

# **Nutrient and sensory quality of orange-fleshed sweet potato**

**by**

**Christina Stephanie Leighton**

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**Department Consumer Science**

**School of Agricultural and Food Sciences  
University of Pretoria  
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**Study leaders: Prof HC Schönfeldt  
Dr R Kruger**

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## **ABSTRACT**

### **Nutrient and Sensory quality of orange-fleshed sweet potato**

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Christina Stephanie Leighton

Leaders: Dr HC Schönfeldt  
Dr R Kruger

Department of Consumer Science  
Faculty Natural and Agricultural Sciences  
University of Pretoria

#### **for the Master's Degree in Consumer Science**

Vitamin A deficiency has been recognised as a widespread problem affecting about 750 million people, mostly in developing countries. Mortality due to vitamin A deficiency can be reduced by as much as 23 % with improved vitamin A status. Vitamin A's immune-enhancing aspects strengthen the body's defence system against infectious diseases such as measles, malaria and diarrhoea, thus preventing death. Children beyond the weaning age (6 months to 6 years) are most at risk. In South Africa, one in three children has a low vitamin A status, with the rural areas being most affected. Orange-fleshed sweet potato (OFSP) has emerged as a promising plant source with a high beta-carotene content that can make a significant contribution to the vitamin A intake of individuals at risk of vitamin A deficiency.

The purpose of this study was to determine the nutrient and sensory quality of OFSP. To this end, the nutrient content of different cultivars of OFSP was determined as well as the sensory characteristics and consumer acceptability was established.

During the first phase, four different cultivars of OFSP i.e. Resisto, W119, Jewel and A15, plus one composite sample, all cultivated by the Agricultural Research Council (ARC)-Roodeplaat, South Africa, were sampled for nutrient analysis. During the second phase (descriptive sensory analysis), four OFSP cultivars and one white-fleshed sweet potato (WFSP) cultivar i.e. Blesbok, were evaluated. A trained sensory panel was used

to establish terminology for describing the sensory attributes of the different sweet potato cultivars in terms of its aroma, texture, flavour and aftertaste attributes. Consumer preference (n=180) for OFSP and WFSP was measured by means of a paired preference test. Focus group discussions were conducted to verify findings of the consumer preference test.

The results obtained from the nutrient analysis confirmed that OFSP is an excellent source of beta-carotene. A 100 g portion of cooked OFSP can provide up to 6528 µg beta-carotene, which is approximately 136 % of the RDA for vitamin A for children four to eight years. High levels of other nutrients present in OFSP were identified namely vitamin C, calcium and zinc. OFSP further contributes 28 % vitamin C, 13 % calcium, 15 % magnesium and 75.6 % zinc of their daily requirements. This study confirms the valuable contribution that OFSP can make as a food-based approach to reduce vitamin A deficiency in individuals at risk.

The sensory profiles indicated that OFSP differed from WFSP in colour, flavour and texture. OFSP is generally less moist and subsequently more dense and adhesive compared to WFSP. The latter being more fibrous and less firm than OFSP. Overall OFSP had an earthy aroma which was not typical of WFSP and had a sweeter flavour. The flavour of OFSP was described as similar to that of yellow vegetables such as butternut and pumpkin. Although the different OFSP cultivars had similar characteristics, differences were found in the moist, adhesive and grainy texture attributes as well as the vegetable sweet flavour. Resisto had the sweetest in flavour, with the most dense and pasty texture of the four OFSP cultivars. W119 had the grainiest texture. No significant differences were found in the earthy aroma, sweet potato and yellow vegetable flavour attributes. It can be concluded that in flavour, few differences were found among the OFSP, except in sweetness. OFSP differed primarily from each other in texture.

The consumer preference test results showed that overall 85 % of respondents preferred the taste of OFSP to that of WFSP, 53 % liked the orange colour a lot while 24 % liked the colour a little and the remaining 22 % disliked the colour (either a lot, a little, neither like nor dislike). The majority of the consumers (86 %) indicated a willingness to buy OFSP. From these results it can be concluded that the taste and colour of OFSP are

acceptable to consumers of sweet potato and that it has potential to be successful in the marketplace.

Given the high level of consumer acceptability of OFSP, an opportunity exists to address vitamin A deficiency through commercially viable decentralised vine production centres. Such centres could be managed by commercial-, small-scale- and subsistence farmers in South Africa in key sweet potato production areas, with adequate water supply throughout the year. However, availability of commercially produced OFSP in retail stores in recent months, may change this prospect.

Key words: Orange-fleshed sweet potato, sweet potato, nutrient analysis, sensory profiles, consumer acceptance.

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## LIST OF ABBREVIATIONS

AI	Adequate Intake
ANOVA	Analysis of variance
AOAC	Association of Official Analytical Chemists
ARC-ANPI	Agricultural Research Council-Animal Nutrition and Animal Products Institute
ASTM	American Society for Testing and Materials
DRI	Dietary Reference Intake
g	gram
HPLC	High Performance Liquid Chromatography
kJ	kiloJoules
kcal	kilocalories
kg	kilogram
LSD	Least significant difference
MIC	Meat Industry Centre
mg	milligram
NFSC	National Food Consumption Survey
OFSP	Orange-fleshed sweet potato
PC	Principal Component
PCA	Principal Component Analysis
PPECB	Perishable Products Export Control Board
QDA	Quantitative Descriptive Analysis
r	Correlation coefficient
RDA	Recommended Dietary Allowances
SANAS	South African National Accreditation Services
SAVACG	The South African Vitamin A Consultative Group
%	Percentage
µg	Microgram
USDA	United States Department of Agriculture
WFSP	White-fleshed sweet potato