 http://dx.doi.org/10.4314/bajopas.v5i1.11

Bayero Journal of Pure and Applied Sciences, 5(1): 57 – 59
Received: January 2012
Accepted: April 2012
ISSN 2006 – 6996

CALCIUM AND IRON LEVELS IN SOME FRUITS AND VEGETABLES COMMONLY CONSUMED IN KANO METROPOLIS, NIGERIA

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ABSTRACT
Four different fruits and vegetables (i.e. Apple, Egg Plant, Pineapple, Watermelon, Cabbage, Pepper, Spinach, and Tomato) in each case were analysed for their Calcium and iron levels using spectrophotometric method of analysis; From the results, it was found that the concentration of Calcium was highest in spinach (14.30 mgdm^{-3}), while iron concentration was highest in eggplant (2.00mgdm^{-3}).The moisture contents of the samples analysed revealed that watermelon had the highest mean moisture content of 93.9% and spinach had the least moisture content of 65.8 %.
Keywords: Calcium, Iron, Fruits, Vegetables, Dry weight matter

INTRODUCTION

Fruit is a ripened seed- bearing part of a plant usually fleshy, dry and edible. The matured ovary may form a juicy fruit such as apple, peach etc or it may develop into dry fruit such as chesnut (Kingsley, 2008). Fruit is formed through the process of fertilization which involves the union of male and female reproductive structures of flowering plant. The major part of the edible portion of fresh fruit contains about 75 – 95 % water , poor source of protein and oil but contain reasonable amount of carbohydrate (Pearson *et al*, 1984).

Normally, all plants are vegetables. The term vegetable applies to edible part of the plant that stores food in roots, stems, or leaves. Vegetables are green and leafy- like in appearance bearing edible stems or leaves and roots of plants (Sharma, 2004),the food value of vegetable is low owing to the large amount of water present (79 – 96 %) . The nutritive value of vegetable is increased greatly because of the presence of mineral salts and vitamins, they also serve as roughages that help in digestion (Sharma, 2004).Vegetables constitute essential diet components by contributing proteins, vitamins,iron,calcium, and other nutrients that are in short supply. Vegetables also contain both essential and toxic elements over a wide range of concentrations. Metals in vegetables may pose a direct threat to human health, plants or vegetables take up elements by absorbing them from contaminated soils and waste water used for irrigating them as well as from deposits on different parts of the vegetables exposed to the air from polluted environment (Funtua *et al,* 2008).

The aim of this study is to determine the dry matter level of calcium and some iron in fruits and vegetables that are consumed regularly by humans because they serve as food source and thus offer rapid and ideal means of providing adequate vitamins supplies, minerals and fibre as suggested by Ihekeronye and Ngoddy (1995).

MATERIALS AND METHODS

In the preparation of reagents, chemicals of analytical grade purity and distilled de ionised water were used. All glass wares were cleaned with detergent and rinsed with water and acetone before drying in an oven.

Sampling

Four different of fruits i.e. Apple *(Maius domestica),* Eggplant *(Solanum molengena),* Pineapple (*Ananas comosis),* and Watermelon (*Citrullus lanatus)* and four different Vegetables i.e. Cabbage (*Brassica oleracea),* Spinach *(Spinacia oleracea)*, Tomato *(Solanum lycopersicum)* and Pepper *(Piper nigrum)* were purchased from Yan'kaba market.

Moisture content

This is the amount of water present in a sample. However, removal of water from sample is done by dehydration in an oven (Wilcox 2006).

Treatment of Samples

The fruits and vegetables were washed, cut into small pieces with knife and were dried in an oven at 105 ^{o}C for about 24 hours. The samples were crushed into powder in a mortar with a pestle, 2.0 g powder of each sample was weighed in a porcelain crucible and ashed in a muffle furnace at 450 ^{o}C for 7 hours.

Digestion of Sample

A quantity (5 cm^3) of 1N $HN0_3$ solution was added to each left over ash and was left to evaporate to dryness on a steam bath. The samples were then returned to the furnace and heated to 40^{o}C for 10 – 15 minutes until a perfect white or grayish white ash was obtained. The ash was cooled, and treated with 10 cm^3 of 1N HCl, this was filtered and made to the mark in a 50 cm^3 volumetric flask with 0.1N HCl (Vogel,1983).

Determination of Calcium

Both the standard solutions and samples solutions were aspirated into a flame photometer (JENWAY CLINICAL P7P7 MODEL) one after the other and absorbance readings were obtained and the concentrations of calcium in the samples were obtained by extrapolation from standard calibration plot, (Vogel, 1983).

Determination of iron

The solution from each sample (10 cm^3) was transferred into a 100 cm^3 volumetric flask, 5 cm^3 of 2.058 mol dm^3 potassium thiocynate and 3 cm^3 of 6 mol dm^{-3} Nitric acid were added to develop the colour. e volume was made to 100 cm^3 mark with de ionised water. Absorbance readings were measured for each including the standard solutions at 579 nm using UV-Visible spectrophotometer, (Vogel 1983).

RESULTS AND DISCUSSION

The results of the percentage moisture content of the various samples analysed is presented in Fig 1. From the result, it was found that watermelon had the highest moisture content (93.9 %) while spinach had the least moisture content (65.8 %).

The results of Ca^{2+} and Fe^{2+} concentrations in the samples analysed is presented in Fig 2, from the results of the analysis , it was found that the mean concentration of calcium was found to be 6.32 ± 3.63 $mgdm^{-3}$ which is below the maximum permissible limit of 7.5 $mgdm^{-3}$ as reported by W.H.O (2003). Calcium is not known to be toxic because it is an essential element for bone development and maintenance and also for reduction of cholesterol level in humans (Ibrahim, 2008). The mean iron concentration was found to be 1.50 ± 0.49 in the samples analysed , however the mean concentration was above the maximum permissible 0.30$mgdm^{-3}$ (W.H.O, 1999), this may be due to a number of factors that influence the concentration of mineral elements on and within plants, these factors include climate , atmospheric deposition , nature of soil on which the plant is grown , irrigation with waste water, these observations were made by Anyawu *et al*,(2004) and Khairah *et al*, (2004).

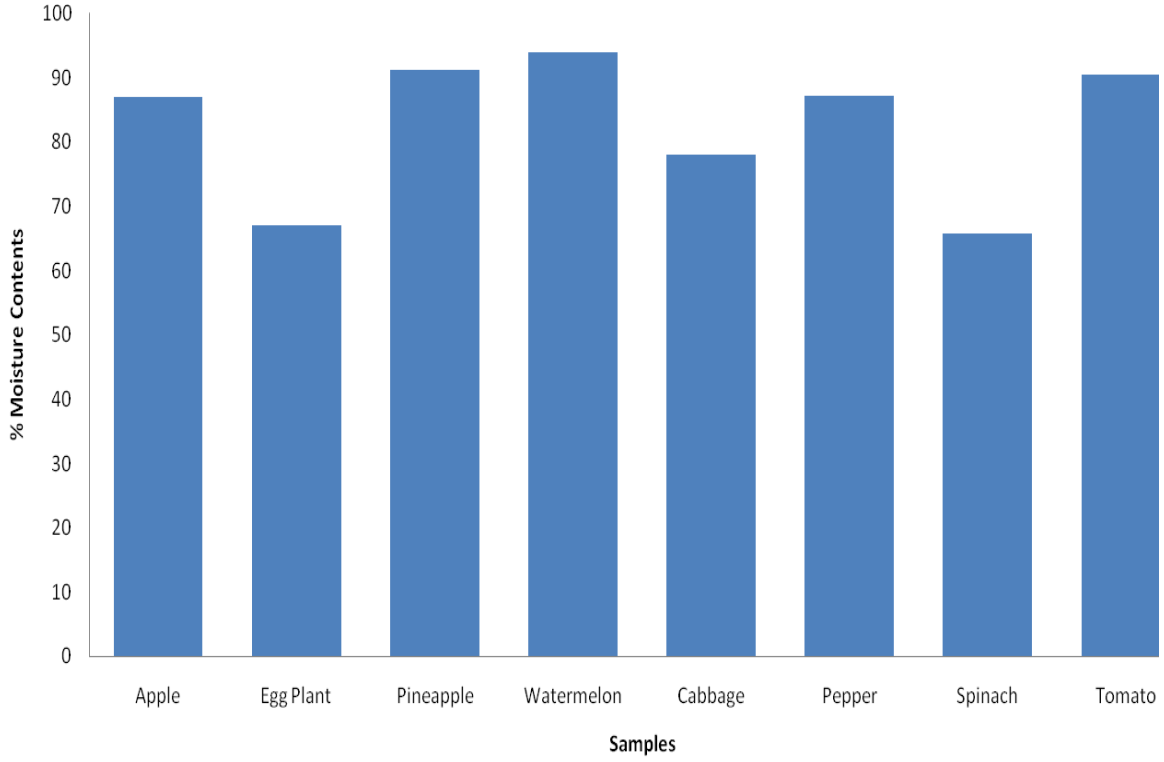

Fig. 1: Moisture Content of Fruits and Vegetables

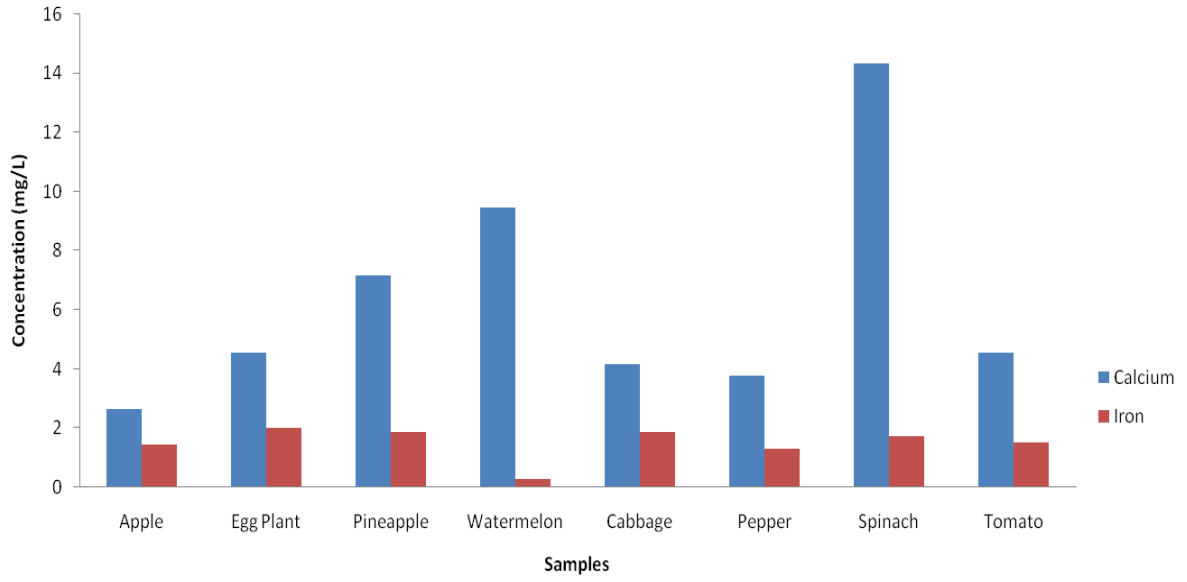

Fig. 2: Concentration of Ca^{2+} and Fe^{2+} in Fruits and Vegetables

CONCLUSION

Mineral elements are of vital importance to both plants and animals including humans, some of these elements are required in large quantities and are recognized as macro elements or bioessential because they are essential in all living system examples include calcium, potassium, phosphorus etc, while others are required in small amount (micronutrients) they are essential for plant growth and metabolism in animals examples are iron, copper, zinc etc. Fruits and vegetables are good sources of calcium and iron, therefore regular consumption of these fruits and vegetables is essential for bone development and efficient oxygen carrier in blood system respectively.

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