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ORIGINAL ARTICLE

Antifungal Activity of Some Fruit Extracts Against Seed-Borne Pathogenic Fungi

B. T. PAWAR
Department of Botany,
Shri. Muktanand College, Gangapur,
Dist. Aurangabad – 431 109.

ABSTRACT
Plant extracts are being used to control the diseases since last several years. Extracts of the various plant parts like leaf, stem, root, fruit and seeds are found to be effective against seed-borne pathogenic fungi. The in vitro studies have been performed by using cup-plate method to examine the antifungal activity of some fruit extracts. Fruit extracts of 9 plants were screened against 5 seed-borne pathogenic fungi viz. Alternaria alternata, Aspergillus niger, Curvularia lunata, Fusarium moniliforme and Trichoderma viride. Out of 9 fruit extracts, 6 root extracts showed antifungal activity. The extract of Jatropha curcas showed maximum activity; while minimum activity was observed with Capsicum annum against the fungi under investigation. These plant extracts can possibly be exploited in the management of seed-borne pathogenic fungi to prevent biodeterioration of seeds in an eco-friendly way.
Kyewords: *Antifungal activity, Seed-borne Pathogenic Fungi, Fruit Extracts.*

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INTRODUCTION

Fungal diseases are known to cause great damages all over the world. Different species of *Alternaria, Aspergillus, Ceratobasidium, Cercospora, Cochliobolus, Curvularia, Dreschslera, Fusarium, Gaeumanno-myces, Microdochium, Penicillium, Pyricularia, Pythium, Rhizoctonia, Rhizopus, Sclerophthora, Trichoderma* and *Tricoconella* are most common associates of seeds all over the world, causing pre- and post-infections and considerable quality losses *viz.* seed abortion, seed rot, seed necrosis, reduction or elimination of germination capacity, seedling damage and their nutritive value have been reported [1-3]. Seed treatment is the safest and the cheapest way of control of seed-borne fungal diseases and to prevent bio--deterioration of grains [4,5].

Even though effective and efficient control of seed- borne fungi can be achieved by the use synthetic chemical fungicides, the same cannot be applied to grains for reasons of pesticide toxicity [6]. Medicinal plant extracts are endowed with several biologically active compounds with potent antimicrobial activity and could be used effectively to replace synthetic chemicals [7]. The investigation of plants containing natural antimicrobial metabolites for plant protection has been identified as a desirable method of disease control. The screening of plant extracts has been of great interest to scientists in the search for new drugs for greater effective treatment of several diseases [8].Fruit extracts of various plants are known to possess antimicrobial activity. Several workers have observed the antifungal activity of fruit extracts [11-14]. Hence, during the present investigation fruit extracts were tested against seed-borne pathogenic fungi.

MATERIALS AND METHODS

Fungal pathogens were isolated on PDA medium from different stored seeds. Identified fungal cultures were isolated and pure cultures of each fungi made separately on PDA slants. These pure cultures were used for further investigation.

a) Preparation of fruit extracts: The fruits were collected, thoroughly washed with tap water and then rinsed with sterile distilled water. Fruits weighing 20 gm were crushed in electric mixer grinder with 50 ml sterile distilled water. Then it was centrifuged for 20 min at –4^{o}C at the 11000 rpm speed.

b) Cup Plate Method: 20 ml of PDA media was poured in sterilized petridishes (9 cm diameter) and allowed to solidify. Then pure cultures of fungi were streaked out in regular intervals on the media poured in petridishes. In the centre of the medium, a cup cavity of 8 mm diameter was made with sterilized cork borer No. 4. This cup was filled with 0.1 ml of the stem extract [15]. The petridishes were incubated for 6 days at 30±2°C temperature and the observations were recorded as diameter of inhibitory zone in mm.

Cup plate filled with sterile distilled water was used as control in all the experiments. All the experiments were in triplicate and mean has been considered in an observation table.

RESULTS AND DISCUSSIONS

The antifungal activity of 9 fruit extracts against 5 seed-borne fungi is presented in table 1 as zone of inhibition (in mm). It was observed from table 1 that out of 9 fruit extracts, 6 fruit extracts showed antifungal activity; out of which *Jatropha curcas* showed maximum activity (Mean activity zone 21.996 mm), followed by *Azadirachta indica* (Mean activity zone 21.728 mm) and minimum activity was observed with fruit extract of *Capsicum annum* (Mean activity zone 16.062 mm). The fruit extracts of *Acacia nilotica, Terminalia thorelii* and *Trachyspermum ammi* also showed good antifungal activity; however, fruit extracts of *Coriandrum sativum, Cyamopsis tetragonoloba* and *Foeniculum vulgare* could not exhibit any antifungal activity against the fungi under investigation.

Many reports revealed that, plant metabolites and plant based pesticides appear to be one of the better alternatives as they are known to have minimal environmental impact and danger to consumers in contrast to synthetic pesticides [16,17,18]. Similar results were recorded by Pandey and Shweta [19] with *Psidium guajava* leaves and fruits extracts against various plant pathogenic fungi. Antifungal activities of ethanolic seed, root and fruit rind extracts of three Saudi plants were investigated by Aziz and Askar [20] against fungal plant pathogens like *Alternaria alternata, Fusarium oxysporum, Phoma destructiva, Rhizoctonia solani,* and *Sclerotium rolfsii.* Faiza *et al*, [21] powdered and extracted olive fruit (*Olea europaea* L.) from Algeria to assess antifungal activity against fungal plant pathogens *viz. Cladosporium herbarum* MNHN 3369, *Alternaria alternaria* MNHN 843390, *Aspergillus fumigates* MNHN 566, *Aspergillus flavus* MNHN 994294.

Kavitha and Satish [22] also reported eco-friendly management of plant bacterial and fungal pathogens by using leaf and fruit extracts of some medicinal plants. Manjulatha *et al*, [23] observed significant antimicrobial potential in the fruits of S*apindus emarginatus.* Gopalakrishnan *et al,* [24] evaluated antimicrobial activity of *Cucumis trigonus* fruits against two plant pathogenic fungi and three gram positive bacteria. Singariya *et al,* [25] investigated the antimicrobial activity of *Withania somnifera* (RUBL-20668) and *Cenchrus setigerus* (CAZRI-76) extracts in order to use it as a possible source for new antimicrobial substances against important human pathogens.

Table 1: Antifungal activity of Fruit Extracts against Seed-borne Pathogenic Fungi

Sr. No	Name of the Plant	Zone of Inhibition (in mm)					
		Alternaria alternata	***Aspergillus niger***	***Curvularia lunata***	***Fusarium moniliforme***	***Trichoderma viride***	**Mean**
1	*Acacia nilotica* (L.) Del.	18.33	15.66	16.66	17.33	14.66	**16.528**
2	*Azadirachta indica* L.	22.66	21.66	20.00	22.66	21.66	**21.728**
3	*Capsicum annum* L.	15.66	14.00	18.66	15.33	16.66	**16.062**
4	*Coriandrum sativum* L.	–	–	–	–	–	–
5	*Cyamopsis tetragonoloba* (L.) Taub.	–	–	–	–	–	–
6	*Foeniculum vulgare* Mill.	–	–	–	–	–	–
7	*Jatropha curcas* L.	22.33	23.00	22.33	20.66	21.66	**21.996**
8	*Terminalia thorelii* Ganep	21.66	22.66	21.66	19.00	20.33	**21.062**
9	*Trachyspermum ammi* (L.) Sprague	19.33	19.00	19.33	18.00	19.66	**19.064**

– : No Activity.

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