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"Competing pathways for equitable food systems transformation: Trade-offs and synergies"

Micronutrients and secondary plant metabolites composition of commonly consumed African indigenous vegetables from Tanzania

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Abstract

The "triple burden of malnutrition" (TBM), meaning the coexistence of undernutrition, overweight and obesity and micronutrient deficiencies, is a growing challenge in sub-Saharan Africa. Nutrition transition refers to changes in lifestyle and dietary patterns driven by ongoing urbanisation, globalisation and economic growth and is rapidly taking place also in Tanzania. The FoCo-Active project therefore fosters to modify food and physical activity environments including the implementation of a health literacy programme to holistically combat TBM in rural and urban Tanzania. Nutrition-sensitive interventions linked to horticultural production and post-harvest treatments have the potential to improve local food environments by increasing the availability of affordable nutrient-dense vegetables. Simple low-cost horticultural production systems such as flat and bag gardens with associated nutrient-sensitive post-harvest treatments of African indigenous vegetables (AIVs) have the potential to improve AIVs' availability to rural and urban populations throughout the year. The aim of this study was to determine the content of selected minerals (Ca, Fe, K, Mg, Na, P, Zn) and secondary plant metabolites (glucosinolates, carotenoids, flavonoids and phenolic acids) of five selected AIVs commonly consumed in Tanzania: amaranth (*Amaranth* spp.), Chinese cabbage (*Brassica chinensis*), pumpkin leaves (*Cucurbita maxima*), Abyssinian mustard (*B. carinata*) and black nightshade (*Solanum nigrum*). To determine the actual state of profiles of the selected micronutrients and secondary plant metabolites in leaf material of the AIVs available in Tanzania, plant samples from two different markets were subjected to analytical component analyses at Humboldt-Universität zu Berlin. Mineral contents were determined by using inductively coupled plasma-optical emission spectrometry (ICP-OES). Secondary plant metabolites were specifically extracted and quantified via high-performance liquid chromatography (HPLC). Metabolites were identified on the basis of mass fragmentation (mass spectrometry), as well as retention times and specific UV-spectra if commercial standards were available. Results indicated significant differences in the contents and compositions of the specific minerals as well as glucosinolates, carotenoids, flavonoids and phenolic acids in the different AIV samples. In conclusion, the selected and analysed AIVs have the potential to improve local food environments by providing health-promoting secondary plant metabolites and micronutrients for improved diets in rural and urban Tanzania.

Keywords: African indigenous vegetable, carotenoids, flavonoids, food environments, glucosinolates, micronutrients, phenolic acids

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