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Research Note

On the Interaction between Tannins and Aflatoxin B_1 in Sorghum

Grain sorghum is an important cereal of the tropics and is used there extensively for human food. Relatively small but not insignificant amounts are also imported into the UK for feed purposes. Sorghum may be attacked by *Aspergillus flavus* and the closely related *A. parasiticus*, two fungi which may produce aflatoxin (Cole & Cox, 1981; Betina, 1984).

Recent studies in this laboratory have shown that the tannin content of sorghum grain affects the recovery of aflatoxin B_1. The tannin contents were determined by the modified vanillin-hydrochloride method (Price *et al.*, 1978) and aflatoxin B_1 by the usual method employing thin-layer chromatography (Horwitz, 1975).

The varieties of sorghum used in this study were as follows: white, cream and red varieties purchased in the market in Ibadan, Nigeria.

HP3 and Ex-Bauchi varieties obtained from the Institute of Agricultural Research, Ahmadu Bello University, Zaria, Nigeria.

Dabar and Safra varieties were obtained from the Sudanese Agricultural Research Co-operative in Karthum.

For each test, 10 g of the milled sample was contaminated with a given amount of pure aflatoxin B_1 (Uniscience Ltd., Cambridge).

Figure 1 shows two graphs of the percentage recovery of aflatoxin B_1 against mixtures of Nigerian white sorghum and HP3 variety. The former contained $0{\cdot}89 \pm 0{\cdot}014$ mg/g of tannin as catechin equivalent, the latter $1{\cdot}97 \pm 0{\cdot}042$ mg/g ($n = 2$). It is apparent that aflatoxin recovery decreased with an increasing proportion of HP3 (original aflatoxin concentrations, 106 μg/kg and 1337 μg/kg).

Table 1 shows the tannin content as catechin equivalent of seven varieties

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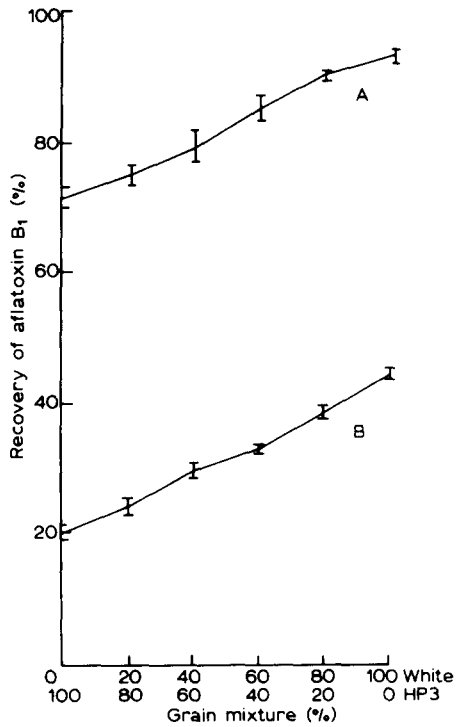

Fig. 1. Recovery of aflatoxin B_1 from mixture of sorghum varieties 'White' and HP3. A. Initial level of 1337 μg/kg. B. 106 μg/kg.

TABLE 1

Recovery of Aflatoxin B_1 (%) and Tannin Contents (mg/g catechin equivalent) of Seven Sorghum Varieties. Mean ± SD, $n = 2$

Variety	*Tannin content (mg/g)*	*Aflatoxin B_1 recovery (%)*	
		Original level (106 μg/kg)	*Original level (1117 μg/kg)*
Dabar	0·80 ± 0·000	48·01 ± 0·30	92·50 ± 1·17
White	0·89 ± 0·014	46·66 ± 1·01	90·84 ± 1·18
Safra	0·90 ± 0·000	42·18 ± 0·11	87·50 ± 1·17
Cream	1·00 ± 0·000	41·71 ± 1·80	85·00 ± 2·38
Red	1·10 ± 0·057	39·05 ± 0·65	81·67 ± 2·35
Ex Bauchi	0·69 ± 0·049	33·90 ± 1·15	75·84 ± 1·18
HP3	1·97 ± 0·042	19·72 ± 1·90	68·34 ± 2·36

of sorghum together with the aflatoxin B_1 recovery at an original concentration of 106 μg/kg and 1117 μg/kg.

In all instances, except the Ex-Bauchi variety, there is a direct relation between tannin content and aflatoxin recovery. (Why this one variety behaves differently is at present unknown.) At the original concentration of aflatoxin B_1 of 106 μg/kg, the correlation coefficient between aflatoxin recovery and tannin content was $r = -0{\cdot}88$. At the original concentration level of 1117 μg/kg, $r = -0{\cdot}975$.

There is therefore some evidence to suggest that aflatoxin recovery is affected by tannin content. This may lead to a significant underestimation of the aflatoxin in products containing tannins.

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