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# Efficacy of Some Plant Extracts Against Postharvest Fruit Rot Pathogens

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## ABSTRACT

Fruit rot is a very common and destructive disease that causes serious economic loss in production of mainly fruits and vegetables. Ecofriendly, plant extracts have shown great potential as an alternative to synthetic fungicides. Plant produce wide range of secondary metabolites.In the present study, preliminary antifungal activity of *A. indica*, *L. camara*, *D. stramonium*, *O. sanctum* was tested against postharvest fungal pathogens of Papaya, Lemon and Sapota. Aqueous, ethanolic, methanolic and Acetone Extracts were prepared to test the antifungal activity in the concentration of 20%, 40%,60%,80% and 100%. The investigation showed that methanolic plant extracts gives better results as compare to other solvent extracts. And the rate of mycelial growth decreases as the rate of concentration increases.

**Key words:** Postharvest pathogens, Plant extracts, Antifungal activity

## INTRODUCTION

Most farmers used fungicides to overcome postharvest pathogens. But it causes negative environmental impacts, mammalian toxicity and high cost too. Therefore now a days researchers work on plant based chemicals, as an alternative. The use of plants and plant products as medicines could be traced as far back as the beginning of human civilization. Plants are the richest resource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs (Hammer et al.,1999).

Plants has the ability to synthesize secondary metabolites like phenols, phenolic acid, quinones, flavones, flavonoids, flavonols, tannins and coumarins (cowan, 1991).

These groups of compounds shows antimicrobial effect and serves as plant defense mechanisms against pathogenic microorganisms (Das et al., 2010). Many Researchers tried to find out safe and economical control of plant diseases by using extracts of different plant parts (Hasan et.al.2005; Badiya and Akali,2008). *Azadirachtha indica* L. (Neem), belongs to family-Meliaceae, is perhaps the most useful traditional medicinal plant. It provides household remedy against various human ailments. The tree is still regarded as “Village dispensary” in India dueto it’s antiseptic, antipyretic, anti-inflammatory, antiulcer and antifungal properties. *Lantana camara* Linn. is flowering ornamental plant belonging to family- Verbenaceae and distributed throughout India. A signifacant amount of research has been done on the it’s chemical components. The roots are used to treat toothaches, the flowers to treat chest complaints in children, the leaf oil is used as an antiseptic for wounds. Leaf extracts also have antiproliferative, antifungal, antibacterial, fungicidal, insecticidal and nematocidal properties. *D. stramonium* L. belongs to a family- Solanaceae. It is a small herb having wide range of medicinal properties. It exhibits potent, analgesic, antiviral, antidiarrheal and anti-inflammatory activities, owing to the wide range of bioactive constituents. *Ocimum sanctum* Linn (known as tulsi), a small herb seen throughout India, have been recommended for the treatment primarily attributed to it’s antioxidant, anti-inflammatory and adaptogenic effects. Hence the objective of the study was to determine the efficacy of aqueous, ethanol, methanol and acetone plant extracts of some selected plants for controlling some postharvest pathogens, *in vitro*.

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# MATERIAL AND METHODS

**Preparation of cultured media:**

Potato Dextrose Agar (PDA) was prepared by dissolving 39 grams in 1 litre Erlnmayer's flask and then made up to 1 litre using sterile distilled water. The medium was autoclaved at 121℃ for min., then allowed to cool at room temperature, before supplemented with streptomycin sulphate (3 grams) and aseptically dispensed into sterilized 9 cm diameter glass petridishes.

**Isolation and identification of Fungal Pathogens:**

Infected fruits were randomly collected from the market. The Chiejina (2008) isolation method was used. Thin sections were cut from the periphery of infected fruits and surface sterilized in 0.1% mercuric chloride for 2-3 min, after which they were rinsed in three changes of sterile distilled water. The sections were plated in water agar and mycelium was transferred into clean PDA plates.

The plates were incubated at room temperature (27±2 ℃) for 6-7 days. Then, subculture frequently until pure cultures were obtained. The identification of isolation of fungi was done macro and microscopically. The identification was confirmed with the aid of books by Barnett and Hunter (1999), Alexopolus et.al. (2002), agrios(2005) and Eltis et.al(2007).

**Pathogenecity Test:**

Each of the fungal isolates obtained from the diseased fruits (Papaya, Lemon, Sapota) were tested for the ability to cause the same disease condition previously observed in healthy fruits. The pathogens were reisolated and identified as previously isolated fungal pathogens. This was taken as evidence that they incited the disease.

**Preparation of plant Extracts:**

Leaves of three plant species named as *Azadirchta indica* (A. Juss), *Lantana camara* L., *Datura stramonium* L. were used in the experiment. All the plant leaves were washed with tap water then surface sterilized with 1% NaOCl for 5 min. and rinsed in five changes of sterile distilled water. Then air dried at 28 ± 2℃ for 1 hr. 20 gms, 40 gms, 60 gms, 80 gms and 100 gms of each plant material grounded in mixer. Then dissolved in 100 ml distilled water and then filtered through a whatman no.9 filter paper separately in to a 250 ml concentrations.

The modified disc diffusion method was employed to determine the antifungal activity of solvent extract of leaves of selected plants. 0.1 ml fungal suspension of $10^5$ CFU $ml^{-1}$ was uniformly spread on PDA plate to form lawn cultures. The aqueous, ethanol, methanol and acetone extracts were prepared in their respective solvents in such a manner that ultimate amount (in dry form) in each disc came to 10mg, 8mg, 6mg, 4mg and 2mg.

The blotting paper disc (10mm diameter) were soaked in various diluted extracts, dried in oven at 60℃, to remove excess of solvent and tested for their antifungal activity against postharvest pathogens by disc diffusion technique. After incubation of 24hr. at 37℃, Zone of inhibition of growth was measured in mm. The antifungal activity was classified according to the zone of inhibition such as strong(19-22mm), moderate(15-18mm) and mild(11-14mm). Griesofulvin 10 mcg (Hi media disc) was used as positive control while discs soaked in various organic solvent sand dried were placed on lawns as negative control.

# RESULTS

Table: 1 Inhibition of Mycelial growth by some selected plant extracts against fungal pathogens

| **Medicinal plants** | **Solvent extracts** | ***A. niger*** | ***F.oxysporum*** | ***P.digitatum*** |
|---|---|---|---|---|
| *Azadirachta indica* | Aqueous | **10** | **12** | **13** |

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| | | | | |
|---|---|---|---|---|
| | Ethanol | **15** | **16** | **18** |
| | Methanol | **19** | **22** | **20** |
| | Acetone | **18** | **20** | **21** |
| *Lantana camara* | Aqueous | **11** | **12** | **14** |
| | Ethanol | **16** | **16** | **16** |
| | Methanol | **19** | **17** | **20** |
| | Acetone | **18** | **12** | **21** |
| *D. stramonium* | Aqueous | **--** | **17** | **14** |
| | Ethanol | **14** | **18** | **17** |
| | Methanol | **18** | **20** | **19** |
| | Acetone | **16** | **18** | **18** |
| *Ocimum Sanctum* | Aqueous | **07** | **10** | **12** |
| | Ethanol | **08** | **08** | **07** |
| | Methanol | **17** | **18** | **21** |
| | Acetone | **15** | **14** | **11** |
| **Griseofulvin(10mcg)** | Positive control | **25** | **20** | **18** |

## DISCUSSION

The mycelial growth inhibition and of the pathogens by the leaf aqueous extracts of *A. indica, L. inermis, O. sanctum* and *Datura stramonium* investigated in this study indicated that antifungal activity showed by the tested plant extracts had inhibitory effects on the growth of *A. niger*, *F. oxysporum* and *P. digitatum*. These results further revealed that antifungal activities of the extracts were enhanced by increasing the concentration from 20 to 100%(w/v), Hence the inhibition activities of the extracts were concentration dependant. This is in aggrement with the report of IIondu (2012) and Chiejina and Ukeh (2013) who indicated that increase in the antifungal activities had corrosponding increase in concentration of plant extracts.

*A. indica* exhibited high fungitoxic effect in inhibiting mycelial growth reduction against selected fungal pathogns.

Antifungal activity of *A. indica* conforms to the result of (Ogbebor and Adekunle 2005; Conventry and Allan, 2001) that this extract is very effective in inhibiting the growth of *F. moniliforme, A. flavus* and *A. niger*.

Fungitoxic properties of *A. indica* could be attributed to the presence of sapronin and alkaloid, chemical compounds which has been identified as antifungal agents in the plant (Kumar et.al.2008).

The fungicidal effects of plant extracts on different pathogens of crop plants have been widely reported (Amadioha and Obi, 1999; Okigbo and Ogbonnaya, 2006; Olufolaji, 1999 and Onifade, 2002).

However, the differences in the efficacy of the extracts could be attributed to the differences in their active ingredients.

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