

ABSTRACT

The widespread utilization of single-use plastics, driven by its convenience and low cost in food packaging has fostered a throwaway culture that possess significant environmental risk on biodiversity. The present study aims to develop edible tableware from millets (Pearl millet and Sorghum) as a sustainable alternative to single-use plastic cutlery. The millet tableware is functionally enhanced by germinating and roasting the millets and enriched with antioxidant-rich flower powder (Hibiscus and Rose). The physical, technological, and nutritional properties of pearl millet and sorghum grains were assessed. Germinating the millets improved flour yield and reduced antinutritional factors, while roasting enhanced water and oil absorption, reduced moisture content, and increased total phenolic content. Functional properties indicated that processing millets reduced crystallinity of millet flour. Roasted pearl millet tableware exhibited higher nutrient content, particularly in fiber, iron, and phosphorus, while sorghum tableware excelled in carbohydrates, protein, and calcium. Roasted tableware also showed an improved textural property, whereas germinated millet tableware demonstrated reduced hardness and water absorption rate. Drop test revealed that roasted tableware had higher resilience than its germinated counterparts. The flower-enriched millet tableware exhibited enhanced antioxidant properties. Roasting and flower enrichment significantly improved the nutritional profile, particularly carbohydrate, protein, fiber, and iron content. The enrichment also introduced distinct sensory attributes, with high consumer acceptance in the liked moderately and liked very much categories of nine-point hedonic scale. The flower-enriched cup and spoon maintained its structural integrity upto 20 minutes, while bowl, katori and plate hold upto 30 minutes at cold and hot temperature without water absorption and the tableware remained intact upto 60 minutes at cold temperature that suits for serving hot and cold food and beverages. It exhibited minimal microbial load and weight gain over the storage period of 120 days. Brine shrimp lethality assay confirmed millet tableware as safe to consume with a mortality rate of 10 per cent due to bioactive compounds. It degraded completely within 12 days in wet topsoil. The present study demonstrates the potential of millet tableware, especially roasted and flower-enriched variants, as sustainable, biodegradable, and functional alternatives to single-use cutlery. It provides an eco-friendly solution for culinary and packaging applications that can be utilized in food service sector including hospitality, entertainment, catering and food courts.

Key words: *sorghum, pearl millet, edible flower, single-use cutlery, millet tableware, biodegradability*