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Influence of culture filtrate of seed-borne *Colletorichum demetium* and *Alternaria alternata* on chilli seed germination

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Colletotrichum dematium and *Alternaria alternata* were found to be associated with chilli seeds in Madhyay Pradesh and were responsible for severe seed rot and seedling decay. The production of toxic metabolities of these two seed-borne pathogens was determined by adopting the bioassay method inhibitory to seed germination and root/shoot elongation. Culture filtrate of *C. dematium* obtained from 13 day incubation in potato-sucrose broth was most inhibitory (50%) to seed germination and seedling development while culture filtrate of *A.. alternata* from 15 day incubation in Richards medium was most inhibitory (69.42% inhibition).

Key words : *Colletotrichum dematium, Alternaria alternata,* culture filtrate, influence, chilli seed

INTRODUCTION

The concept that seed-borne mycoflora cause diseases by producing toxic substances is well established (Neergaard, 1977; Owens, 1969; Ciegler *et al.*, 1971; Sadashivan and Kalyansundaram, 1965). If is already known that *Colletotrichum dematium* and *Alternaria alternata* reported to cause severe seed-rot and seedling decay of crops under central Indian conditions. The seed-borne nature of *C. dematium* and *A. alternata* in chillies had been observed (Kulshreshtha *et al.*, 1976; Siddiqui *et al.*, 1977; Grover and Bansal, 1970; Mridha and Siddiqui, 1989; Showkat *et al.*, 1978; Hashmi, 1989). The pathogens were also found responsible for causing leaf spot and fruit rots limiting the profitable cultivation of chillies in recent years. The present investigation was undertaken to study the influence of toxic effect of culture filtrate of these two fungi on seed germination and seedling development.

MATERIALS AND METHODS

A bioassay method based on the inhibition of root and shoot elongation (RL and SL) was used (Das and Shrivastava, 1969). An aliquot of 50 ml of potato sucrose broth (PSB) was taken in 150 ml Erlenmeyer flask, inoculated with a disc (5 mm diameter) cut out from developing culture of *C. dematium* and incubated at room temperature (28°C) for different period of time. Richard's medium was used in place of PSB for *A. altrnata*

The crude culture filtrate (CF) was obtained by filtering through muslin cloth, cotton pad and finally seitz filter after various incubation periods. Twenty five surface sterilized

chilli seeds free from any apparent infection by *C. dematium* and *A. alternata* were soaked for 4 h in sterile plates containing the CF. The non-association was already confirmd by testing through incubation on moist blotters. The CF treated seeds were plated on moist blotters following standard blotter method (ISTA, 1985). The seed soaked in sterile distilled water served as control. Parallel studies were also made by using different dilutions of CF in sterile distilled water.

RESULTS AND DISCUSSION

Influence of culture filtrate of C. dematium

Higher germination (90%) was observed in control seeds soaked in sterile water as compared to those soaked in all ages of CF. Most effective inhibition (50%) was recorded when the chilli seeds were soaked in 13 days old CF. However, the extent of inhibition was lower in CF from 17 days old CF onwards and germination increased (Table 1) progressively indicating gradual loss in toxicity of the older CFs.

Table 1 : Influence of culture filtrate of *Colletorichum dematium* on germination of chilli seeds

Age of CF (days)	Seed germination (%)		Reducation of seed grmination. (%)
	CF	SW	
5	72	90	20.0
9	59	90	34.5
13	45	90	50.0
17	57	90	36.6
21	65	90	27.7

CF : Crude culture filtrate SW : Sterile water

The most effective culture filtrate obtained after 13 days incubation when diluted (25% and 50%) exhibited lower toxicity in terms of RL and SL elongation. The RL (0.3 cm) and SL (0.5 cm) was recorded in seeds soaked in cent per cent CF while in control RL (5.6 cm) and SL (3.10 cm) was recorded (Table 3).

Table 2 : Influence of culture filtrate of *Alternaria alternata* on germination of chilli seeds

Age of CF (days)	Seed germination (%)		Reduction of seed germination (%)
	CF	SW	
5	58.0	85.0	31.77
10	42.0	85.0	50.59
15	26.0	85.0	69.42
20	31.0	85.0	63.53
25	39.0	85.0	54.12
30	43.0	85.0	49.42

CF : Crude culture filtrate SW : Sterile water

Table 3 : Effect of culture filtrate of seed-borne *C. dematium* and *A. alternata* on root-shoot elongation

Dilution of CF (%)		Culture filtrate			
		C. dematium		*A. alternata*	
		RL	SL	RL	SL
Control	0	5.60	3.10	4.90	3.25
	25	3.90	1.50	4.90	3.15
	50	2.20	1.00	1.15	2.00
	100	0.30	0.50	0.25	0.47

RL : Root length (cm) SL : Shoot length (cm)

Influence of culture filtrate of A. alternata

Higher (85%) seed germination was recorded when seeds were soaked in sterile water as compared to seeds soaked in CF of different ages. Maximum inhibition (69.42%) in seed germination was observed when seeds were soaked in CF of 15 days old culture. However, seed germination gradually increased when seeds were treated with CF of more than 15 days old culture (Table 2).

Here also the most inhibitory CF obtained from 15 days old culture when diluted (25% and 50%) exhibited lower toxicity in terms of RL and SL (Table 3).

In the present studies it was observed that both the seed-borne fungi produced toxic metabolities which inhibited the seed germination and also had the inhibitory influence on root and shoot development. *Colletorichum fuscum* was reported by Lewis and Goodman (1962) to produce toxin colletotin whereas Powell and Whalley (1959) and McMillan and Pryce (1968) mentioned the production of macrocyclic carcenogenic lactones as colletodiol by *C. capsici.* Progressive inhibition of seed germination, root elongation and production of non-host specific toxins was also observed by Sahni *et al.* (1974). *Alternaria alternata* was also reported to produce toxins (tentoxin) which caused chlorosis while Meronuck *et al.* (1972) recorded production of tenuazonic acid. The production of toxin and its effect was studied by Siddaramaiah and Hegde (1984), Templeton *et al.*, (1967) while Mehan and Murphy (1947) and Sahni *et al.*, (1974) observed the progressive loss in seed grmination and root elongation.

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