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Farmers’ and academia’s views”

## Optimisation of nutritional and functional qualities of local complementary foods of southern Ethiopia using a customized mixture design

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### Abstract

Commercially produced complementary foods are inaccessible to rural households in Ethiopia despite of disparity in agro ecologies. And this study aimed to optimise the nutritional and functional properties of local complementary foods using flours of the following locally available crops: maize, red kidney bean, “kocho”/fermented root of false banana (*Ensete ventricosum*), and pumpkin fruit. Ten formulations were generated using a customized mixture design. A five-point hedonic scale was used for the determination of organoleptic properties, and standard methods were used for the analyses of nutritional composition and functional properties. The flours were mixed in the range of 20%–30 % for kocho, 10%–25 % for pumpkin fruit, 10%–40 % for red kidney bean, and 15%–30 % for maize. Optimal nutritional and functional properties were obtained using 33.5 % kocho, 22.5 % maize, 17.5 % pumpkin, and 26.5 % red kidney bean. Optimal values for functional properties were 0.86 g/ml, 5.94 ml/g, 4.14 ml/g, 2.96 g/g, 5.0 ml/g, and 1225.3 cP for bulk density, water absorption capacity, oil absorption capacity, swelling capacity, swelling index, and viscosity, respectively. All formulations were within acceptable limits with scores ranging from 3.00 to 4.32 on a scale of 5. The inclusion of 25 % pumpkin fruit flour and other ingredients between 20 % and 30 % increased the pro-vitamin A carotenoid and vitamin E contents of the composite flours. Apart from optimisation, a higher concentration of limiting amino acids was achieved with 40 % kidney beans and 15%–25 % of the other ingredients. The mineral contents improved with increasing pumpkin, kidney bean, and kocho. To sum up, the nutrient quality, energy density, and functional quality of complementary foods can be optimised at a low cost using local ingredients

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