SASHA
Sweetpotato Action for Security and Health in Africa

AUG 2018

To eat or not to eat the peel of sweetpotato

Results of this experiment, clearly prove that it is best from a nutrition standpoint to carefully wash, but not peel your orange-fleshed sweetpotato root before cooking.

Fig. 1 Washing and drying of roots for NIRS analysis at the CIP Quality Laboratory in Maputo, Mozambique. Credit: G. Makunde

What is the problem?

Agriculture supports 99% of the millions of households in Mozambique in terms of food, income and employment (ADB 2011). In Mozambique, stunting is 43% (Ministry of Health 2011) which underlies more than a third of deaths among children less than five years. Prevalence of malnutrition is spatially distributed in Mozambique, highest in Nampula Province with 55%. The cost of malnutrition is 10.9% of GDP which is equivalent to 1.6 billion USD according to a study 'The Cost of Hunger in Africa' (2017). Sweetpotato plays a vital role in combating food shortages and malnutrition and has potential to maintain human health and mitigate the diseases. A common practice in cooking the sweetpotato root is to peel before cooking. The literature, however, indicates that peels contain several minerals and dietary fiber. Hence, it would be useful to know for all 14 released orange-fleshed sweetpotato (OFSP) varieties in Mozambique, the difference in nutritional quality between peeled and unpeeled roots.

How did we setup the study?

The main objective of our work was to assess the nutrient losses associated with peeling sweetpotato from 14 Orange-fleshed Sweetpotato (OFSP) varieties released in Mozambique (Table 1). Samples for quality evaluation were taken from harvested trials at Umbeluzi Research Station and Nwalate Farm in 2016, 2017 and 2018 sweetpotato growing seasons. The field trials had three replications in each season.

NUMBER	NAME OF GENOTYPE	ORIGIN	YEAR OF RELEASE
1	Namanga	Bred by CIP-Mozambique	2011
2	Lourdes	Bred by CIP-Mozambique	2011
3	Melinda	Bred by CIP-Mozambique	2011
4	Irene	Bred by CIP-Mozambique	2011
5	Delvia	Bred by CIP-Mozambique	2011
6	Ininda	Bred by CIP-Mozambique	2011
7	Amelia	Bred by CIP-Mozambique	2011
8	Jane	Bred by CIP-Mozambique	2011
9	Gloria	Bred by CIP-Mozambique	2011
10	Victoria	Bred by CIP-Mozambique	2016
11	Resisto	USA	2000
12	Alisha	Bred by CIP-Mozambique	2016
13	Ivone	Bred by CIP-Mozambique	2016
14	Esther	Bred by CIP-Mozambique	2011

Table 1: Orange-fleshed Sweetpotato Genotypes Evaluated over 3 seasons (2016, 2017, 2018)

CIP
INTERNATIONAL POTATO CENTER
A CGIAR RESEARCH CENTER

CGIAR RESEARCH PROGRAM ON Roots, Tubers and Bananas

Fig. 2 Peeled and unpeeled root samples of the OFSP variety Sumaia prior to cutting for freeze drying at the CIP Quality Laboratory in Maputo, Mozambique. Credit: G. Makunde.

Fig. 3 Sliced samples from unpeeled and peeled roots that will be freeze dried and subsequently sent for NIRS analysis. Credit: G. Makunde

Sample preparation: Three roots were randomly selected from each plot and sent to CIP laboratory in Maputo, Mozambique to assess quality traits. The protocol as described in Burgos et al. (2009) was followed, whereby three roots were washed with water, towel dried and allowed to air dry for 3 hrs (Fig.1). Two treatments were established during processing of samples – peeled and unpeeled (Fig. 2). Approximately 1 mm layer of peel was removed using a handheld potato peeler to remove the periderm (peel). The three roots were combined. Then a 50g sample of peeled and unpeeled (Fig. 3) were freeze dried in a vacuum freeze dryer for 72 hours. After freeze drying, key quality traits were measured, such as dry matter. Near-infrared reflectance spectroscopy (NIRS) technology was used to determine beta-carotene, starch, sucrose, fructose, glucose, protein, iron and zinc contents in milled samples derived from the freeze-dried samples.

What did we learn?

Our study had two major findings. The first finding relates to traits associated with palatability of sweetpotato storage roots. Dry matter, starch content and associated monosaccharides, fructose and glucose were not significantly different between the peeled and non-peeled samples. Starch is evenly distributed across the root sections. This, in turn, affects the dry matter content since starch and sugars are the primary nutrients in sweetpotato, accounting for 80-90% of the dry matter. Quantitatively, starch is the major component accounting for 60 to 70% on a dry matter basis (Wolfe 1992). Both the peeled and non-peeled sweetpotato have the same palatability since this is heavily influenced by the carbohydrate composition.

The second finding was associated with the concentration of micronutrients in peeled and non-peeled samples. Concentration of beta-carotene, iron and zinc in raw, freeze-dried roots were significantly higher in the non-peeled than peeled samples as shown in Fig. 4. The means for beta-carotene, iron and zinc were 24.30 ± 5.97, 2.13 ± 0.19 and 1.25 ± 0.15 (mg/100g, DW) respectively in unpeeled samples. In peeled samples, the means for beta-carotene, iron and zinc were 16.04 ± 5.67, 1.89 ± 0.23 and 1.06 ± 0.15 (mg/100g, DW), respectively. Thus, eating OFSP with peels supplies more of these three key micronutrients: beta-carotene, iron and zinc in the body. Additionally, total protein content was significantly higher in the unpeeled than peeled samples. Unpeeled raw, freeze-dried root samples had a mean of 3.83 ± 0.59 compared to 3.1 ± 0.57 percent protein content for the peeled samples. Valuable proteins can be extracted from the peel during the processing of sweetpotato.

The recommendation from this study is quite clear: Carefully wash the storage roots and eat the peel along with the flesh to maximize on all micronutrients and protein endowed in OFSP. The skin retains nutrients and enhances nutritional quality after cooking.

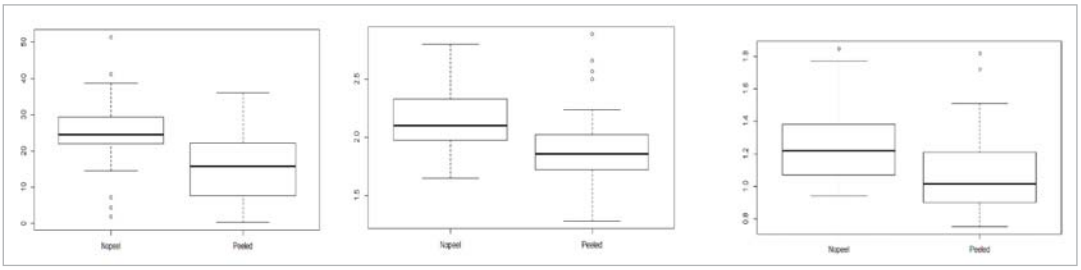

Fig. 4 Boxplot showing significant differences observed between means of non-peeled (left boxplot) and peeled (right boxplot) samples for beta-carotene (mg/100g, DW) (left), iron (mg /100g, DW) (center) and zinc (mg/100g, DW) (right).

References

1. African Development Bank, Mozambique. (2011). Regional Integration Strategy Paper 2011 – 2015.
2. Burgos G., Carpio, R., Sanchez, C., Sosa, P. Porras, E. Espinoza, J. & Grüneberg, W. (2009). *Guide for Using the RHS Colour Chart for Selecting for High β-carotene Sweetpotato*. Lima, Perú; International Society for Tropical Root Crops.
3. Ministry of Health. Demographic and Health Survey 2011. (2012). National Institute of Statistics, ICF International (ICFI), Ministry of Health of the Republic of Mozambique. Calverton, Maryland.
4. Woolfe J.A. (1992). Sweet potato: An Untapped Food Resource. Cambridge, UK, Cambridge University Press.

CONTACTS

Amandio Ussaca (CIP)
A.Ussaca@cgiar.org

Godwill S. Makunde (CIP)
G.Makunde@cgiar.org

Maria Andrade (CIP)
M.Andrade@cgiar.org