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Safety, nutritional and sensory quality of fermented and refractance window dried amaranthus cruentus l. leaves

Rachel Byarugaba[1], Dorothy Nakimbugwe[2], Susanne Huyskens-Keil[3]

[1] *Humboldt-Universität zu Berlin, Thaer-Institute - Div. Urban Plant Ecophysiology, Germany*
[2] *Makerere University, Dept. of Food Technology and Nutrition, Uganda*
[3] *Humboldt-Universität zu Berlin, Thaer-Institute - Div. Urban Plant Ecophysiology, Germany*

Abstract

Processing and other value-addition activities are poorly developed in the African Indigenous Vegetables (AIV) value chain. Consumer concerns about health coupled with the growing shift in consumer behaviour and diets necessitates innovations in the AIV value chain to ensure wider utilisation and acceptability of AIV products. The purpose of this study was to determine the effect of fermentation and refractance window drying on leaves of *Amaranthus cruentus* L. The study identified the processing conditions for safe and shelf-stable leaf amaranth products, evaluated the nutritional composition and quality as well as the sensory acceptability of peanut sauce, a commonly consumed dish in East Africa, enriched with the products. Leaves that were harvested at 9 and 12 weeks after sowing were subjected to spontaneous and culture assisted fermentation using Leuconostoc carnosum and Lactiplantibacillus plantarum at 25 and 30 °C for 0, 24, 48, 72, 96, 120, 144 and 168 h. Refractance window drying was conducted on both fermented and non-fermented leaves at 80 and 90 °C for 0, 20, 40, 60, 80, 100 and 120 min. Results showed that the most suitable processing was fermentation with the starter culture at 25 °C for 72 h and subsequent drying at 90 °C for 40 min. Both fermented and non-fermented leaves that had been dried at 90 °C for 40 min had moisture contents ranging from 2.14–2.70 %, total plate counts ranging from 30–240 cfu g^{-1} while no detectable coliforms and yeasts and moulds were found. Antinutritional compounds were significantly lower in the fermented then dried samples compared to the samples that had only been dried. The fermented then dried samples also had comparatively significantly higher *in vitro* protein digestibility, iron and zinc bio-accessibility but had significantly lower ß-carotene, total polyphenols and total flavonoids content in comparison to the samples that had only been dried. In terms of overall sensory acceptability, peanut sauces enriched with the processed amaranth leaves were liked slightly (6.07–6.52 on a 9-point scale) compared to peanut sauce enriched with fresh amaranth leaves which was liked moderately (7.00 on a 9-point scale).

Keywords: Amaranthus spp., fermentation, mineral bio-accessibility, protein digestibility, refractance window drying, sensory acceptability

Contact Address: Rachel Byarugaba, Humboldt-Universität zu Berlin, Thaer-Institute - Div. Urban Plant Ecophysiology, Lentzeallee 55, Berlin, Germany, e-mail: rachel.byarugaba@hu-berlin.de