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Revealing the Novel Biochemical and Physicochemical Transformations for Finger Millet (*Eleusine coracana*) During Malting and Lactic Acid Fermentation

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Abstract

Malting and fermentations are important food processing procedures for the value addition of cereals and millets. In this study, finger millets (Eleusine coracana) were used as raw materials to evaluate the effects of malting as well as Lactiplantibacillus plantarum-mediated fermentation. The changes in biochemical and physicochemical attributes of the four different finger millet products in powder form, unmalted unfermented millet (UM-UF), unmalted fermented millet (UM-F), malted unfermented millet (M-UF), malted fermented millet (M-F) were analyzed. The results showed that the malting process increased the content of reducing sugars and the fermentation increased the acidity in the millet. Infrared spectroscopy indicated significant changes in the functional groups of the samples during lactic acid fermentation. The X-Ray diffraction studies showed that the lactic acid fermentation decreased the crystalline properties of the starch molecules in the millet sample. Thermogravimetric analysis revealed a total weight loss of 76.81% in UM-F through the whole temperature scan (25ºC to 800 ºC, 5°C per minute) and is relatively more stable than UM-UF which had a weight loss of nearly 83.89% in the same experimental conditions. Interestingly, malting and fermentation together could reduce the spiked pesticides, lindane, and chlorpyrifos from the initial content of 330.83 ppb and 295.12 ppb in the finger millets to 44.44 ppb (86.53% reduction) and 12.13 ppb (95.88% reduction), respectively. In silico analysis predicted the involvement of alcohol dehydrogenase and alkaline protease of L. plantarum in the degradation of lindane and chlorpyrifos.