Food Research 3 (5) : 515 - 524 (October 2019)
Journal homepage: http://www.myfoodresearch.com

FOOD RESEARCH

FULL PAPER

Sensory evaluation of instant noodles produced from blends of sweet potato, soybean and corn flour

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Article history:
Received: 14 November 2018
Received in revised form: 8 February 2019
Accepted: 10 February 2019
Available Online: 12 April 2019

Keywords:
Noodles,
Formulation,
D-optimal,
Sensory evaluation,
Optimization

DOI:
https://doi.org/10.26656/fr.2017.3(5).305

Abstract

Wheat flour is unique for noodles production, but due to the high cost of wheat, its continuous use in a developing economy is no longer encouraged. This study was aimed at determining the sensory effect of full substitution of non-wheat flour in noodles production. D-optimal mixture-process experimental design of the response surface methodology (RSM) was adopted. Thirty-nine (39) samples of noodles were formulated, each with blends of sweet potato, soybean and corn flour. The respective formulation design constraints were sweet potato flour ($10\% \leq x_1 \leq 61\%$), soybean flour ($5\% \leq x_2 \leq 20\%$), corn flour ($5\% \leq x_3 \leq 30\%$), and water ($25\% \leq x_4 \leq 37\%$). Other components of the formulation were salt (2.5%), sodium carbonate (0.5%), guar gum (0.5%), and soy lecithin (0.5%). The processing factors investigated were mixing time (2 mins $\leq z_1 \leq$ 10 mins), frying time (1 min $\leq z_2 \leq$ 3 min), and frying temperature (140°C $\leq z_3 \leq$ 160°C). The formulated instant noodles were subjected to a 9-point hedonic scale sensory evaluation by a panel of semi-trained panellists who had been eating noodles for a long time, and the best formulations were determined in accordance with a preference test. Optimization analysis on the data obtained from the sensory session showed that blend of 23.31% of sweet potato flour, 28.53% of soya bean flour, 18.02% of corn flour, 26.15% water, 2.75 minutes mixing time, 1.35minutes frying time, and 140°C frying temperature, with the highest desirability index of 0.72, produced the best composite instant noodles in terms of taste, texture, flavour, appearance, and overall acceptability. The proximate compositions, cooking, physical and sensory properties of this optimal formulation were: 13.17% moisture content, 6.62% ash content, 22.86 crude protein, and 37.71% energy value, 16.00% crude fat and, 4.64% crude fibre, 5.42 minutes cooking time, 26.45 g cooking weight, 164.49 water absorption index, 0.77 bulk density, 6.41 taste, 8.25 texture, 7.66 flavour, 6.22 appearance, and 5.33 overall acceptability. The D-optimal mixture-process design was used to evaluate the effect of changes in mixture compositions and the three processing factors on the main proximate, cooking and physical qualities of instant noodles. The effects were established through analysis of variance at 5% level of significance. The quadratic x mean model for taste, the reduced special cubic x cubic model for texture, the reduced special cubic x cubic model flavour, the quadratic x mean model for appearance, and the quadratic x mean model for overall acceptability were all found to be statistically significant at 5% level of significance ($p<0.05$).

1. Introduction

In Nigeria, ready-to-eat baked products (snacks) consumption is continually growing and there has been increasing reliance on imported wheat (Olaoye *et al.,* 2006). Since wheat cannot perform well under tropical climate, the country had over the years been dependent on wheat imports mostly from the United States. Wheat importation had detrimental effects on the Nigerian economy involving huge expenditure of foreign exchange. The economy of the country would be improved if other staple food crops that are grown locally are exploited. In Nigeria, staple crops that are grown which can be used as substitutes for wheat for baked foods include cassava, yam or sweet potatoes and cereals (Shittu *et al.,* 2007; Baljeet *et al.,* 2014; Oluwamukomi *et al.,* 2011).

Efforts have been made to partially replace wheat flour with non-wheat flours as a possibility for increasing

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eISSN: 2550-2166