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## Proximate Chemical Composition of Acha (*Digitaria exilis*) Grain

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*Digitaria exilis* Stapf is an annual cereal plant indigenous to West Africa where it is cultivated for its straw and edible grains. The plant grows well on poor, sandy or ironstone soil in areas of low rainfall. In northern Nigeria the grain of *D. exilis*, commonly called Acha or hungry rice, is harvested 3–4 months after sowing. Acha is one of the staple cereal foods in northern Nigeria during the dry season. Acha grain can be ground into flour and used to prepare local beverages; it can also be cooked in various forms with fish, meat, legumes or vegetables. The grains are also used to prepare feeds for domestic animals.

We have chemically analysed the proximate composition of acha grain as part of its nutritional evaluation.

Acha grains purchased in Jos markets were dried at 60°C to constant weight (AOAC 1975) and milled into fine powder. The total ash, crude lipid and crude protein ( $N \times 6.25$ ) were determined according to the recommended AOAC (1975) procedures. Crude fibre estimation was according to Joslyn (1970). A Gallenkamp automatic adiabatic bomb calorimeter was used for caloric value estimation. Mineral elements were determined using an atomic absorption spectrophotometer. Amino acid composition was estimated by the procedure of Spackman *et al* (1958), tryptophan according to Mba *et al* (1974) and cysteine by the procedure of Gaitonde (1967).

The proximate composition of acha is shown in Table 1 and its amino acid composition in Table 2. The very low moisture content ( $38.0 \text{ g kg}^{-1}$ ) suggests that acha loses a considerable amount of water during storage resulting in a longer shelf life. The crude lipid value is higher than the reported values for polished and unpolished rice, wheat and barley but lower than the values for maize, millet and sorghum (Oyenuga 1968). The protein content of acha ( $69.6 \text{ g kg}^{-1}$ ) is low compared with rice, millet, maize and sorghum (FAO 1968; Oyenuga 1968). The

TABLE 1

Proximate composition of acha (*Digitaria exilis*) (moisture content  $38.0 \pm 0.6$  g kg<sup>-1</sup> fresh weight; mean of three different determinations  $\pm$  SD)

Component	g kg <sup>-1</sup> DM	Component	mg kg <sup>-1</sup> DM
Crude lipid	21.0 $\pm$ 1.0	Potassium	1090.0 $\pm$ 6.3
Crude protein	69.6 $\pm$ 2.0	Sodium	56.4 $\pm$ 0.4
Crude fibre	10.2 $\pm$ 2.0	Calcium	75.6 $\pm$ 0.2
Nitrogen-free extract	874.8 $\pm$ 5.0	Magnesium	849.0 $\pm$ 4.0
Total ash	24.4 $\pm$ 0.3	Manganese	24.0 $\pm$ 0.1
		Iron	133.6 $\pm$ 0.3
		Zinc	42.3 $\pm$ 0.01
		Copper	1.76 $\pm$ 0.01
		Lead	0.21 $\pm$ 0.01

TABLE 2

Amino acid composition of acha (*Digitaria exilis*) (g per 16 g N; mean of three determinations  $\pm$  SD)

Amino acid	Acha	FAO (1970) reference protein
Isoleucine	1.39 $\pm$ 0.03	4.20
Leucine	4.49 $\pm$ 0.02	4.20
Lysine	1.93 $\pm$ 0.01	4.20
Methionine	3.02 $\pm$ 0.02	2.20
Threonine	1.93 $\pm$ 0.02	2.80
Phenylalanine	2.34 $\pm$ 0.01	2.80
Valine	2.37 $\pm$ 0.01	4.20
Tyrosine	0.95 $\pm$ 0.01	2.80
Tryptophan	0.90 $\pm$ 0.03	1.40
Cysteine	3.00 $\pm$ 0.04	2.00
Arginine	1.33 $\pm$ 0.02	
Histidine	1.35 $\pm$ 0.02	
Alanine	4.22 $\pm$ 0.01	
Serine	2.20 $\pm$ 0.03	
Proline	3.22 $\pm$ 0.02	
Glycine	1.93 $\pm$ 0.01	
Glutamic acid	6.93 $\pm$ 0.04	
Aspartic acid	3.53 $\pm$ 0.02	

total ash value for acha is within the range 10.9–31.3 g kg<sup>-1</sup> reported for millet, wheat, oats, sorghum and maize (FAO 1968; Oyenuga 1968). The crude fibre content of acha is lower than in sorghum and maize but higher than the values for millet and rice (Oyenuga 1968). The calorific value of acha (4102.2  $\pm$  83.0 kcal, 17.164  $\pm$  0.347 MJ kg<sup>-1</sup>) compares well with the values (3340.0–4137.9 kcal, 13.975–17.313 MJ kg<sup>-1</sup>) reported for most cereals (FAO 1968; Oyenuga 1968). Acha is richer in calcium, magnesium, iron and copper than most cereals but poorer in potassium, sodium, lead and manganese (FAO 1968; Oyenuga 1968).

With the exception of methionine the essential amino acid content of acha is lower than in maize, rice, sorghum, millet, wheat, barley and oats (Oyenuga 1968). The leucine, methionine and cysteine values in acha are slightly higher than the values in the FAO reference protein (FAO 1970).

The results indicate that acha is a cheap source of carbohydrate for man and livestock, particularly in dry, infertile areas in the tropics. It should be complemented, however, with protein-rich foods to make a balanced diet.

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