

Effect of various Processing Techniques on Nutritional, Biological, Techno-functional, Structural, and Molecular Interactions of Fingermillet (*Eleusine coracana*)

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The impact of different processing techniques on the characteristic changes of Finger millet flour was assessed. It provides additional knowledge of the functionality of Finger millet and will increase its utilization and potential in the food industry and contribute to a better food security. Anti-nutritional factors, *in vitro* protein and starch digestibility and *in vitro* protein bio-accessibility, molecular and structural interactions of soaked, germinated, fermented and a combination of aforesaid treatments of grains were studied. Alterations of processed Finger millet's techno-functional properties were determined as water absorption capacity, water solubility index, oil absorption capacity, paste clarity, swelling power, emulsion activity, emulsion stability, and viscosity. Scanning Electron micrographs and Fourier Transform Infrared spectroscopy revealed structural variations and macromolecular arrangement of processed Finger millet. soaking, fermentation, and the treatment combination showed a reduction pattern of tannin and phytate contents. But saponin content was increased ($p < 0.05$) with time in the germinated Finger millet sample (2.03 – 2.50%). All bioprocess techniques increased *in vitro* starch digestibility (6.18 to 9.95 g/100 g) and *in vitro* protein digestibility (65.68 to 90.56 g/100 g). Soaking, germination, fermentation, and treatment combination significantly increased ($p < 0.05$) water sorption isotherm and oil absorption capacity than the control sample and slightly modified the swelling power, emulsion capacity, and emulsion stability of finger millet flour while water absorption capacity, paste clarity and viscosity were decreased. Among all treatments, the combination of soaking, germination, and fermentation greatly improved most of the functional properties of flour with reduced antinutrients. A combination of treatments could enhance the use of finger millet in novel food products development. And the results are suggesting that processed flour could serve as potential ingredients with improved techno and bio functionality in value-added cereal products such as noodles, cookies, biscuits, and muffins.

Keywords: Fermentation, Germination, Saponin, Soaking, Tannin