

Utilization of Bean leaves as a cheap source of Vitamin A, Iron and Zinc

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Abstract

Deficiencies of vitamin A, iron and zinc are highly prevalent in Kenya especially among children under five, women, especially pregnant women. Although bean leaves are consumed in some regions in Kenya, their potential as a cheap source of micronutrients is not well known. The objectives of this study was to determine the concentration of vitamin A, iron and zinc in young bean leaves of recently released bean varieties and advanced breeding lines. Vitamin A was analyzed as beta carotene. The carotenoids were extracted from 12 bean genotypes using acetone. Acetone was evaporated and the residue mixed with petroleum ether to dissolve beta carotene. This was then passed through an activated silica gel column to separate the beta carotene from the other carotenoids. The absorbance was determined using atomic absorption spectrometer. Vitamin A concentration was calculated using a constant from the standard curve. Iron and zinc were determined by digesting ash from dry samples of bean leaves with 20% hydrochloric acid. Results showed that there were significant differences ($P<0.001$) in vitamin A and zinc concentration among bean genotypes. Vitamin A concentration varied from 21,781.685 \pm 2399.23 (BCB11-204) to 114,906.185 \pm 1343.34 IU/100 g dry matter (*Kenya Almasi*) with a mean of 61,148.2. Iron concentration varied from 89.1 (BCB11-204) to 466.9 mg/ 100g dry matter (KCB 13-04) with a mean of 212.6. Zinc concentration varied from 6.5 (BCB11-204) to 50.1 mg/100g dry matter (BCB11-132) with a mean of 16.8. Bio-fortified bean varieties had significantly more vitamin A (69,277 IU) compared to other advanced lines (54915 to 59253 IU) which were not previously selected for mineral concentration. Cooking had no significant effect on vitamin A concentration, indicating high micronutrient retention in these genotypes. Results showed that the bean leaves had 22 to 28 times more vitamin A than the recommended daily allowance of 2500 IU, suggesting that bean leaves can be a cheap source of vitamin A. About 100 g of bean leaves contained enough amounts of iron to meet the daily requirements of adult males (8mg), adult females (18mg) and pregnant and lactating mothers (27mg). Bean leaves also met the recommended daily zinc allowance of 12 mg for pregnant and lactating mothers, 11 for male adults, 8 mg for females, and 3-5 mg for children of 1 to 8 years.

Key words: bean varieties, bean leaves, bio-fortification, bean leaves, iron, vitamin A, Zinc