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Research Paper

Proximate analysis of sweet potato (*Ipomoea batatas)* products

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Abstract

The sweet potato (Ipomea batatas (L.) is a dicotyledonous plant that belongs to the family Convolvulaceae. It is a short seasonal crop which reliably provides food on marginal and degraded land with little labor and few or no input outside the farm. It is commonly referred to a subsistence, food security or famine relief crop; its uses have diversified considerably in the developing countries .The main objective of the study was to analyze the nutrient composition of sweet potato and its products. The moisture content of the sweet potato was 62.2 per cent while 54.83 per cent was present in boiled sweet potato and 39.16 per cent was present in fried sweet potato. Corresponding carbohydrates in sweet potato, boiled sweet potato and fried sweet potato were 35.71 g, 70.54g and 68.78g respectively. Protein content was found to be 0.89g in sweet potato, 2.27g in boiled sweet potato and 2.25g in fried sweet potato. The fat content of sweet potato was 0.2g whereas 0.3g of fat present in boiled sweet potato and 2.65g was found in fried sweet potato. The amount of crude fibre in sweet potato, boiled sweet potato and fried sweet potato was found to be 0.7 g, 0.84g and 0.78g respectively. Iron content was found to be 0.21mg in sweet potato, 1.15mg in boiled sweet potato and 1.49mg in fried sweet potato. Calcium content was 46.0 mg in sweet potato, 26.73mg in boiled sweet potato and 23.80mg in fried sweet potato. Zinc content was higher (0.26mg) in boiled sweet potato and lowest (0.11mg) in sweet potato in which fried sweet potato maintained 0.25mg. Results reveal that, the sweet potato contains an appreciable amount of nutrients which can be developed into different products.

Keywords: Dicotyledonous; Convolvulaceae; food security

INTRODUCTION

The high population without an equivalent increase in food production and availability to the citizens resulted to household food insecurity. This is an issue posing serious nutritional problem in the world, particularly among children and mothers of child bearing age. The resultant effect is rampant malnutrition, affecting growth and development of the children and low productivity level among the mothers. The above problems prompted the campaign for increase production, utilization and consumption of traditional foods (sweet potato) among the citizens [1].

Sweet potato (*Ipomoea batatas*) is a perennial tuber. It is a dicotyledonous plant that belongs to the family *Convolvulaceae*. Flowers can be white or purple, and leaves can be green or purple. Flesh can be white, cream, yellow, orange, or purple with orange, white, and cream, the most commonly grown and eaten. Sweet potatoes grow well in tropical, subtropical, and temperate areas. Sweet potatoes originated in the New World and were introduced into Spain, India, and the Philippines by Spanish explorers in the 15th

and 16th centuries. Their distribution is now worldwide. In parts of Africa, Asia, and the Pacific, sweet potatoes are an important staple crop [2].

Sweet potato is a short seasonal crop which reliably provides food on marginal and degraded land with little labor and few or no input outside the farm. Sweet potato is among the world's most important and under-exploited crop. It is commonly referred to a subsistence, food security or famine relief crop; diversified uses are considerably in the developing countries [3].

Sweet potatoes are good sources of vitamins A (beta carotene), B_6, C and E as well as dietary fiber and they are low in fat and cholesterol. It serves as an important protein source for many world populations and is an important source of starch and other carbohydrates. The carbohydrate content of the storage roots varies from 25% to 30%, while the rest is composed of water (58%-72%). Sweet potato also contains some essential minerals and trace elements *viz.,* iron, potassium, calcium, zinc, sodium, magnesium and manganese [4].

In addition to the nutritional values of sweet potatoes, it has been rediscovered as a functional food containing high levels of various phytochemicals which might have various health beneficial effects [5].

The nutritionists in several developing countries compelled the evidence of lack of adequate essential vitamins and minerals in the diet of many children and adults. In India, about 40,000 children are affected every year by blindness mainly due to the deficiency of vitamin A and nearly half of the world's micronutrient deficient people may be found in this country. Various international efforts are being made since long back for alleviating vitamin A deficiency and thereby combating night blindness. Among three different approaches, namely supplementation programme through distribution of vitamin capsules; fortification of common foods with micronutrients and the improvement of dietary quality through diversification of foods, the third one is an important food based approach in achieving and maintaining adequate intake of micronutrient-rich foods in the context of an adequate total diet [6].

The nutritional value of sweet potato (higher content of vitamin A) offers an added benefit to processed products. Sweet potato plays an important role in food security, for example, the dried chips can be stored for consumption during the hungry period when some vital crops are in short supply or not available. The bulkiness and perishability of sweet potato storage is a major barrier to the wider utilization of the crop. A possible means of approach to this problem is to diversify the use of sweet potato. Sweet potato roots are being utilized for various products but there is need to further diversify the processing of the roots into more products. Some of the products produced from the processing of sweet potato include fermented sweet potato drink and sweet potato cocktail [7]. Further diversification of the products of sweet potato is an attempt to supplement the nutrients for school children.

MATERIAL AND MEHODS

A. *Collection and treatment of samples:*

Raw sweet potato tubers and leaves were purchased from the open markets in Bangalore Karnataka state. The tubers were prepared into commonly consumed dishes. The prepared dishes are sweet potato boiled and sweet potato fried. All samples were oven dried at 65^0 C and after grinding into powder mechanically ready for analysis.

B. Proximate analysis:

The proximate analysis for the various constituents was carried out based on the recommendation of the Association of Official Analytical Chemist [8].

Moisture content determination involved washing a known weight of sample with clean and distilled water and drying to a constant weight at 60^0 C in an oven.

Fat determination involved using exhaustive soxhlet extraction of a known weight of sample with petroleum ether and methanol mixed properly in the ratio 1:1. Crude fibre was obtained from the loss in weight on ignition of dried residue remaining after digestion of fat free samples with 1.25% each of sulphuric acid and sodium hydroxide solution under specified condition.

$$\% \text{ Fibre} = \frac{\text{Loss of weight on ignition}}{\text{Weight of sample used}} \times 100$$

Determination of protein was done using the kjeldahl nitrogen method which involves the digestion of a given weight of the sample with concentrated H_2SO_4 and a catalyst to convert any organic nitrogen to ammonium sulphate in solution, followed by the decomposition of ammonium sulphate with N_aOH .The ammonia liberated was distilled into 5 % boric acid. The nitrogen from ammonia was deduced from titration of the trapped ammonia with 0.05N HCl using methylene red and methylene blue (double indication solution) indicators. The value of nitrogen obtained was multiplied by 6.25 to give the % protein.

The carbohydrate content was determined by subtracting the total protein, crude fibre, ash and lipid from the total dry matter. The caloric value estimation was done by summing the multiple values for protein, fat and carbohydrate (excluding crude fibre) by their respective AT WATER factors (4, 9, 4).

C. Mineral elements analysis:

Iron, zinc and calcium were determined using atomic absorption spectrophotometer [9].

RESULTS AND DISCUSSION

TABLE 1: PROXIMATE COMPOSITION OF SWEET POTATO SAMPLES FOR (100 G)

Food sample	Moisture %	Protein (g)	Fat (g)	Crude fibre (g)	Carbohydrate(g)
Sweet potato	62.2	0.89	0.2	0.7	35.71
Sweet potato Boiled	54.83	2.27	0.3	0.84	70.54
Sweet potato Fried	39.16	2.25	2.65	0.78	68.78

The proximate compositions of the sweet potato samples were presented (Table 1). The highest value moisture contents were 62.2 %, in sweet potato and lowest moisture content in sweet potato fried. Protein was highest in sweet potato boiled with 2.27g and lowest in sweet potato. The fat content was low in all the samples except sweet potato fried. The crude fibre content of the samples was generally low in the tuber sample. The carbohydrate content in the samples was generally high. The highest value was in sweet potato boiled (70.54g).

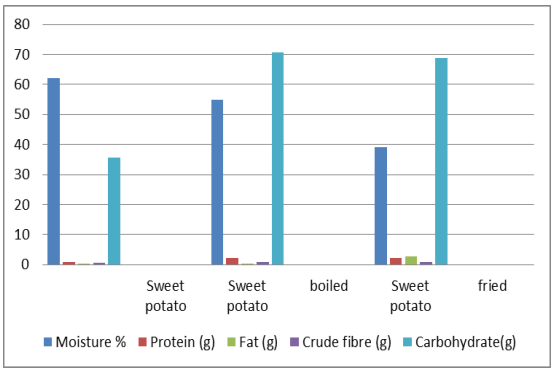

Fig 1. Proximate composition of sweet potato samples for (100 g)

TABLE 2. MINERAL CONTENT OF SWEET POTATO SAMPLES

Food sample	**Iron (Fe) (mg/100g)**	**Zinc(Zn) (mg/100g)**	**Calcium (mg/100g)**
Sweet potato	0.21	0.11	46
Sweet potato boiled	1.15	0.26	26.73
Sweet potato fried	1.49	0.25	23.80

Table 2. Deficit mineral elements present in sweet potato samples. The iron contents in all the samples were generally low apart from the sweet potato (0.21g/100g). The zinc content of all the samples were ranged from 0.11mg, 0.25mg and 0.26 mg/100g in sweet potato, sweet potato boiled and sweet potato fried respectively. The calcium content was high in all the sweet potato (46.o mg) sample compare to other samples.

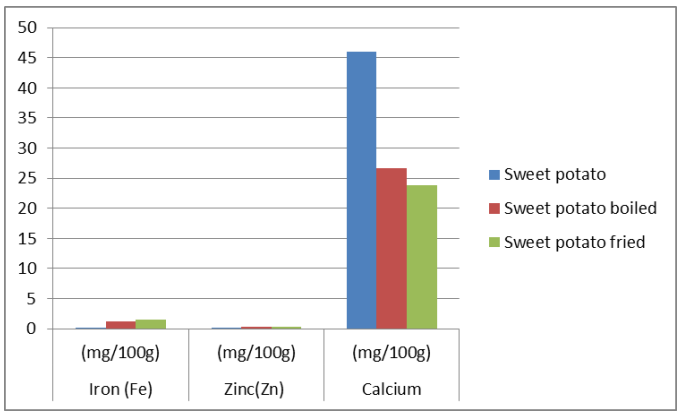

Fig 2. Mineral content of sweet potato samples

CONCLUSION

The present study revealed that sweet potato dishes contained nutritional components and it improve the nutritional status of the consumers and in effects reduce their nutritional problems. Moreover the appreciable protein and crude fibre in the sweet potato samples gives it an added value for its consumption to be encouraged. Since it contains substantial amount of nutrients, it can therefore be concluded that sweet potato can contribute significantly to the nutrient requirements of man and should be recommended.

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