African Journal of Biotechnology Vol. 8 (5), pp. 858-859, 6 March, 2009
Available online at http://www.academicjournals.org/AJB
ISSN 1684–5315 © 2009 Academic Journals

Short Communication

Compositional changes in banana (*Musa* ssp.) fruits during ripening

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Accepted 3 February, 2009

The compositional changes in banana (*musa spp*) fruits were investigated. Banana fruits were collected, dried, ground and ashed. The moisture content and mineral elements composition was determined as ripening proceeds. The mineral elements analyzed included magnesium (Mg), manganese (Mn), zinc (Zn) and cobalt (Co). Their composition was found to be 0.68, 0.66 and 0.60% in unripe, ripe and overripe banana fruits, respectively. The moisture content and ash values for the selected mineral elements were 73.47 and 0.68%; 77.19 and 0.80%; 79.22 and 0.78% in unripe, ripe and overripe banana fruits, respectively. The results showed that the nutritional composition of banana pulp was diversely affected by ripening. Changes in mineral composition varied and were not consistent with the stages of ripeness. Bananas are considered a good source of Mg in the diet, and the data obtained herein support these assertions. Zn and Mn are other minerals of nutritional importance in bananas and this study has shown that their average values are adequate to support its nutritive value at the various ripening stages. The result obtained in this study showed that banana fruits at any ripening stage (unripe, ripe or overripe) can be a potential source of mineral elements supplement in the diet especially for Mg.

Key words: Banana, ripening, mineral elements, moisture content, ash value.

INTRODUCTION

Banana fruits are wholesome and fairly well balanced source of nutrient containing various mineral salts, vitamins and high amount of carbohydrates with a little oil and protein (Simmonds, 1966; Ketiku, 1973; Ahenkora et al., 1997). Banana fruits are eaten raw as desert fruits. Nutritional information is used increasingly by public agencies and agricultural industries to promote fresh produce. Consumers are looking for variety in their diets, and are aware of the health benefits of fresh fruits and vegetables. Of special interest are food sources rich in anti-oxidant vitamins (vitamins C, A, and E), calcium (Ca), magnesium (Mg), and potassium (K), (Marisa, 2006). bananas are considered nutritive with high content of vitamins A and C but poor in vitamins B (Margard and Briav, 1979). Generally, bananas contain a considerable amount of mineral elements and could therefore serve as a good source of mineral supplement in human/animal diets. Because of its high nutritive and consumption rate, an experiment was designed to study the physico-chemical changes of the mineral element composition of banana fruits at various ripening stages which were grouped as unripe, ripe and overripe.

MATERIALS AND METHODS

The banana fruits employed in this study were purchased from the New Market, Baboko-Ilorin Kwara State, Nigeria. The bananas were divided into three (3) groups namely, unripe, ripe and overripe. All chemical reagents used were of analytical grade and obtained from the British Drug House (BDH) Poole, England as supplied by the Department of Biochemistry, University of Ilorin, Ilorin, Nigeria. The standard AOAC (1984) and Oyeleke 1984 methods were used to determine the moisture content and the minerals were extracted from dry-ashed samples in HCl and determined by atomic absorption spectrophotometry (AOAC, 1984).

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Table 1. Moisture, ash and mineral contents of ripening banana fruit.

Banana	Moisture (%)	Ash (%)	Zn (%)	Mn (%)	Co (%)	Mg (%)
Unripe	73.47	0.68	0.146	0.506	-	337.18
Ripe	77.19	0.80	0.271	0.886	-	326.70
Overripe	79.22	0.78	0.118	0.756	-	299.48

RESULTS AND DISCUSSION

There were varied changes in mineral composition of bananas during ripening and the ash content increased with ripening (Table 1). The moisture content increased with ripening. This explains the softening texture of banana fruits as ripening proceeds and it agrees with Simmonds (1966) and Ahenkora et al. (1997). The ash values increase gradually with ripening and can be said to be concomitant with the mineral element composition. The magnesium content of the banana kept decreasing with ripening, while increase in zinc and manganese reached a peak at the ripe stage and decreased thereafter. Decrease in mineral element composition is a crucial physical event of softening of banana fruits (Hearer, 1986; Aboua, 1991; Ahenkora et al., 1997).

The Mg content of the banana kept decreasing with ripening, while increase in Zn and Mn reached a peak at the ripe stage and decreased thereafter. The decrease in the level of Mg could be attributed to the conversion of chlorophyll, the green pigment in unripe banana to carotenoids which is responsible for the characteristic yellow colour of ripe banana fruits (Hearer, 1986; Fonad, 1996). The degree of coloration is indicative of the composition of these components in banana. Magnesium is an important component of chlorophyll thus unripe banana has a higher value for magnesium. As ripening proceeds, the green pigment of unripe banana is converted to carotenoids in ripe banana. Zinc is an important component of carotenoids (Tee and Lim, 1991; Fonad, 1996; Ben-Amotz and Fishler, 1998); it forms a non-enzymatic covalent bonding with chlorophyll thus its conversion to carotenoids. This explains why the level of zinc increases with ripening.

The results as obtained herein showed that banana fruits could serve as mineral element supplement in diet for both humans and animals and that the nutritive and quality of the fruits can still be employed at the various ripening stages. Banana fruits may be consumed unripe (green), yellow-green, or ripe. Understanding of the chemical changes associated with ripening may form the basis for expanding the utilization of bananas.

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