# Some Proximate Properties Of Sweet Potato (Ipomoea Batatas L) As Influenced By Cooking Methods

Adepoju, A. L., Adejumo, B. A.

**Abstract:** The effect of cooking methods on some proximate properties of sweet potato (Ipomoea batatas L) was investigated. With the initial properties of the fresh sweet potatoes (sample A) determined, 600g each of samples B, C and D were boiled peeled, boiled unpeeled and roasted unpeeled respectively. The properties determined for the samples are moisture content, ash, fibre, protein, fat, carbohydrate, vitamins A and C. Data collected were analysed statistically to determine the effect of cooking methods on the properties of sweet potatoes. The results show that cooking methods used has no significant effects ($p<0.05$) on the moisture, ash and crude fibre contents of cooked sweet potato. Cooking generally increases the protein content but decreases the vitamin C and β-carotene content. Cooking of sweet potatoes unpeeled has the highest protein and carbohydrate content, it hence recommended for cooking sweet potatoes.

**Keyword**: Proximate properties, cooking methods, sweet potato.

## 1. INTRODUCTION

Sweet potato, Ipomoea batatas is one of the main root and tuber crops commonly grown in the tropical and subtropical parts of the world. It was described as the seventh most important food crop in the world [1, 2]. It originated from Central America but is now widely grown and consumed as subsistence staples in many parts of Africa (including Nigeria), Latin America, the Pacific Islands and Asia. Sweet potato is valued for its short growing period of about 3-4 months, high nutritional content and its sweetness. Sweet potato is considered as an important food security crop, especially in Nigeria and is also identified as the least expensive, year round source of dietary vitamin A, especially the orange-fleshed type among the poor [2]. Sweet potatoes are among the major tropical staple foods utilized as food as well as livestock feed all over the world [3]. In the tropics the fresh roots are commonly boiled, fried or roasted and eaten as a carbohydrate constituent of the diet [4]. In parts of East Africa tubers are sometimes sliced and sun-dried to produce chips, which are later ground into flour. In the Northern part of Nigeria, a garri-like product from sweet potato has been produced and evaluated; it is found it to be in high nutritional value [5]. Sweet potatoes are rich source of energy, antioxidants and vitamins (especially C) as well as carotenoids [6, 7]. They are also an excellent source of fibre and minerals, which are important in reducing blood cholesterol and aid digestion [8, 9]. The most common methods of cooking sweet potato before consumption include boiling (either with the peel or without the peel), roasting, frying and baking. Cooking has been reported to either be beneficial or detrimental to the nutritional content of food [10].

Cooking helps to improve the microbiological and organoleptic qualities of food, increase digestibility and nutrients bioavailability, destroy toxins, microbes and antinutritional factors in food [11]. Cooking can also cause the loss of some micronutrients in the food [12]. Therefore proper attention must be given to the method used in cooking foods, especially sweet potato. A study on the impact of three cooking methods (Steaming, Roasting on Charcoal and Frying) on the β-carotene and vitamin C contents of plantain and sweet potato has been carried out [13]. These nutrients were analysed in raw, steamed, roasted and fried plantains and sweet potatoes. The results showed there were significant losses in β-carotene and vitamin C contents with the cooking methods at $p<0.05$. Losses of β-carotene were higher after frying and vitamin C losses were smaller after frying, but higher after roasting. Significant losses of total carbohydrate were also observed after steaming and frying. On the contrary, total lipids content were significantly higher after frying but did not vary with roasting or steaming. They concluded that steaming was the best cooking method which preserves the β-carotene and vitamin C contents in plantain and sweet potato. The aim of this study is to determine the effect of cooking methods on some proximate properties of sweet potato grown in Minna, Niger State Nigeria.

## 2.0 MATERIALS AND METHODS

The variety of the sweet potato used in this study is the orange flesh (Jewel) type and was purchased at the Bosso market in Minna, Niger state, Nigeria. The samples were washed with clean water to remove dirt and other foreign materials. The samples were divided into samples A, B, C and D of 600g each. The samples were cooked using the conventional traditional methods of cooking sweet potatoes by the Nigerian households. Sample A served as the control and were analysed raw. Sample B was peeled, washed and boiled with about 750ml of water in an aluminum pot for about 10-15 minutes. Sample C was boiled with about 750ml for 10-15 minutes unpeeled.

- *Adepoju, A. L., Adejumo, B. A.*
- *Department of Agricultural and Bioresources Engineering, Federal University of Technology, Minna, Nigeria bolanleadejumo@yahoo.com*

**Table 1: Proximate properties of sweet potato samples**

| S/No | Moisture (%) | Ash (%) | Fibre (%) | Protein (%) | Fat (%) | CHO%) | Beta carotene (mg/100g) | Vit C (mg/100g) |
|---|---|---|---|---|---|---|---|---|
| A | 69.80 | 1.00 | 1.00 | 0.46 | 1.70 | 26.84 | 7.68 | 0.46 |
| B | 66.20 | 1.00 | 0.81 | 0.78 | 2.30 | 28.90 | 0.48 | 0.44 |
| C | 63.00 | 0.81 | 1.00 | 0.82 | 1.00 | 33.37 | 4.80 | 0.37 |
| D | 67.00 | 1.00 | 1.00 | 0.53 | 3.50 | 27.00 | 6.24 | 0.44 |

Sample D was roasted unpeeled on hot charcoal for about 10-15 minutes. The samples were turned regularly to ensure even roasting. The proximate properties of all the samples were determined [14]. The proximate properties determined are moisture content, ash content, fibre content, protein, fat, carbohydrate, β-carotene and vitamin C. The data obtained were analysed statistically to determine the effect of cooking methods on the proximate properties of sweet potatoes using the SPSS 15.0 statistical package.

## 3.0 RESULTS AND DISCUSSION

The effects of cooking methods on the proximate properties of sweet potato samples are as presented in Table 1. The results show that the moisture content of raw sweet potato (sample A) was 68.80% while that of samples B (peeled boiled), C (boiled with peel) and D (roasted with peel) was 66.20%, 63.00% and 67.00% respectively. These moisture contents are found to be within the range of values obtained by previous researchers [15, 13]. The result shows that there is no significant difference ($p<0.05$) in the moisture contents of the samples. The values of the ash and fibre contents of the samples also show that there is no significant difference. This implies that the cooking methods studied do not actually influence the content of the ash and fibre of the sweet potato samples. Sample C (boiled with peel) have the highest value of protein which is 0.82%. This suggests that the potato peel helps in retaining protein in boiled sweet potato. Carbohydrate content increases in the cooked samples compared with the raw sweet potato whereas previous work [13] shows that there were losses in the carbohydrate content of sweet potato after boiling and frying. They deduced that these losses might be as a result of diffusion of free sugar from food to oil/water during frying and boiling. Sweet potato sample boiled unpeeled has the highest value of protein, carbohydrate and low value of fat content compare with the other samples. The raw sweet potato has the highest values of β-carotene (7.68mg/100g) and C (0.458mg/100g). These values are similar to 4.99mg/100g (β-carotene) and 0.50mg/100g (vitamin C) obtained by previous work on the effect of cooking and frying on antioxidant present in sweet potatoes [10].

## 4.0 CONCLUSION

It concluded that cooking does not have significant effect on the moisture content, ash, crude fibre and vitamin C content of sweet potatoes. Sweet potato sample boiled unpeeled retained nutrients close to the raw sample. It can therefore be recommended that potato should be taken raw or boiled unpeeled to ensure a considerable intake of these nutrients.

## REFERENCES


[1] Bhattiprolu S. (2000). Color, Texture and Rehydration Characteristics of Ohmically Treated Sweet Potatoes. A Thesis Submitted to the Graduate Faculty of the Louisiana State University and Agricultural And Mechanical College, Louisiana.

[2] Okorie, S.U and Onyeneke, E.N. (2012). Production and Quality Evaluation of Baked Cake from Blend of Sweet Potatoes and Wheat Flour. Journal of Natural and Applied Science, Vol.3, No. 2.

[3] Dzomeku,B.M; F. Armo-Annor; K.Adjei- Gyan and S.K. Darkey. (2007). Consumer preference for three selected Musa hybrids in Ghana. American Journal of Food Technology, 2: 684-688.

[4] Zuraida N. (2003). Sweet Potato as an Alternative Food Supplement during Rice Shortage. Journal Litbang Pertanian 22: 150- 155.

[5] Kure, O.A; Nwankwo, L., and Wyasu, G. (2012). Production and quality evaluation of garri- like product from sweet potatoes.Journal Natural Production and Plant Resources, 2012, 2 (2):318-321.

[6] Wakjira, M; D. Adugna and G. Berecha. (2011). Determining slice thickness of Banana (Musa spp.) for enclosed solar drying using solar cabinet dryer under Ethiopian condition. American Journal of Food Technology, 6:568- 580.

[7] Woolfe, J. A. (1992). Sweet Potato: An untapped Food Resource. Cambridge University Press, Cambridge, U.K.

[8] Effah-Manu L; Oduro I and Addo A. (2013). Effect of Dextrinized Sweet potatoes on the Physicochemical and Sensory. Journal of Food Processing and Technology 2013, 4:5.

[9] Chukwu, O., Nwadike, N. and Nwachukwu N. G. (2012). Effect of cooking and frying on antioxidants present in sweet potato (Ipomoea batatas). Academic Research International, vol 2., No. 2.

[10] Chukwu, O., Orhevba, B. A. and Mahmood, B. A. (2010). Influence of Hydrothermal Treatments on Proximate Compositions of Fermented Locust Bean (Dawadawa). Journal of Food Technology, 8 (3):99 – 101.

[11] Erdman J.W.J and A.G.P Schneider. (1994). Factors Affecting Nutritive Value in Processed Foods. In: Modern Nutrition in Health and Disease, Shils, M.E., J.A. Olson and M. Shike (Eds.). 8th Edition. Lea and Febiger, Philadelphia, pp:1569-1578.

[12] Yang, J. and R.L. Gadi. (2008). Effect of steaming and dehydration on anthocyanins, antioxidant activity, total phenols and colour characteristics of purple-fleshed sweet potatoes (Ipomoea batatas). American Journal of Food Technology, 3: 224-234.

[13] Gouado, I., Demasse, M. A., Etame, L. G., Meyimgo, O. R., Solange, E. A. R. and Fokou, E. (2011). Impact of Three Cooking Methods (Steaming, Roasting on Charcoal and Frying) on the β-Carotene and Vitamin C Contents of Plantain and Sweet Potato. American Journal of Food Technology, 6: 994-1001.

[14] AOAC. (2006). Official methods of food Analysis of the Association of Official Analytical Chemists 18th Edition. Washington D.C.

[15] Bahado-Singh, P.S., A.O. Wheatley, M.H. Ahmad, E.Y. Morrison and H.N. Asemota. (2006). Food processing methods influence the glycaemic indices of some commonly eaten West Indian carbohydrate-rich foods. British Journal of Nutrition, 96: 476-481.