1	7.5
R2	4.1	4.5	5.6	6.4	6.1	7.5
R3	4.1	4.5	5.6	6.4	6.1	7.5

Table 2: Antifungal activity of *Mimusops elengi* seed fresh Distilled water extract (1 ml) against *Alternaria solani*, (Colony diameter in cm)

Sample	3rd Day	Control	5th Day	Control	7th Day	Control
R1	2.6	2.8	3.8	5.5	4.2	7.5
R2	2.6	2.8	3.8	5.5	4.2	7.5
R3	2.6	2.8	3.8	5.5	4.2	7.5

Table 3: Antifungal activity of *Mimusops elengi* pulp fresh Distilled water extract (1 ml) against, *Fusarium oxysporum* (Colony diameter in cm)

Sample	3rd Day	Control	5th Day	Control	7th Day	Control
R1	2.4	3	4.7	5.2	6.2	7
R2	2.4	3	4.7	5.2	6.2	7
R3	2.4	3	4.7	5.2	6.2	7

Table 4: Antifungal activity of *Mimusops elengi* seed fresh Distilled water extract (1 ml) against *Fusarium oxysporum*, (Colony diameter in cm)

Sample	3rd Day	Control	5th Day	Control	7th Day	Control
R1	3.6	4	4.5	5.8	5.2	7
R2	3.6	4	4.5	5.8	5.2	7
R3	3.6	4	4.5	5.8	5.2	7

Table 5: Antifungal activity of fresh Distilled water extract of *Mimusops elengi* against *Alternaria solani*, ZOI in cm

Plant extract	3rd Day	5th Day	7th Day
Mimusops elengi Pulp	0.4	0.8	2.4
Mimusops elengi seed	0.2	1.7	3.3

Table 6: Antifungal activity of fresh Distilled water extract of *Mimusops elengi* against *Fusarium oxysporum*, ZOI in cm

Plant extract	3rd Day	5th Day	7th Day
Mimusops elengi Pulp	0.6	0.5	0.8
Mimusops elengi seed	0.4	1.3	1.8

Figure 1: Antifungal activity of fresh extract of *Mimusops elengi* Pulp and Seed part against *Altenaria solani*. Control (A), Pulp (B) and Seed (C)

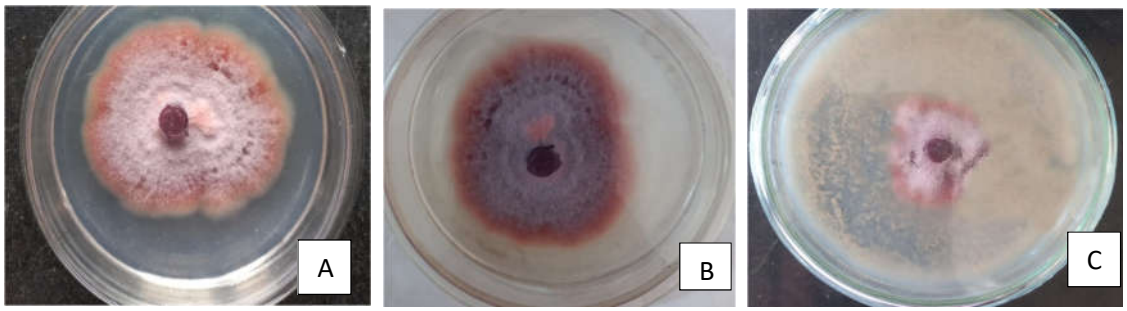

Figure 2: Antifungal activity of fresh extract of *Mimusops elengi* Pulp and Seed part against *F. oxysporum*. Control (A), Pulp (B) and Seed (C).

DISCUSSION

This study revealed that, fresh distilled water *Mimusops elengi* Pulp and Seed part extract of weeds resist the growth of A. solani and F. *oxysporum*. Similar antifungal activities of *Mimusops elengi* extracts have been demonstrated in previous studies against a variety of fungal species, including *Aspergillus candidus, A. flavus, A. niger, A. flavipes, A. terreus, A.,tamari, Penicillium oxalicum , P. chrysogenum, P. griseofulvum, Fusarium solani, F. equiseti, Penicillium notatum, Fusarium oxysporum* (Satish et.al., 2008), *Puccinia arachidis* (Yusnawan and Inayati, 2018), and *Rhizopus stolon*. Other studies have also reported on the variations in antifungal activities of different sub-fractions of methanolic extracts of other plant species, namely *Chenopodium album, C. quinoa, C. murale, Coronopus didymus, Senna occidentalis*, and *Sisymbrium irio* (Javaid et al., 2017a, b; Naqvi et al., 2019; Khan and Javaid, 2020, Banaras et al., 2021). According to these researches a part of discussion that a fresh extract means crude extract having better antifungal activity as comparable as solvents, because herbal extract is eco-friendly low cost in lieu of chemicals against *A. solani* and *F. oxysporum*.

CONCLUSION

The antifungal activity of *Mimusops elengi* pulp and seed extracts in distilled water thoroughly investigated. The crude extract of both plants found antifungal to the growth of *A. solani* and *F. oxysporum* fungi. The fungal infections caused a serious threat to crop plants and economy loss. The present study able to provide eco-friendly management of fungal disease with the use of ethnomedicinal weeds.

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