

FUMONISIN PRODUCING ISOLATES OF *Fusarium moniliforme* ASSOCIATED WITH SORGHUM GRAINS DURING FIELD AND STORAGE**SHRADHA DIXIT^{a1}, SHIKHA DIXIT^b AND S. SINGH^c**^{abc}Department of Botany, Agra College, Agra, India**ABSTRACT**

In all 84 Isolates of *Fusarium moniliforme* were obtained from 160 samples of sorghum grains. 39 isolates (out of 84) were found to be toxic. The production of fumonisin B₁ from isolates of preharvest, postharvest and stored samples was recorded as 800-2200 ppb, 1000-2600 ppb, and 650-1700 ppb. The production of fumonisin B₂ (FB₂) from isolates of *Fusarium moniliforme* preharvest and postharvest samples ranged between 300-700 ppb and 200-550 ppb respectively. Interestingly, FB₂ was not detected in stored samples.

KEYWORDS : *Fusarium moniliforme*, Fumonisin, Sorghum

Mycotoxins are secondary metabolites of fungi that are harmful to both animals and human beings. The Fumonisin belong to a recent group of mycotoxins which were discovered in 1988 (Gelderblom et al., 1988 a) and chemically characterized by Benzuidenhout et al., (1988). Fumonisin are primarily produced by isolates of *Fusarium moniliforme* (Cawood et al., 1991).

Seven Fumonisin Viz., Fumonisin A₁, A₂, B₁, B₂, B₃, B₄ and C₁, have been isolated from *Fusarium moniliforme* cultures (Gelderblom et al., 1992) out of these, Fumonisin B₁ (FB₁) is highly toxic and most abundant representative of known fumonisins. Toxic effects of fumonisins have been reported on animals, human beings, plants and cell cultures (Ross et al., 1992; 1995; Bacon et al., 1995). Fumonisin have been associated with a number of diseases such as Porcine pulmonary edema (PPE). (Harrison et al., 1990), Liver and Kidney toxicity in rat (Riley et al., 1994; Gelderblom et al., 1996), Immunosuppression in Chickens (Marijanovic et al., 1991) and human oesophageal cancer in South Africa (Rheeder et al., 1992 Myburg 1998) and China (Chu and Li, 1994).

Fumonisin toxicity in fish brain was seen by Kovacic et al., 2009.

The reports clearly indicate that isolates of *Fusarium moniliforme* isolated from sorghum grains were able to produce fumonisin in variable amounts. This contamination is definitely harmful to human beings and animals, so an attempt has been made to screen isolates of *Fusarium moniliforme* obtained from sorghum grains for their ability to produce fumonisin.

MATERIALS AND METHODS

Samples of sorghum were collected from different localities of Agra region. These samples were assayed for the association of moulds following seed plating method (ISTA, 1966) using potato sucrose agar medium. Isolates of *Fusarium moniliforme* were isolated, then screening of isolates of *Fusarium moniliforme* for fumonisin producing potentiality was made by using moist maize medium following Albert et al., 1990. For this purpose, each isolate of *Fusarium moniliforme* was inoculated on sterilized moist maize medium contained in 250ml Erlenmeyer flasks. Five replicates of each isolate of *Fusarium moniliforme* were prepared and kept in a incubator at 25°C for 2 weeks and then at 10°C for an additional week. The cultures were harvested and dried at 55±1°C for 24 hours. After cooling, the content of each flask was ground with the help of mechanical blender. The Chemical extraction of fumonisin from these cultures of *F. moniliforme* was done following method outlined by (Cawood et al., 1991).

Qualitative analysis of fumonisin was done on silica gel G TLC plates by developing in solvent system of chloroform : methanol : acetic acid (6: 3 : 1) as suggested by (Cawood et al., 1991).

Chemical confirmation of fumonisin was done by spraying the TLC spotted plates with p-anisaldehyde spray [(0.5gm. of p-anisaldehyd. in methanol-acetic acid-sulphuric acid (8 : 10 : 5) and heated at 110°C)].

Quantitative estimation of fumonisin was done by "dilution to extinction" procedure (Jones, 1972)

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Table 1: Production of Fumonisin (FB₁ and FB₂) by Isolates of *Fusarium moniliforme* Isolated from Sorghum Grains

S. No.	Conditions	Total No. of Samples analysed	Total Number of <i>F.moniliforme</i> isolates screened	Number of toxigenic isolates	% occurrence of toxigenic isolates	Concentration of fumonisin B ₁ (in ppb)	Concentration of fumonisin B ₂ (in ppb)
1.	Preharvest	54	30	17	56.66%	800-2200	300-700
2.	Post harvest	48	22	10	45.45%	1000-2600	200-550
3.	Stored	58	32	12	37.50%	650-1700	-
	Total	160	84	39	46.42% (Mean Value)	650-2600	200-700

RESULTS AND DISCUSSION

84 isolates of *Fusarium moniliforme* were obtained from sorghum grains and screened for fumonisin production. Out of 84 isolates of *F. moniliforme* only 39 isolates were positive for fumonisin production. Out of 30 isolates of *F. moniliforme* obtained from preharvest condition, 17 were found to be toxigenic thereby showing 56.66% of toxigenic isolates.

The concentration of FB₁ and FB₂ was recorded as 800-2200 ppb and 300-700 ppb respectively. Highest concentration of FB₁ (2200 ppb) was produced by isolate S₁. P_R.25 and Highest concentration of FB₂ (700 ppb) was produced by S₁. P_R.25.

Further, 10 isolates (out of 22) of *Fusarium moniliforme* obtained from post harvest conditions were found to be toxigenic, there by indicating 45.45% toxigenic isolates. The FB₁ ranged from 1000-2600 ppb while FB₂ ranged from 200-550 ppb. The isolate S₂.Po.6 produced highest concentration of FB₁ (2600 ppb). On the other hand, highest concentration of FB₂ (550 ppb) was produced by isolate S₂.Po.16. Further, 12 isolates (out of 32) obtained from stored grains were found to elaborate fumonisin B₁ in range of 650-1700 ppb. Thus percentage of toxigenic isolates comes to 37.50%.

Interestingly no isolate from stored samples could produce FB₂ but isolate S₃.S.22 produced maximum concentration of FB₁ (1700 ppb).

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