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ANTIFUNGAL ACTIVITY OF FLAX SEED EXTRACT AGAINST SEED-BORNE PATHOGENIC FUNGI

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ABSTRACT

Plant extracts are being used to control the diseases since last several years. Flax oil seeds are reported to exhibit antibacterial and antifungal activity in the literature. It was 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 *Brassica* seeds. Flax seed extract was screened against 5 seed-borne pathogenic fungi *viz. Alternaria alternata, Aspergillus niger, Curvularia lunata, Fusarium moniliforme* and *Trichoderma viride*. Out of them, antifungal activity of flax seed extract against *F. moniliforme* was found maximum (Mean activity zone - 18.33 mm) followed by *A. niger* (Mean activity zone - 17.67 mm); while minimum activity was observed against *C. lunata* (Mean activity zone - 14.00 mm). Flax seed extract can possibly be exploited in the management of seed-borne pathogenic fungi to prevent biodeterioration of seeds in an eco-friendly way.

KEYWORDS: Antifungal activity, Flax Seed extract, Seed-Borne Pathogenic Fungi.

INTRODUCTION

Seed-Borne fungal diseases are known to cause great damages all over the world. Different species of *Alternaria, Aspergillus, Ceratobasidium, Cercospora, Cochliobolus, Curvularia, Dreschslera, Fusarium, Gaeumannomyces, 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

(Miller, 1995; Janardhana *et al.*, 1998; Kavitha *et al.*, 2005). Seed treatment is the safest and the cheapest way of control of seed-borne fungal diseases and to prevent biodeterioration of grains (Chandler, 2005; Bagga and Sharma, 2006).

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 (Harris *et al.*, 2001). The toxic effect of synthetic chemicals can be overcome, only by persistent search for new and safer pesticides accompanied by wide use of pest control methods, which are eco-friendly and effective (Mohana *et al.*, 2011). Green plants represent a reservoir of effective chemotherapeutants and can provide valuable sources of natural pesticides (Balandrin *et al.*, 1985; Hostettmann and Wolfender, 1997).

Flax seed (*Linum usitatissimum* L.) contain considerable amount of phenolics namely lignan. Lignans are important for their possible application in the fields of pharmacy and nutrition. Seed oil has individual *in-vitro* antimicrobial activity against a wide range of bacteria fungal pathogens (Alaa *et al.*, 2013; Joshi *et al.*, 2014). Hence, during the present investigation antifungal activity of flax seed extract was screened against five 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 fungus made separately on PDA slants. These pure cultures were used for further investigation.

a) Preparation of seed extracts: The flax seeds were collected, thoroughly washed with tap water and then rinsed with sterile distilled water. Seeds 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 (Pawar, 2015)

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 No. 4 cork borer. This cup was filled with 0.1 ml of the flax seed extract (Pawar and Papdiwal, 2010). 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

(Pawar, 2013). All the experiments were in triplicate and recorded as Experiment A, B and C. Mean of all experiments has been considered in the observation table (Pawar, 2013)

RESULTS AND DISCUSSION

The antifungal activity of flax seed extracts against five seed-borne fungi is presented in table 1 as zone of inhibition (in mm). It was observed from table 1 that antifungal activity of flax seed extract against *F. moniliforme* was found maximum (Mean activity zone - 18.33 mm) followed by *A. niger* (Mean activity zone - 17.67 mm); while minimum activity was observed against *C. lunata* (Mean activity zone - 14.00 mm). Flax seed extract also showed good activity against *Alternaria alternate* (Mean activity zone – 15.33 mm) and *Trichoderma viride* (Mean activity zone - 14.67 mm).

Average antifungal activity recorded against all fungal pathogens under investigation was 16 mm. Two fungal pathogens such as *F. moniliforme* and *A. niger* showed more activity than the average activity. Similar results were reported by Alaa *et al.,* (2013). They studied *in-vitro* antioxidant and antimicrobial activities of Lignan flax seed extract (*Linum usitatissimum*, L.). Joshi *et al.,* (2014) evaluated antimicrobial activity of Gemifloxacin with *Linum usitatissimum* seed oil. Bakht *et al.,* (2011) investigated the antimicrobial activities of different solvents extracted samples of *Linum usitatissimum* against seven bacterial and one fungal pathogen.

Table 1: Antifungal activity of Flax seed extract against five Pathogenic Fungi.

Sr. No.	Name of the Fungi	Zone of Inhibition (in mm)			
		Exp. A	Exp. B	Exp. C	Mean
01	*Alternaria alternate*	16	15	15	15.33
02	*Aspergillus niger*	18	17	18	17.67
03	*Curvularia lunata*	14	14	14	14.00
04	*Fusarium moniliforme*	19	19	17	18.33
05	*Trichoderma viride*	16	14	14	14.67

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