

# Biochemical Studies On Sorghum

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## Abstract

The present research work was carried out to eliminate the anti-nutritional factors (ANFs) associated with sorghum grains and to improve iron and zinc bioavailability and protein digestibility by different treatment. In order to achieve the previous aims, the three sorghum varieties named; Dorado, Shandaweel-6 and Giza-15 were subjected to physical, chemical, in vitro biological and technological evaluation. Regarding the physical evaluation, Giza-15 variety was the highest variety in 1000 kernel weight, hectoliter and extraction of whole flour. Regarding the chemical evaluation and ANFs Shandaweel-6 was the highest variety in crude protein content and crude fiber. Dorado was the highest variety in fat and ash. After treatments, the different proximate analysis were decreased related to the untreated sorghum. Dorado, Shandaweel-6 and Giza-15 had the highest amount of vanillic acid, ferulic acid, and protocatechuic acid respectively. Shandaweel-6, Dorado and Giza-15 had the highest amount of luteolin, kaempferol and catechin, respectively. After treatments, phenolic acids, flavonoids, tannins, antioxidant activity and phytate were decreased. After soaking and germination, the phyt/Fe molar ratios were increased while the phyt/Zn molar ratios were decreased. After soaking and germination protein solubility was significantly increased while, after cooking and fermentation protein solubility was significantly decreased. Regarding protein fractions, there was an increase in albumin and kafirins proteins after soaking. After cooking, there was a decrease in albumin and kafirins proteins. While, after germination and fermentation there was an increase in albumin, globulin and kafirin proteins. Shandaweel-6 was the highest variety in protein solubility. Shandaweel-6 and Giza-15 were the highest variety in water holding capacity (WHC) and oil holding capacity (OHC), respectively. After cooking and fermentation, there was a significant increase in WHC. After germination, there was a significant increase in OHC. Regarding to the in vitro biological evaluation, protein digestibility was significantly improved as a result of soaking and germination treatments especially for Giza-15. Also, iron and zinc bioavailability was significantly improved because of soaking, germination and fermentation treatments. Giza-15 was the highest variety in iron bioavailability after germination and fermentation treatments. While, Shandaweel-6 was the highest variety in zinc bioavailability after germination treatment. Regarding, technological evaluation, sorghum biscuits had the acceptable color. After treatments, there were non significant differences between treatments in taste comparing to wheat biscuit. Hardness of sorghum biscuits was lower than wheat biscuit except for germination treatment

**Keywords:** Sorghum; Soaking; Cooking; Germination; Fermentation; Phytate; Phenols; Protein digestibility; Bioavailability of iron and zinc.