Proximate Composition, Antinutritional Factors and Protein Fractions of Guar Gum Seeds as Influenced by Processing Treatments

Majed B. Ahmed¹, Rashed A. Hamed¹, Mohamed E. Ali², Amro B. Hassan² and Elfadil E. Babiker¹
¹Department of Food Science and Technology, Faculty of Agriculture, University of Khartoum, Khartoum North 13314, Shambat, Sudan
²National Center for Research, Environment and Natural Resource Research Institute (ENRRI), P.O. Box 6096, Khartoum, Sudan

Abstract: The proximate composition, antinutritional factors and protein fractions of guar seeds were studied before and after autoclaving, soaking followed by dehulling and germination treatments. Chemical composition was varied between the treatments. Soaking of seeds followed by dehulling significantly increase protein content to 67.8%. Germination of seeds increased tannin and phytic acid content of the seeds. Polyphenols were fluctuating during processing. Albumin fraction of the seeds was decreased; prolamin and globulin were fluctuated during processing while glutelin was greatly increased.

Key words: Guar gum, phytate, tannin, polyphenols, protein fractions

Introduction
It is well recognized that food grain legumes, such as common beans, lentils and kidney beans, represent the main supplementary protein source in cereal and starchy food-based diets consumed by large sectors of the population living in developing countries. Although, the nutritional value of these legumes is of great importance, their intake is unfortunately lower than what is desirable. Furthermore, food grain legumes should be free of antipholysiological substances, have high nutrient bioavailability and be easily processed into edible, acceptable products (Bressani, 1989; Bressani, 1993). The nutritional value of grain legumes, not always fully understood and accepted by consumers, is divided here into two large groups: positive and negative factors. The positive factors include high protein and lysine content, which allows legumes to serve as excellent protein supplements to cereal grains (Bressani, 1989; Bressani, 1993). The health-related value of beans includes their positive effect on blood cholesterol and glucose levels (Walker, 1982; Leeds, 1982), possibly through the dietary fiber present in beans. The negative factors fall into two groups. Antinutritional factors such as enzyme inhibitors, flatulence factors, polyphenols, tannin and phytic acid. The other negative nutritional factors include protein, carbohydrate digestibility and sulfur amino acid deficiency (Bressani, 1989; Bressani, 1993). Legumes such as lentil contain a high concentration of proteins, carbohydrates and dietary fiber and make an important contribution to human diet in many countries. Legumes have to be processed prior to consumption due to their content of antinutritional compounds, such as trypsin inhibitors, phytic acid, •-galactosides (Vidal-Valverde et al., 2002). Processing techniques such as soaking, cooking, germination and fermentation have been found to reduce significantly the levels of phytates and tannins by exogenous and endogenous enzymes formed during processing (Mosha and Savanberg 1990; lorr and Savberg 1995; WHO, 1998). The objective of this study was to investigate the effect of different processing methods on antinutritional factors and protein fractions of guar seeds.

Materials and Methods
Guar seeds were obtained from the Department of Crop Production, Faculty of Agriculture, University of Khartoum, Sudan. The seeds were cleaned and freed from foreign matters and milled in a laboratory miller to pass through a 0.4 mm screen. Unless otherwise stated all chemicals used in this study were of reagent grade.

Processing treatments
Soaking: The seeds were soaked in water for 18 h. Then the soaked seeds were dried at 60°C and ground to pass a 0.2 mm screen.

Dehulling: The seeds were soaked in water for 18 h and then hand pounded to separate the hull. The dehulled seeds were then dried at 60°C and ground to pass a 0.2 mm screen.

Autoclaving: The seeds were ground to pass a 0.2 mm screen and autoclaved at 110°C for 10 min.

Germination: The whole seeds were spread on trays lined with cloth. It was kept wet by frequent spraying of water. After 36 h the germinated seeds were removed from the trays, sun-dried and ground to pass a 0.2 mm screen.