JASEM ISSN 1119-8362

Full-text Available Online at www.ajol.info and www.bioline.org.br/ja

J. Appl. Sci. Environ. Manage. *Sept,* 2012
Vol. 16 (3) 287 - 290

Preliminary Studies on the Development and Evaluation of Instant Pounded Yam from D*ioscorea alata*

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ABSTRACT: Of all the species of *Dioscorea*, *D. alata* possesses higher multiplication ratio and better storability, and requires less capital and labour to produce than the most common specie, *D. rotundata.* Exploitation of the industrial potential of *D. alata* by diversifying its utilisation through the development of novel products will expand its utilisation. This study therefore investigated the potential of developing instant poundo yam flour from *D. alata*. Instant poundo yam flour was prepared from *D. alata* by peeling, dicing and immersing yam tubers in sodium metabisulphite solution (800 ppm for 20 min). The tubers were thereafter blanched at 70 ^{o}C for either 5 or 10 min, dried in a cabinet dryer at 60 ^{o}C for 72 hr, milled and sieved (600 µm) to obtain two experimental samples of poundo yam flours. The proximate composition of the flours was determined using standard methods. Sensory evaluation was conducted to determine the sensory attributes [colour, flavour, taste, textural quality (strecthability, adhesiveness, cohesiveness, smoothness) and general acceptability] of the flours. The two instant poundo yam samples were further compared with a commercial poundo yam in terms of the sensory attributes. There was no significant difference ($p \leq 0.05$) in the proximate composition of the two experimental instant poundo yam samples but their textural quality differed significantly ($p \leq 0.05$). Instant poundo yam blanched for 10 min recorded higher sensory scores than the one blanched for 5 min and compared fairly well with the reference sample. An acceptable instant poundo yam has been developed from *D. alata.* @JASEM

Keywords: D. alata, instant poundo yam, proximate composition, sensory attributes

Yams, the most important staple food in West Africa, after cereals (Ekwu et al., 2005; Shajeela et. al., 2011), belong to the Dioscoreaceae family. Yam, with its appreciable content of essential dietary nutrients, has been reported to have nutritional superiority when compared with other tropical root crops (Eka, 1988; Bhandari et al., 2003; Shanthakumari et al., 2008; Maneenoon et al., 2008; Arinathan et al., 2009; Shajeela et al., 2011). About 94 % of the world population of yams is in Africa and Nigeria is the leading producer in the continent (Akinwande et. al., 2008). The important yam species in Nigeria include *Dioscorea rotundata* (white yam), *Dioscorea alata* (white yam), *Dioscorea cayensis* (yellow yam), *Dioscorea bulbifera* (aerial yam or air potato), *Dioscorea esculenta* (Chinese yam) and *Dioscorea dumentorium* (trifoliate yam). Traditional foods derivable from yam tubers include chips, *fufu*, *amala* and pounded yam. Pounded yam is the most prominent among the traditional foods as its consumption cuts across the major tribes of Nigeria. It is also exclusively prepared during yam festival, to usher in the arrival of new yams. However, yam pounding is time and energy consuming. In order to remove the drudgery associated with the preparation of pounded yam, food scientists came up with the idea of instant poundo yam. The technology of instant poundo yam is simple; it involves peeling, washing, dicing, sulphiting, blanching, drying and milling of yam tubers. The resulting powdered yam flour is the instant poundo yam which only requires being stirred in boiling water to obtain the pounded yam.

Of all the *Dioscorea spp.*, *D. rotundata* is the most widely cultivated and consumed in Nigeria, with the other *Dioscorea species* being underutilised and gradually slipping into extinction. *D. rotundata* is the usual species in the production of instant poundo yam. *Dioscorea alata*, a climbing plant with glabrous leaves and twining stems which coil readily around a stake, is a highly economical yam species (Udensi et al., 2008). *D. alata* has been suggested to possess potential for increased consumer demand due to its low sugar content, an important factor for diabetic patients. The antinutrients in *D. alata* are low when compared to other tropical root crops (Udensi et al., 2010). Abara et al. (2011) reported that *D. alata* is low in dietary fibre. Akinwande et al. (2008) and Okorie et al. (2011) also reported on the effect of steaming methods and time on the quality attributes of flour from *D. dumentorum, D. alata, D. rotundata* and *D. cayensis*. Okorie et al. (2011) suggested the use of underutilised yam species such as *D. alata* in the production of instant flour because of their higher hot and cold paste viscosities as well as high set back and index of gelatinization values in pounded yam flour.

This research work therefore aimed at evaluating the suitability of *Dioscorea alata* in the production of instant poundo yam. It also assessed the proximate and sensory attributes of the instant pounded yam.

MATERIALS AND METHODS

Materials: D. alata was purchased from a local market in Iwo, Osun State. Sodium metabisulphite (Sigma Chemical) was obtained from the Laboratory of Food Science and Technology, Bowen University, Iwo, Nigeria.

Preparation of instant pounded yam: Instant pounded yam was produced according to the method of

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Akinwande et al. (2008), with modification. Washed and drained yam tubers were peeled, diced ($2cm^3$) and immersed in sodium metabisulphite solution (800 ppm for 20 min) to delay enzymatic browning. The diced yams were thereafter blanched at 70 ^oC for either 5 or 10 minutes. Diced yam samples were dried in a cabinet dryer at 60 ^oC for 72 hr, milled to powder by a micro mill and sieved (600 µm). Fig. 1 shows the flow chart for the production of the instant pounded yam flour.

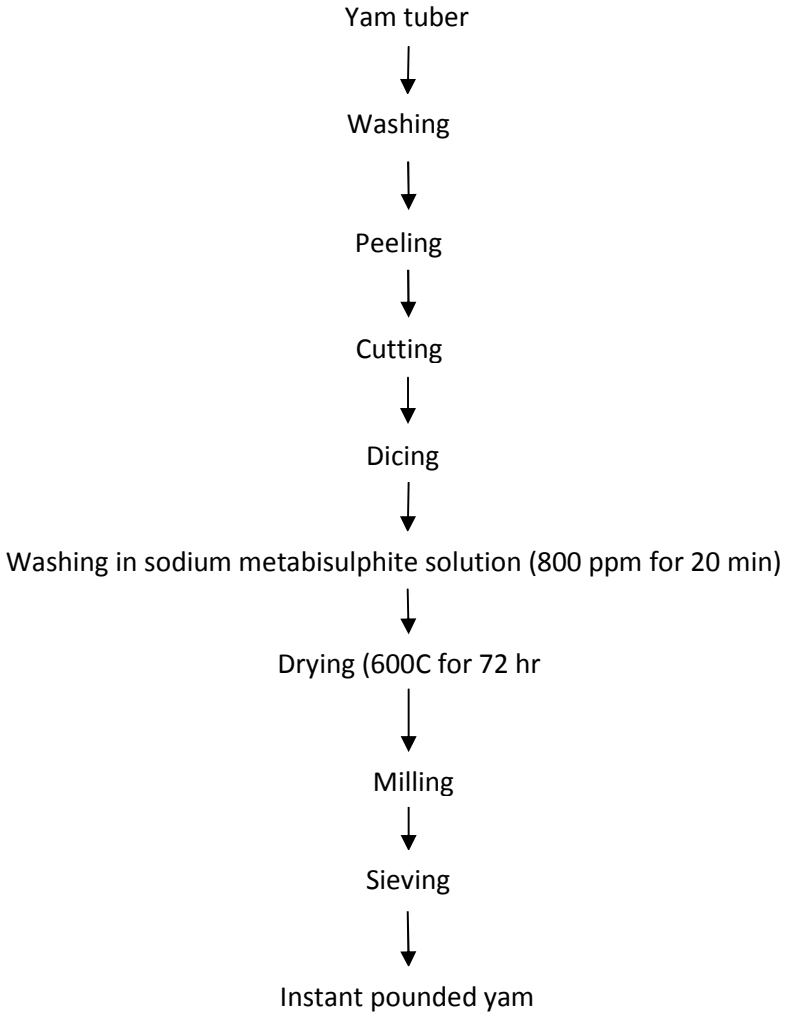

Fig. 1: Flow chart for the production of instant pounded yam

Proximate analysis: The moisture, crude protein (N x 6.25), crude fat, ash and crude fibre were determined according to AOAC (1995). Carbohydrate was determined by difference.

Sensory evaluation: Samples of instant pounded yam were evaluated by the hedonic rating and multiple comparison tests, using 10 trained assessors who are familiar with the product. Coded samples were evaluated for colour, taste, flavour, textural quality (strecthability, adhesiveness, cohesiveness, smoothness) and overall acceptability, using a 10 point hedonic scale where 1= dislike extremely, 5= neither like nor dislike and 9= like extremely. In the multiple comparison test, a commercial instant poundo yam, tagged R, was used as a reference against which assessors were asked to compare stretchability, cohesiveness, smoothness, adhesiveness, colour and taste of the instant pounded yam samples.

Data analysis: All the data were analysed using analysis of variance and Duncan's multiple range test (SAS, 1995).

RESULTS AND DISCUSSION

The result of proximate composition of the instant poundo yam samples is presented in Table 1. Instant poundo yam flours blanched at 5 and 10 minutes had the same moisture (8.8 %) and crude fat contents (0.7

%). There was no significant difference ($p \leq 0.05$) in the proximate composition of the instant poundo yam flours blanched for 5 and 10 min. The protein and ash contents obtained for poundo yam flour in this study are lower than those reported by Udensi et al. (2008), may be due to differences in varieties and processing methods. The ether, crude fibre and carbohydrate contents are, however, within the range reported by Udensi et al. (2008). The low fibre contents of the poundo yam flours agreed with the report of Abara et al. (2011) that *Dioscorea* species are low in fibre. Fortification efforts to improve the protein and fibre contents of poundo yam with appropriate plant foods that will not adversely affect its acceptability are therefore essential.

Table 1: Proximate composition of instant pounded yam blanched for 5 and 10 min

Blanching duration (min)	Moisture (%)	Crude protein (%)	Crude fat (%)	Crude fibre (%)	Ash (%)	Carbohydrate (%)
5	8.8 ± 0.12a	3.9 ± 0.00a	0.7 ± 0.00a	1.2 ± 0.00a	1.9 ± 0.05a	83.5 ± 0.08a
10	8.8 ± 0.09a	3.8 ± 0.05a	0.7 ±0.00a	1.1 ± 0.05a	1.8 ± 0.05a	83.8 ± 0.14a

Means with same letters in the same columns are not significantly different at $p \leq 0.05$

The mean hedonic scores of the sensory attributes of the instant poundo yam are presented in Table 2. Blanching improved the sensory quality of the instant poundo yam since assessors rated the instant poundo yam blanched for 10 min much higher than the one blanched for 5 min in all the sensory attributes. According to Fellows (2000), blanching brightens the colour of some foods by removing air and dust on the surface and thus altering the wavelength of reflected light. Significant differences ($p \leq 0.05$) were observed in the sensory attributes of the instant poundo yam blanched for 5 and 10 min. Instant poundo yam blanched for 10 min compared fairly well with the reference sample (Table 3). Hence, blanching of *Dioscorea alata* at 70 ^{o}C for 10 min ensured adequate enzyme inactivation, and prevented excessive softening and loss of flavour in instant poundo yam.

Table 2: Sensory attributes of instant pounded yam blanched for 5 and 10 min

Blanching duration (min)	Colour	Flavour	Texture	Taste	Overall acceptability
5	6.8a	6.5a	6.4a	5.8a	6.8a
10	8.6b	7.6b	7.9b	7.8b	8.2b

Means with same letters in the same columns are not significantly different at $p \leq 0.05$

Table 3: Mean scores of the comparison test of instant pounded yam (*iyan*)

Instant pounded yam	Stretchability	Cohesiveness	Smoothness	Adhesiveness	Colour	Taste
5 min blanching	1.8^{a}	2.2^{a}	2.7^{a}	2.2^{a}	2.0^{a}	2.4^{a}
10 min blanching	2.6^{b}	3.6^{b}	2.9^{a}	3.8^{b}	2.8^{b}	3.8^{b}
Reference	5.0^{c}	5.0^{c}	5.0^{b}	5.0^{c}	5.0^{c}	5.0^{c}

Means with same letters in the same columns are not significantly different at $p \leq 0.05$

Conclusion: Instant pounded yam from water yam is low in protein and crude fibre. It may therefore be beneficial if other plant sources are added to poundo yam to increase its nutritional value. The low fat content of instant poundo yam from water yam may be especially beneficial to those people suffering from non communicable diseases such as heart disease and stroke, diabetes, cancer and chronic lung disease.

Blanching of *Dioscorea alata* at 70 ^{o}C for either 5 or 10 min did not produce any significant difference ($p \leq 0.05$) in the proximate composition of instant poundo yam. However, blanching of *Dioscorea alata* at 70 ^{o}C for 10 min resulted in instant poundo yam of significantly ($p \leq 0.05$) higher sensory qualities than the one produced from blanching at 70 ^{o}C for 5 min. Instant poundo yam blanched for 10 min compared fairly well with the reference sample produced fron *D.* rotundata. *Dioscorea alata* can therefore be used to produce an acceptable instant poundo yam.

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