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Toxic potentialities of fungal metabolites on germination status of Mataki seeds *(Vigna aconitifolia* Jacq.)

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ABSTRACT

Seeds of *Vigna aconitifolia* Jacq. (mataki seeds) pre-soaked in cell free culture filtrate of post-harvest sapota fungi viz. *Geotrichum candidum*, *Aspergillus niger* and *Rhizoctonia solani.* In order to study the effect of incubation period on toxin production, the fungi were grown for different period ranging from 5-25 days. It is clear from the result that with the increase in incubation period, toxicity also increased. All the fungal filtrates showed decrease in percentage of seed germination with increase in filtrate age i.e. soaking time in all the fungal filtrates.

Introduction

Phytotoxins are other important metabolites of fungi involved in the process of fruit pulp biodeterioration. Harvested grains are colonized by various species of *Aspergillus*, under such conditions leading to deterioration and mycotoxin production (Reddy et al., 2009). *Aspergilli* are the most common fungal species that can produce mycotoxins in food and feedstuffs. Mycotoxins are well known for their health–hazardous effects in human beings and animals (Probst et al., 2007; Reddy and Raghavender, 2007). During the metabolic process, fungi secrete their metabolites in medium. These metabolites are of different types and are known to cause diseases in plants, animals and humans who use to eat this infected food (Schumann, 1991; Singh et al., 1991). Several other workers reported the role of toxic metabolites of storage fungi on seed germination. Soyabean seeds showed reduction in germination percentage, which were soaked in filtrate of *Phomopsis phaseoli* (Hilty and Lee, 1988).

The present study was undertaken to evaluate the effect of toxic metabolites of storage fungi (*Geotrichum candidum*, *Aspergillus niger* and *Rhizoctonia solani*) on Mataki seed germination.

Materials and methods

Storage fungi: Storage fungi (*Geotrichumcandidum*, *Aspergillus niger* and *Rhizoctonia solani*) were isolated from post-harvested sapota and maintained on PDA media.

Culture Filtrate Preparation: The test fungi isolated from post-harvest sapota fruits were grown on Glucose nitrate medium. 25 ml of the medium was poured in 100 ml Erlenmayer conical flasks and autoclaved at 15 lbs pressure for 20 minutes. The flasks on cooling were inoculated separately with 1 ml standard spore suspension of the test fungi prepared from 7 days old culture grown on PDA slants. The flasks were inoculated for 6 days at 25 ± 1°C. On the 7th day the flasks were harvested by passing the contents through sterile Whatman's filter No.l. The cell free filtrates were collected in the presterlised bottles and termed as crude toxin preparations, which is cell-free filtrate. These preparations were tested for their toxicity. (Umecharuba and Neachukwa, 1997).

Assay of Phytotoxins: The toxicity of culture filtrates was determined by Seed germination method. Surface sterilized 100 seeds of the test crops were soaked in crude toxin preparation for 24 hours. They were then placed on moist blotter in petriplates. Seeds soaked similarly in freshly prepared uninoculated liquid medium served as control. Percent germination or per cent inhibition of germination, root and shoot length of seedlings were measured after 7 days of incubation at room temperature.

Results and discussion

The effect of presoaking seeds in cell free filtrate of storage fungi for different period of time (days) on percentage seed germination of mataki seeds is shown in table I. It showed maximum percentage inhibition of seed germination as compared to control. Percentage inhibition of seed germination is different according to different culture filtrates and incubation period. *Aspergillus niger* showed maximum inhibition of seed germination percentage followed by *Geotrichum candidum* and then *Rhizoctonia solani.*

From the data given in table 1, it becomes clear that with increase in incubation period, toxicity also increases. It was noticed that after 5 days, *Geotrichum candidum* could produced toxin. The culture filtrates of three fungi harvested from 10th day onwards showed increase in toxicity with increase in the incubation period upto 25 days. On 25th day, *Aspergillus niger* (85%), *Geotrichum candidum* (70%) and *Rhizoctonia solani* (50%) showed inhibition of seed germination.

It is clear from the result that filtrate of *Aspergillus niger, Rhizoctonia solani* and *Geotrichum candidum* inhibited seed germination which means that metabolites are discharged by the tested fungi in the media in which they were grown. These toxic metabolites can inhibit and reduce seed germination percentage. Inhibitory nature of the fungi was also recorded by different workers. Sinha and Prasad (1981) recorded inhibition of seed

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germination in mung due to *Alternaria alternata, urvularia lunata* and *Macrophomina phaseolina*. Haikal (2008) reported that toxic metabolites secreted by *Aspergillus niger, Fusarium culmorium, Penicillium* spp. and *R.solani* reduced the percentage of seed germination of soyabean. Hilty and Lee (1988) found that filtrate from *Phomopsis phaseoli* reduced germination of soyabean, this is due to toxins secreted in the media. Madhavrao and Thakur (1978) reported that culture filtrate of *Sclerotium rolfsii* hampered the germination of *Solanum melongena*.

Table 1: Effect of incubation period on toxin production

Fungal culture filtrate	Incubation period (Days)				
	5	10	15	20	25
	% inhibition of seed germination				
Control	00	00	00	00	00
Aspergillus niger	20	70	75	80	85
Geotrichum candidum	15	55	60	65	70
Rhizoctonia solani	00	40	45	50	60
CD (P=0.05)	19.1086	27.5394	27.5394	27.5394	32.2385

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