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A Note on the Effect of Malt Pretreatment on Tannin Content of Sorghum Flour

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Abstract: Samples of one, two and three days old sorghum malt were added in concentrations of 1%, 2.5%, 5%, 7.5% and 10% to the sorghum flour of the cultivar Wadahmed (0.96% tannin). The mixtures were incubated for 0, 30, 60, 90 and 120 minutes to determine reduction in tannin content. The results indicated that the treatments significantly decreased the tannin content. The 10% three days old malt treatment reduced the tannin content by 91.5%, after 120 minutes. The results also indicated that the rate of reduction of tannin content increases with the time of incubation, the age and the concentration of the malt.

One of the important factors that affect the nutritional quality of sorghum is the presence of tannin whose biological effects in humans and animals vary considerably. Tannins affect the growth of animals in three ways: (i) they have an astringent taste which affects the palatability and decreases feed consumption, (ii) they form complexes with proteins and reduce their digestibility, and (iii) they act as enzyme inactivators. Realising the antinutritional effects of tannins, many attempts were made to reduce its content in sorghum (Daiber and Taylor 1982; Babiker and El Tinay 1993; Elsheikh and Mohammedzein 1998). These attempts included (i) removal of seed testum and pericarp, (ii) inactivation of the seed tannin, (iii) the use of alkaline solution, (iv) the use of fertilizers, (v) fermentation, and (vi) sprouting. The main disadvantages of these methods are the long time required for each method; and some methods require chemicals, which increase the cost and adversely affect the organoleptic quality of sorghum food products. Thus, the objective of this work was to investigate the effect of sorghum malt on the tannin content of sorghum flour in a short period of time.

Seeds of the sorghum cultivar Wadahmed (high in tannin: 0.96%) were

obtained from Sennar Research Station, Sudan. They were carefully cleaned, freed from dirt and husked and germinated according to Bhise *et al*. (1988). The germinated seeds were sun-dried, and the root portions were manually removed. The seeds were milled into fine flour to pass 0.4 mm sieve and kept at 4°C.

One, two and three days old sorghum malt was added to the sorghum flour in the following concentrations: 1%, 2.5%, 5%, 7.5% or 10% in triplicate. Samples were shaken for 30 min and then mixed with water, 1:2 (w/v), and incubated (at room temperature) in a shaker for 0, 30, 60, 90 and 120 min. The samples were dried at 70°C and finely ground.

The tannin content of all samples was estimated on dry weight basis by the modified procedure of vanillin-HCl method, according to Price *et al*. (1978). The samples were analysed in triplicate and figures were averaged. Statistical analysis was carried out using the analysis of variance and the percentage reduction in tannin content was calculated.

Sorghum malt reduced the tannin content of sorghum flour (Table 1). There was significant decrease with time of incubation and concentration of sorghum malt. The results clearly show that 10% sorghum malt significantly decreased the tannin content of sorghum flour compared to all other treatments; and the reductions were 72%, 80% and 91.5% for one, two and three days old malt, respectively, after incubation for two hours. The reduction of tannin, caused by the addition of malt, is likely due to the activation of tannin degrading enzyme (s) inherent to the sprouted seeds.

The method described in this work overcomes all the shortcomings of other methods; and the main advantages of this method are (i) rapid, not time consuming, (ii) easy to handle, (iii) does not require the removal of the excess chemicals, and (iv) efficient (e.g., 10% malt reduces the tannin content by more than 90% in two hours).

It could be concluded that utilization of sorghum malt to lower tannin content is a promising, simple method for reducing tannin content of sorghum flour.

The rate of reduction depends upon the age of the malt, incubation time and the concentration of the malt. The addition of malt to sorghum flour could be part of the process of preparing fermented sorghum food products.

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Table 1. Effect of malt pretreatment of sorghum flour on tannin reduction (%)*

	Sorghum malt concentration (%)														
	First day malt					Second day malt					Third day malt				
Incubation time (min)	1%	2.5%	5%	7.5%	10%	1%	2.5%	5%	7.5%	10%	1%	2.5%	5%	7.5%	10%
0	0a	0a	0a	0a	0a	0a	0a	0a	0a	0a	0a	0a	0a	0a	0a
30	2.5b	6.0b	12.5b	13.0b	18.0b	4.0b	12.0b	14.5b	16.5b	21.0b	6.25b	12.5b	17.5b	19.5b	23.0b
60	5.0c	12.5c	23.0c	26.0c	31.5c	8.5c	21.0c	29.5c	33.5c	39.0c	12.5c	23.0c	35.0c	42.0c	46.5c
90	7.0d	18.5d	37.0d	39.5d	52.0d	13.0d	29.0d	45.0d	50.5d	62.0d	18.0d	37.0d	55.0d	58.0d	68.0d
120	10.0e	25.0e	49.5e	52.5e	72.0e	17.5e	41.0e	60.0e	67.5e	80.0e	25.0e	49.5e	70.0e	81.0e	91.5e

* Tannin content of sorghum flour at zero time = 0.96%

Values in a column sharing the same superscript letter are not significantly ($P \leq 0.05$) different as determined by Duncan's multiple range test

Approved