Nutritional enhancement of Kenyan porridges: Chia seed and oyster mushroom fortification

AUTHORS

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1. Introduction

The CHIAM project is an ambitious initiative that seeks to develop a climate-smart solution for sustainable food systems in Africa, addressing the complex challenges presented by the Food Systems and Climate (FOSC) call.

In collaboration with the main CHIAM project, the project partner in Germany is working on fortifying local staple foods with chia seeds and oyster mushrooms, with an aim of providing essential nutrients to the local communities. To assess the potential benefits of this fortification, traditional Kenyan porridges made from white maize, sorghum, and pearl millet are being examined for improvements in nutritional quality and technological effects.

2. Materials and Methods

Substitution levels of 3 %, 6 %, and 9 % of the cereals are being tested with ground chia seeds or oyster mushrooms, as well as combinations for thick porridge. Nutritional values of the obtained recipes are calculated by Prodi® compact.

3. Results

RVA

It is clearly evident for recipe 3 (compare Fig. 3) that the substitution of the maize flour with increasing amounts of oyster mushrooms leads to a reduced viscosity. Higher amounts of chia seeds, on the other hand, have an increasing effect on the viscosities, although these still remain below that of the M2 standard.

Rheometer

For porridge recipe 1 the LVE-region remains the same for all recipes. However the levels of the storage and loss modules decrease with samll substitution levels ad increase from 30 % substitution levels again. The porridge behaves more like a liquid compared to porridge recipes 2 and three which behave more solid like.

TPA

For porridge recipe 2 a tendency of increasing stickiness and firmness is observed with increasing substitution levels of maize flour by ground chia.

Nutritional values

A reduction of carbohydrates and kaloric values is obtained by substitution, but also an increase in protein, fat and dietary fibre content. The fat includes of course also unsaturated fatty acids. However, these first three calculations are based on defatted chia flour.

Tab. 1 Calculated nutritional values of the porridge recipes with combined substitution.

	reference	3ch3mush	6ch6mush	9ch9mush	Unit per 100 g
dietary dibre	0	0.9	1.75	2.58	g
protein	2.67	3.06	3.53	3.99	g
fat	0.33	0.4	0.48	0.55	g
kilojoule	2020.67	1950.3	1961.93	1973.11	kJ
kilocalories	482.67	465.86	468.63	471.3	kcal
carbohydrates	25	23.75	23.52	23.3	g
water	66.65	66.65	65.35	64.09	g

4. Outlook

The data will be analysed further and sensory tests regarding the acceptability will be performed at DeKUT. Other cereal based products (muffins, bread) are optmized and evaluated currently. The nutritional values of the resultinng recipes will be calculated.

Fig.1 Chia seeds (left), thick porridge, oyster mushrooms and ground chia seeds (middle), working group on the project (right).

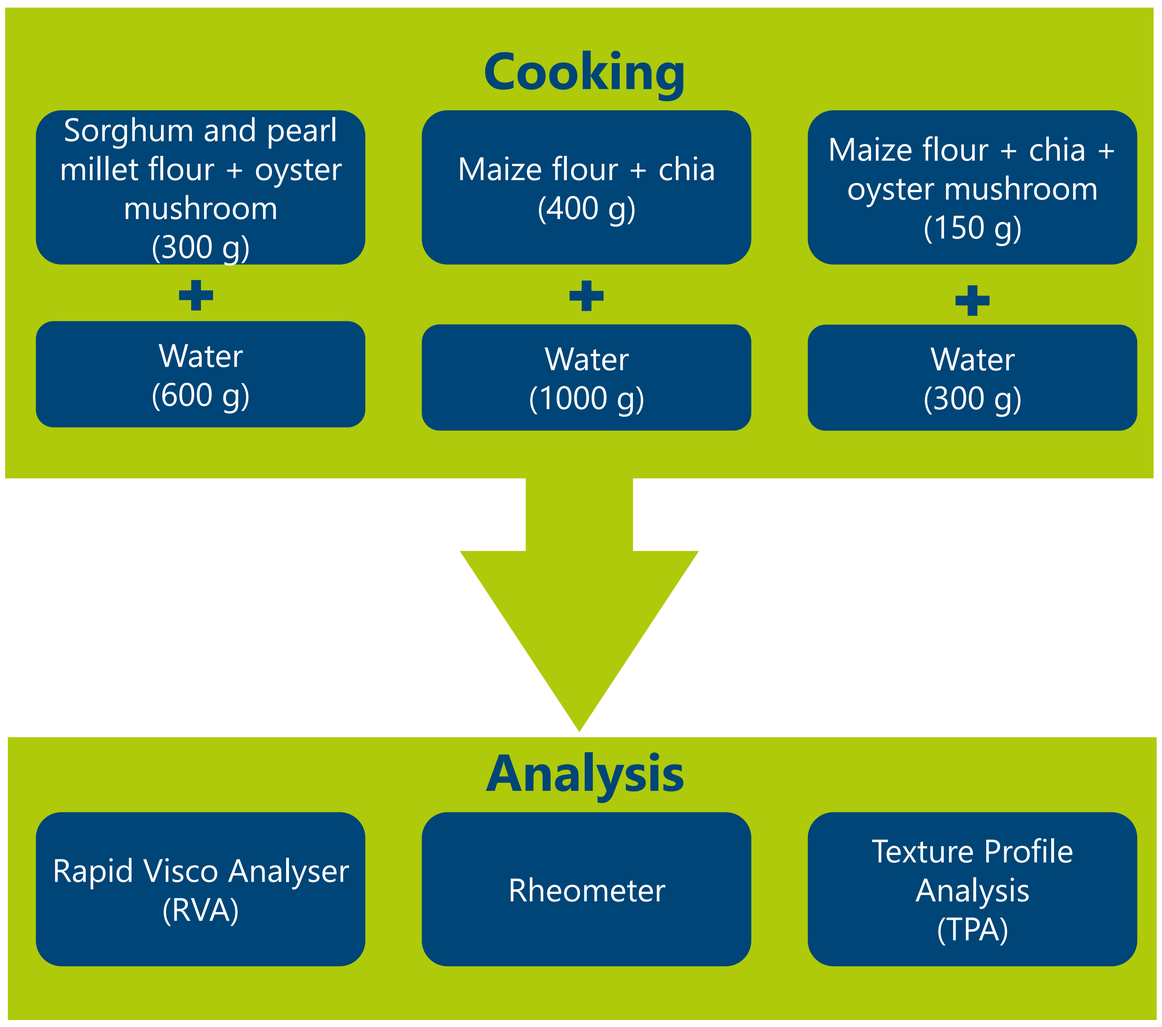

Fig. 2 Recipes for the 3 different porridge recipes: thin based on pearl millet and sorghum (left), thick based on maize flour with chia (middle) and with chia and oyster mushroom (right).

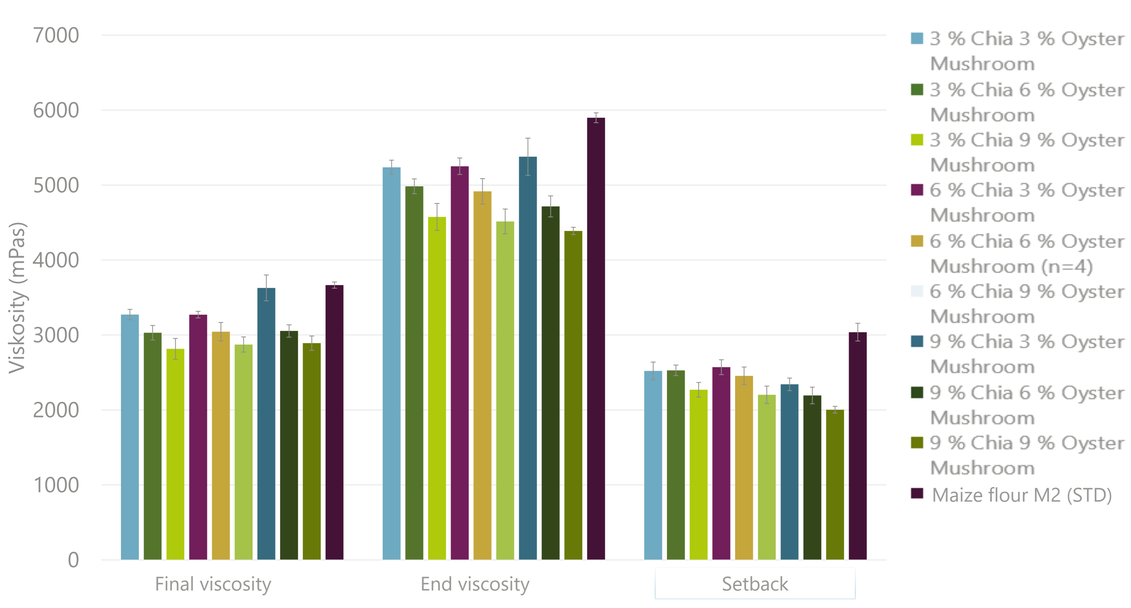

Fig. 3 RVA results for the thick porridge with chia and oyster mushroom supplementation.

This work was financially supported by the German Federal Ministry of Food and Agriculture (BMEL) through the Federal Office for Agriculture and Food (BLE) grant number 2821ERA19C.
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 862555. the work has been performed within the ERA-NET "FOSC".

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