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EFFECT OF FOOD PRESERVATIVES ON ZEAROLENONE PRODUCTION BY *FUSARIUM MONILIFORME*

RAJNI GUPTA
Department of Botany, University of Delhi, Delhi-110007, India.

From the sorghum grains a toxic strain of *F.moniliforme* was isolated and it was grown on sterilized moist rice medium and sorghum grains supplemented with sodium benzoate, sod-meta bi sulphide, potassium metabisulphide and pot-metabisulphite in varying amounts from 0.1% to 0.5%. Potassium meta bi sulphide was found to be most inhibitory agent followed by sodium benzoate and pot-meta bi sulphite at 0.2% concentration.Sodium meta bi sulphide was found to be least inhibitory in zearalenone production at 0.2% concentration. Reduction in zearlenone formation was noted at 0.2% concentration upto 95.0%, 89.1%, 88.3% and 85.8% by potassium meta bi sulphide, sod-benzoate, pot-meta bi sulphite and sod-meta bi sulphide on the moist rice medium.

Keywords : *Fusarium moniliforme*, Sorghum, Zearalenone

Introduction

Mycotoxins are elaborated from negligible to appreciable quantities in different food and feed commodities. Their consumption may lead to devastating results, not only in animals and humans but also in the plants and their ecosystem. So it is essential to minimize the concentration of mycotoxins to safe levels without affecting nutritive value of the treated commodities. Physical methods like harvesting and drying are not so adequate to prevent the agricultural commodities from mycotoxin risk. In the present investigation efforts have been made to inhibit the zearalenone elaboration by a isolate of *Fusarium moniliforme* using food preservatives.

Materials and Methods

One highly toxic isolate of *F.moniliforme* from sorghum grains was grown on moist rice medium supplemented with food preservatives i.e. sodium benzoate, sod.meta bi sulphide, potassium meta bi sulphide and pot.meta bi sulphite at the concentration of 0.1%, 0.2%, 0.3%, 0.4% and 0.5% following Scott *et al*[1]. The flasks were incubated for 2 weeks at 25 ± 2°C and for another week at 10 ± 2°C. Each set was run in triplicate. After incubation period, the content of each flask was dried in an oven at 55 ± 2°C for 24 hours. Chemical extraction of zearalenone from these cultures was done following the method outlined by Swanson *et al*[2]. Similar procedure was followed to study the effect of food preservatives on production of zearalenone by F.moniliforme on sorghum grains of a local cultivars. Chemical confirmation of this toxin was done by spraying the solution of 50% sulphuric acid in methanol. Quantification of zearalenone was done by following the "dilution to extinction" co-efficient method as described by Jones[3].

Table 1. Effect of food preservatives on zearalenone elaboration by *F. moniliforme*.

Food Preservatives	%cent conc.	Zearalenone Production (in ppb)		Percent inhibition in zearalenone production	
		Moist rice medium	Sorghum grains	Moist rice medium	Sorghum grains
Sodium benzoate	0.1	280	260	88.3	86.7
	0.2	260	180	89.1	90.8
	0.3	-	-	100.0	100.0
	0.4	-	-	100.0	100.0
	0.5	-	-	100.0	100.0
Sod. meta bi sulphide	0.1	460	440	80.8	77.5
	0.2	340	320	85.8	83.6
	0.3	260	240	89.1	87.7
	0.4	180	160	92.5	98.0
	0.5	-	-	100.0	100.0
Potassium meta bi sulphide	0.1	160	120	93.3	93.8
	0.2	120	90	95.0	95.4
	0.3	-	-	100.0	100.0
	0.4	-	-	100.0	100.0
	0.5	-	-	100.0	100.0
Pot. meta bi sulphite	0.1	360	320	85.0	83.6
	0.2	280	240	88.3	87.7
	0.3	120	100	95.0	94.8
	0.4	80	60	96.6	96.9
	0.5	-	-	100.0	100.0
Control	-	2400	1960		

Results and Discussion

Table 1 indicates that synthesis of zearalenone by *F.moniliforme* was checked to varying extent by food preservatives i.e. potassium meta bi sulphide, sodium benzoate, pot.meta bi sulphite and sodium meta bi sulphide was able to inhibit the zearalenone synthesis.

Potassium meta bi sulphide proved to be most potent inhibitor of zearalenone production. At 0.1% concentration of potassium meta bi sulphide 93.3 and 93.8% inhibition in zearalenone formation was recorded on moist rice medium and sorghum grains respectively. The growth of *F.moniliforme* was completely suppressed at the conc. of 0.3% potassium meta bi sulphide and the zearalenone formation could not be recorded. It was followed by sodium benzoate, which could reduce zearalenone synthesis upto 88.3% and 86.7% at 0.1% conc. on the moist rice medium and sorghum grains respectively. While at the 0.2% conc. of sod.benzoate 89.1 and 90.8% inhibition in zearalenone elaboration was recorded on both moist rice medium and

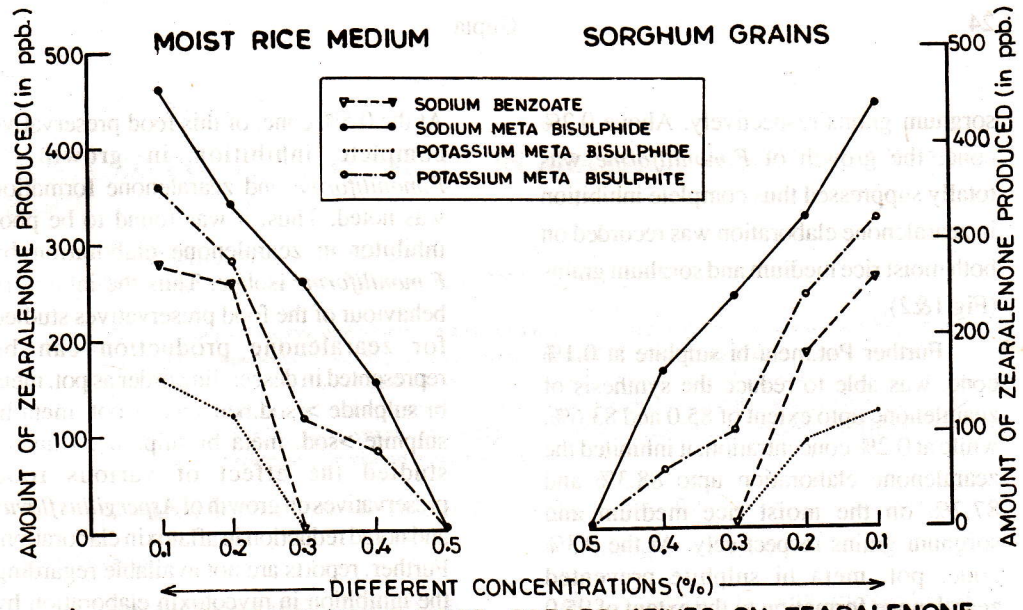

FIG. 1.: INFLUENCE OF SOME FOOD PRESERVATIVES ON ZEARALENONE PRODUCTION BY F. moniliforme (S_2-PR.49) ISOLATE ON MOIST RICE MEDIUM AND SORGHUM GRAINS

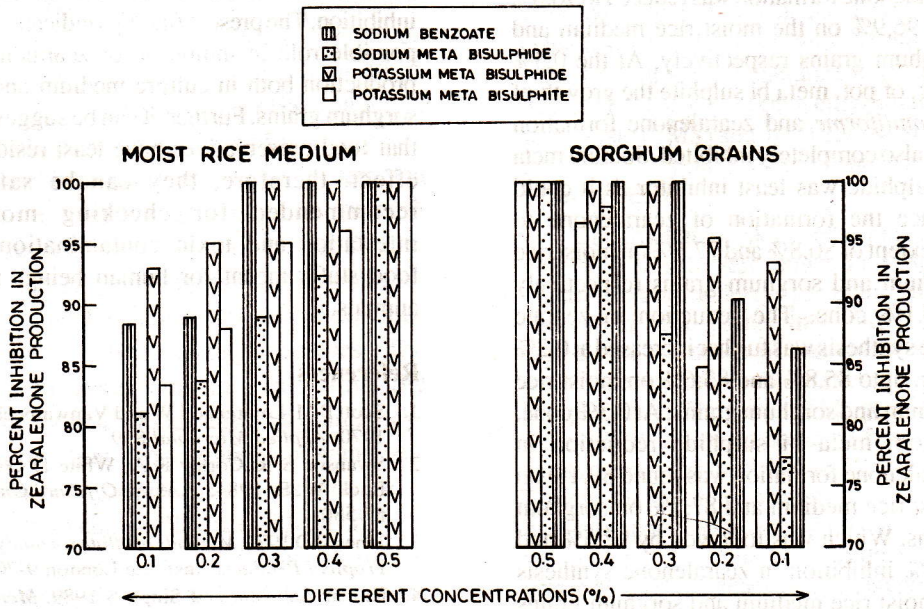

FIG. 2.: INHIBITION BEHAVIOUR OF SOME FOOD PRESERVATIVES ON ZEARALENONE ELABORATION BY F. moniliforme (S_2-PR.49) ON MOIST RICE MEDIUM AND SORGHUM GRAINS

sorghum grains respectively. Above 0.2% conc. the growth of *F.moniliforme* was totally suppressed thus complete inhibition in zearalenone elaboration was recorded on both moist rice medium and sorghum grains (Fig.1&2).

Further Pot.meta bi sulphite at 0.1% conc. was able to reduce the synthesis of zearalenone upto extent of 85.0 and 83.6%, while at 0.2% concentration, it inhibited the zearalenone elaboration upto 88.3% and 87.7% on the moist rice medium and sorghum grains respectively. At the 0.3% conc. pot. meta bi sulphite prevented zearalenone formation to the extent of 95.0 and 94.8% on both moist rice medium and sorghum grains respectively. However at the 0.4% conc of pot. meta bi sulphite zearalenone formation was reduced to 96.6% and 96.9% on the moist rice medium and sorghum grains respectively. At the 0.5% conc. of pot. meta bi sulphite the growth of *F.moniliforme* and zearalenone formation was also completely inhibited. Sodium meta bi sulphide was least inhibitor as it could reduce the formation of zearalenone to the extent of 80.8% and 77.5% on moist rice medium and sorghum grains respectively at 0.1% conc. The reduction in zearale none synthesis was further increased at 0.2% conc. upto 85.8% and 83.6% on moist rice medium and sorghum grains. At 0.3% conc. of sod. meta bi sulphide reduction in zearalenone formation was found 89.1% on moist rice medium and 87.7% on sorghum grains. Which was followed by 92.5% and 98.0% inhibition in zearalenone synthesis on moist rice medium and sorghum grains using 0.4% conc. of sod. meta bi sulphide. At the 0.5% conc. of this food preservative complete inhibition in growth of *F.moniliforme* and zearalenone formation was noted. Thus, it was found to be poor inhibitor in zearalenone elaboration by *F.moniliforme* isolate. Thus the inhibitory behaviour of the food preservatives studied for zearalenone production can be represented in descending order as pot. meta bi sulphide > sod.benzoate > pot. meta bi sulphite >sod. meta bi sulphide. Kumar[4] studied the effect of various food preservatives on growth of *Aspergillus flavus* and noted reduction in aflatoxin elaboration. Further, reports are not available regarding the inhibition in mycotoxin elaboration by the use of food preservatives. It is well known that food preservatives can reduce the mould growth but there is fragmentary information about their role in toxin inhibition. The present findings indicate their possible role in inhibition of zearalenone production both in culture medium and in sorghum grains. Further, it can be suggested that food preservatives have least residual effect, therefore, they can be safely recommended for checking mould infestation and toxin contamination in food stuffs meant for human beings and animals.

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