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Screening of Sorghum Cultivars for the Elaboration of Zearalenone by Two Toxigenic Isolates of *Fusarium*

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Artificial infestation of *Fusarium moniliforme* (S_2.PR.49) and *F. sporotrichioides* (S_2.PR.57) was done on the ten sorghum varieties (CSV-1, CSV-10, CSV-11, CSH-1, CSH-5, CSH-9, SPV-475, SPV-775, SPV-678 and SPV-669). *Fusarium moniliforme* (S_2.PR.49) was able to produce maximum amount of zearalenone (960 ppb) on the sorghum variety CSH-9. While on the sorghum variety CSH-5 the minimum amount (110 ppb) of zearalenone was elaborated by the *F. sporotrichioides* (S_2.PR.57). Other varieties of sorghum were found to be resistant to zearalenone production.

Key Words : ***Fusarium moniliforme; F. sporotrichioides;*** **Sorghum; Zearalenone**

Introduction

Mycotoxin elaboration in food and feed items by various species of *Fusarium* are known to cause a number of serious disorders in animals. Various species of *Fusarium* produce zearalenone on different substrates in variable amounts. Being estrogenic in nature it is harmful to the human beings and animals (Blaney et al. 1984). Natural occurrence of zearalenone in maize, wheat, corn, sorghum and ragi are available from India and abroad (Scott et al. 1970, Shotwell et al. 1980, Sahay 1991, Ansari et al. 1991).

But the present paper deals with the screening of ten sorghum varieties for zearalenone production by two toxic *Fusarium* species *F. moniliforme* (S_2.PR.49) and *F. sporotrichioides* (S_2.PR.57).

Materials and Methods

Ten sorghum varieties (CSV-1, CSV-10, CSV-11, CSH-1, CSH-5, CSH-9, SPV-475, SPV-775, SPV-678 and SPV-669) taken from IARI, New Delhi, were used in this study. For this purpose 150 gm of sorghum sample from each variety was surface sterilized by 2% NaOCl. Then they were soaked in sterile distilled water for 2-3 hours to attain 50% moisture level in the seed. Each seed sample was taken in the Erlenmeyer flask and decanted to remove excess water. After sterilization each flask was inoculated with 2 ml spore suspension of toxic *Fusarium moniliforme* (S_2.PR.49) and *Fusarium sporotrichioides* (S_2.PR.57) separately. Each

set was run in triplicate. Similarly, was done with the toxic *Fusarium* species of *F. sporotrichioides* (S_2.PR.57). Incubation of flask with all the contents was done at 25±2°C for 2 weeks and then at 10±2°C for an additional week. Thereafter the contents of these flask were chemically analysed for zearalenone production using the method outlined by Swanson et al. (1984). For the fluorescence and identification of the zearalenone, extract of the sorghum seeds was spotted on the silica gel TLC plates. The plates were developed in the solvent viz, chloroform: acetone (9:1 v/v). After development of the plate, it was examined under short wave 254 nm UV light in a chromato view cabinet. The characteristic bluish green fluorescence spot at the Rf value similar to the corresponding standard zearalenone was used as visual detection criteria for zearalenone. The bluish green spot of zearalenone changed to yellowish brown spot when sprayed with 50% methanol in sulphuric acid and heated at 120°C for 10 minutes (Ishii et al. 1974). The quantitative estimation of zearalenone was made by "dilution to extinction" procedure (Jones 1972).

Results and Discussion

Perusal of table 1 indicates that zearalenone was synthesized by two different toxic *Fusarium* species in different amounts on the various varieties of the sorghum. *Fusarium moniliforme* (S_2.PR.49) produced zearalenone in maximum amount (960 ppb) on the sorghum variety CSH-9. It was followed by 480 ppb on the sorghum variety CSV-10, 360 ppb on the sorghum variety SPV-678 and the minimum amount (140 ppb) of zearalenone formation by this strain was observed on the sorghum variety SPV-775. Likewise, *Fusarium sporotri chioides* (S_2.PR.57) also supported the formation of zearalenone on two sorghum variety i.e. CSH-5 and CSH-9 in the amount of 110 and 560 ppb respectively.

Sorghum variety CSH-9 supported zearalenone production in maximum amount by the *F. moniliforme* (S_2.PR.49). Sorghum variety like CSH-1, CSH-5, CSV-1, CSV-11, SPV-475 and SPV-669 did support and zearalenone elaboration by the *F. moniliforme* (S_2.PR.49). Similarly, *F. sporotrichioides*

Table 1 *In vivo production of zearalenone by two toxic Fusarium species on various variety of Sorghum*

Fusarium species	Zearalenone formation in ppb on various sorghum variety										
	Sorghum Local variety	CSV-1	CSV-10	CSV-11	CSH-1	CSH-5	CSH-9	SPV-678	SPV-669	SPV-475	SPV-775
F.moniliforme (S_2.PR.49)	2400	-	480 ppb	-	-	-	960 ppb	360	-	-	140
F. sporotrichioides (S_2.PR.57)	1560	-	-	-	-	110	560	-	260	-	-

(S_2.PR.57) synthesized zearalenone on two sorghum variety CSH-5 and CSH-9. Rest of the sorghum variety CSH-1, CSV-1, CSV-10, CSV-11, SPV-475, SPV-775, SPV-678 and SPV-669 were not susceptible for the zearalenone elaboration.

Bilgrami et al. (1990) studied in the *in vivo* production of fusarial toxins on the varieties of maize and wheat by *F. graminearum*, *F. roseum* and *F. sporotrichioides* Sonalika variety of wheat favoured greater production zearalenone 1300 µg/kg than Kalyansona variety. Similarly, zearalenone elaboration was supported by Suwan composite variety of maize in the amount of 3600 µg/kg. Bilgrami et al. (1992) detected citrinin production in some high yielding varieties of paddy, wheat, maize and barley by *Penicillium citrinum*. But report regarding the *in vivo* production of zearalenone on various sorghum varieties by the *F. moniliforme* and *F. sporotrichioides* are not on record. Hence, this study will give an idea about the resistance of sorghum cultivars against zearalenone production. So far, this is the first report of screening sorghum varieties in relation to zearalenone production by toxic species of *Fusarium* in India.

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