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Efficacy of Volatile Compounds and Food Preservatives to Control Terreic Acid Production by *Aspergillus terreus*

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Efficacy of common volatile substances and food preservatives to control growth and terreic acid production by *A. terreus* was evaluated. 2-Butanol followed by benzyl alcohol completely inhibited terreic acid production by *A. terreus*. Chloroform, ethyl acetate and isopropanol stimulated terreic acid production. Crystal violet and benzoic acid completely checked terreic acid production. Sodium acetate had no effect. No correlation existed between vegetative growth and terreic acid production by *A. terreus*.

Key Words - *Aspergillus* Preservative Terreic acid Volatile

Terreic acid is produced by *Aspergillus terreus* heptotoxic (Subramanian *et al.*, 1978) and is responsible for various health hazards. Though different methods have been suggested for the control of mycotoxin contamination such as the use of fungicides (Hesseltine, 1973), fatty acids (Priyadarshini & Tulpule, 1980) and plant extracts (Bilgrami *et al.*, 1980), no method is satisfactory. We tested the efficacy of certain volatile substances and food preservatives to control terreic acid production by *A. terreus*.

MATERIALS & METHODS *A. terreus* Thom, isolated from pearl millet (*Pennisetum americanum*) seeds, was grown in 50 mL mineral liquid medium (glucose 40g; $NaNo_3$ 2g; KCl 0.52 g; $MgSO_4$ $7H_2O$ 0.52g, KH_2PO_4 1.52g; and distilled water 1 L; pH 6.5) kept in 250 mL Erlenmeyer flask and incubated at 27-29°C for 15 days. After 2 days incubation, glass vial (5 mL capacity) containing 1 mL of volatile substance was inserted. Water in place of volatile substance served as control. The mycelium was separated after 15 days of incubation, on previously dried and weighed whatman filter paper No.42. Filter papers alongwith the mycelium were dried at 60-70°C for 48 h and weighed to a constant weight after cooling to room temperature in a desicator.

Some common food preservatives were added to the medium aseptically and their effect on growth and terreic acid production by *A. terreus* was evaluated.

Terreic acid was extracted from culture filtrate after adjusting the pH to 2. with equal volume of ethyl acetate and estimated colorimetrically using Folin reagent (Subramanian *et al.*, 1978). The extract was reduced to 10 mL by flash evaporation. To 0.5 mL of extract, 1 mL of Folin reagent and 2 mL of 20% Na_2CO_3 solution were added, diluted to 10 mL with water and incubated for 15 min at 30± 1°C. The intensity of blue colour was read at 620 nm.

RESULTS & DISCUSSION Most of the volatile substances were effective in reducing terreic acid production by *A. terreus* (Table 1) 2-Butanol followed by benzyl alcohol inhibited terreic acid production to a great extent. Reddy & Reddy (1984) reported the efficacy of acetic acid and ethanol in the inhibition of patulin production by *A. terreus*. Chloroform followed by ethyl acetate and isopropanol stimulated terreic acid production. Other volatile compounds inhibited terreic acid production to different levels. No correlation existed between mycelial growth and terreic acid production. For instance, benzyl

Table 1 Effect of Volatile Substances on Vegetative Growth and Terreic Acid Production by *A. terreus*

Volatile Substance	Dry weight (mg/ml)	Terreic acid (ppb)
Benzyl alcohol	9	58
Chloroform	8	158
Cyclohexane	9	116
Ethyl acetate	8	151
Iso amyl alcohol	7	133
Iso propanol	8	150
2-Butanol	9	56
4-Dioxan	10	79
2-Methyl propan-2-ol	13	70
2-Methoxy ethanol	12	91
Petroleum spirit	12	93
Control	11	140

Table 2 Effect of Food Preservatives on Growth and Terreic Acid Production by *A. terreus*

Food preservative	Concentra--tion (mM)	Dry weight (mg/ml)	Terreic acid (ppb)
Acetone	272	10	129
	816	9	123
	1360	9	112
Boric acid	16.2	16	126
	48.5	14	122
	80.8	12	94
Benzoic acid	0.0040	10	87
	0 0081	10	84
	0 0245	–	–
Crystal violet	0.0001	10	42
Sodium acetate	12 2	13	135
	36.5	12	117
	60.9	8	108
Sodium metabisulphate	2 6	10	78
	5.2	9	62
	10.5	–	–
Control	–	11	140

alcohol and 2-butanol supported almost same amount of mycelial growth and terreic acid production. But isoamyl alcohol did not support growth but favoured significant amount of terreic acid production. 2-Methyl Propan - 2-ol which stimulated mycelial growth reduced the synthesis of terreic acid.

Benzoic acid was effective in the control of terreic acid production even at 0.0245 mM (Table 2). Similarly crystal violet was effective in checking terreic acid production at 0.0001 mM. Lal & Kapoor (1980) also reported the inhibitory effect of food preservatives on the development of *Aspergillus* species in stored maize. Sodium metabisulphate and acetone were effective in checking terreic acid production. Sodium acetate followed by boric acid inhibited terreic acid production at high concentration (60.9 and 80.8 mM). Benzoic acid and sodium metabisulphate completely suppressed the growth of *A. terreus* at 0.0245 mM and 10.5 mM, respectively.

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