

COMMUNICATION TO THE EDITOR

Detoxification of Aflatoxin-Contaminated Corn by Roasting

TO THE EDITOR:

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Roasting has been demonstrated to lower significantly the concentration of aflatoxin in peanuts and pecans. Levels of aflatoxin B₁ have been reduced by about 50 to 70%, depending on the initial levels and on the type and temperature of roasting (1,2).

The roasting process has been applied to corn-containing aflatoxin with similar results. Roasting was carried out in two commercial corn roasters. One (A) is an electrically heated continuous cooker with a capacity of about 150 lb/hr of corn, manufactured by Mix-Mill, Inc., Bluffton, IN. The second roaster (B) is gas-fired and continuous with an hourly capacity of 5000 to 6000 lb of corn (Jo-Fran Roaster Model 6700, manufactured by Jo-Fran, Inc., Ventura, IA). Data in Table I show that reductions of 40 to 80% aflatoxin can be attained by a single passage of corn through a continuous roaster.

Two points need to be emphasized here. First, none of the samples of Table I have had the aflatoxin level lowered below the FDA guideline of 20 ppb (total aflatoxin, B₁, B₂, G₁, G₂) except possibly the sample from roaster A that was roasted at 165°C, reducing B₁ from 80 to 18 ppb. Second, it has not been demonstrated by feeding studies that the reduction in aflatoxin chemical assay by roasting is accompanied by an equivalent reduction in biological activity.

TABLE I
Effect of Roasting on Reduction of Aflatoxin in Contaminated Corn

Treatment	Aflatoxin B ₁		Reduction %
	Initial level ppb	Final level ppb	
Roaster A			
145°C ^a	877 (6) ^b	452 (8)	48
165	877 (6)	300 (8)	66
145	378 (7)	213 (8)	44
165	378 (7)	159 (8)	58
145	133 (4)	80 (4)	40
165	133 (4)	50 (4)	62
145	80 (6)	25 (6)	69
165	80 (6)	18 (6)	77
Roaster B			
150	270 (2)	51 (2)	81

^aTemperature of corn.

^bFigures in parentheses represent number of replicates.

TABLE II
Effect of Ammonia Temper Plus Roasting on Reduction
of Aflatoxin in Contaminated Corn

Treatment	Aflatoxin B ₁		
	Initial level ppb	Final level ppb	Reduction %
Roaster A			
I Temper to 20% moisture, 0.5% NH ₃ , 165° C	214	93	57
II Retemper I to 20%, 0.5% NH ₃ , 165° C	...	14	93
III Retemper II to 20%, 0.5 NH ₃ , 165° C	...	13	93
Roaster B			
I Temper to 20% moisture, 0.5% NH ₃ , 145° C	270 (2) ^a	28 (2)	90
II Retempered I to 20% moisture, 0.5% NH ₃ , 145° C	...	3 (2)	99

^aFigures in parentheses represent number of replicates.

The use of ammonia to decontaminate corn containing aflatoxin has been established as a successful procedure by this Center (3,4). This method involves treatment of corn at 17–18% moisture with 1.5% ammonia for a period of 14 days. In our roasting studies, experiments were conducted which showed that aflatoxin in contaminated corn, tempered to 20% moisture with aqua ammonia diluted to give 0.5% NH₃, db, held for 3 hr and then passed through the corn roaster, was significantly reduced (Table II). When the corn was retempered as described above and again passed through the roaster, further reduction in aflatoxin resulted. Reductions in excess of 90% were achieved.

It thus appears that tempering aflatoxin-contaminated corn with aqua ammonia followed by roasting may be a simple and effective route to decontamination of the corn. Further work on this process is underway to investigate such factors as ammonia level, tempering time, and roasting temperature. Feeding trials to evaluate the biological activity of the decontaminated corn are planned.

The mention of firm names or trade products does not imply that they are endorsed or recommended by the U.S. Department of Agriculture over other firms or similar products not mentioned.

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