

Short Communication

Phytotoxic Effects of Fumonisin on Seed Germination and Seedling Growth of Maize

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The fumonisins as described by Gelderblom et al. [1] are mycotoxic and phytotoxic metabolites of *Fusarium moniliforme* (Sheldon). The fumonisins have been shown to have phytotoxic properties towards jimsonweed [2], tomato cultivars [3], maize callus cultures [4] and duckweed (*Lemna minor* L.) [5]. Fumonisin exert a wide range of symptoms on plants which include chlorosis in creeping cucumber, necrosis in jimsonweed and common sunflower, black leaf lesion in sickle pod and defoliation, curl of tissues in soybean, stunting in hemsbesbani, death in pricklyside [6]. In the present investigations efforts have been made to study the effect of culture filtrate of fumonisin producing isolate of *F. moniliforme* on seed germination and seedling growth of maize.

The culture filtrate of the highly toxigenic isolate of *F. moniliforme* (FM₃-S.29) was used for this study. For this purpose 400 seeds of maize variety "Paras" were taken. The sample was divided in four batches of 100 seeds each. Three batches were soaked in culture filtrate of highly toxigenic isolate for 8, 12 and 16 hours, respectively. Simultaneously, one batch of 100 seeds of the sample soaked in distilled water, served as control. After soaking, the seeds were sown in sterilized sand and observations for shoot length, root length, percentage germination and chlorosis were noted after 10 days from seed sowing.

The data present in table 1 indicate that in

control (soaking of maize seeds in distilled water) seed germination was recorded 80 per cent and root length, shoot length were 21.63 cm, 6.85 cm, respectively. The maize seeds after soaking in culture filtrate of *F. moniliforme* (highly toxigenic) for 8, 12 and 16 hours indicated the percentage seed germination as 78 per cent, 75 per cent and 73 per cent, respectively and root length 14.58 cm, 11.96 cm, 10.75 cm, and shoot length 6.80 cm, 6.79 cm, and 6.78 cm, respectively, thereby causing decrease in all the seed quality parameters tested. The inhibition in seed germination was 2 per cent, root length and shoot length were 32.59 per cent and 0.72 per cent, respectively in maize seed after soaking for 8 hrs in culture filtrate of *F. moniliforme* (Table 1). In case of 12 hours soaking of maize seeds in culture filtrate the inhibition in seed germination was 5 per cent. Inhibitory response in root length and shoot length was observed as 45.70 per cent, 0.87 per cent, respectively. Further treating maize seeds for 16 hours in culture filtrate of toxigenic isolate of *F. moniliforme*, shown inhibition in seed germination, root length and shoot length 7 per cent, 50.30 per cent, and 1.02 per cent, respectively. The leaves were less green in few plants comparison to control plant. It was an initial chlorosis.

The maximum inhibition in seed germination (7%), root length (50.30%) and shoot length (1.02%) was recorded after 16 hour of soaking treatment. Minimum inhibition in seed germination (2%), root

Table 1. Effect of *Fusarium moniliforme* (FM₃-S.29) on seed germination, seedling growth in maize seeds

Treatment	Germination (%)	% inhibition in seed germination	Root length (cm)	% inhibition in root length	Shoot length (cm)	% inhibition in shoot length
Control	80	-	21.63	-	6.85	-
8 hours soaking	78	2	14.58	32.59	6.80	0.72
12 hours soaking	75	5	11.96	44.70	6.79	0.87
16 hours soaking	73	7	10.75	50.30	6.78	1.02

length (32.59%), shoot length (0.72%) was noted after 8 hours of soaking in culture filtrate. Hence, it is concluded that decrease in percentage seed germination, root length and shoot length increases with increase in soaking period. This indicates that decreasing effect is directly related to concentration of phytotoxic chemical in culture filtrate. Van Asch et al. [4] observed the phytotoxic effect of FB₁, moniliformin and T-2 toxins on corn callus and found that FB₁ proved to be more phytotoxic than moniliformin and T-2 toxins. Doewert et al. [7] studied phytotoxic effect of FB₁ on the growth of germinating maize seedlings and found radical elongation and low PI amylase production in the germinating seed by the presence of FB₁, up to 100 ppm. Abbas et al. [8] found both AAL toxin and fumonisin B₁ caused electrolyte leakage and chlorophyll loss in the tomato leaf disc bioassay system. The present study inferred that fumonisin producing isolate of *F. moniliforme* has phytotoxic effects on seed germination and seedling growth in maize.

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Fig. 1. Comparative effect of fumonisin on root and shoot length in maize

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