FUNCTIONAL PROPERTIES AND SENSORY QUALITY OF FERMENTED COCOYAM (*Xanthosoma sagittifolium*) FLOUR AND ITS COOKED PASTE

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BACKGROUND

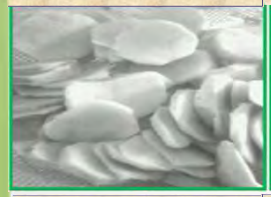
- Cocoyam is one of the neglected underutilized crops that is widely grown in sub-Sahara African countries. The crop is termed to be inferior to yam, although it has been a subsistence crop and a staple food for millions of people in tropics
- Underutilize crop such as cocoyam are now used in product development to produce more products as the world population increases (Idowu *et. al.,* 1996). It is therefore important to open new areas of consumption and utilization which will enhance its cultivation and commercial production
- *Xanthosoma sagittifolium* is nutritionally superior to many root and tuber crop. It is easily digested, has protein of good quality, contains good content of calcium, phosphorus, Pro-vitamin A and vitamin B6 which helps the body to properly metabolise glucose and prevents high blood pressure (Sefa Dedeh and Agyir-Sackey, 2004)
- The variety of yam used, process variables such as parboiling, steeping and drying time, and temperature can affect the quality of the flour and its cooked paste (Babajide *et. al.*, 20061; Ukpabi *et. al.*, 2008)

The objectives of this study are to:

- Evaluate the effect of steeping time and drying temperature on functional properties of fermented cocoyam flour
- Determine the quality and consumer's acceptability of the cooked paste obtained from the fermented cocoyam flour

Cocoyam (*Xanthosoma sagittifolium)* Tuber

Peeled Cocoyam Tuber



Steeped Cocoyam flour

Dried Cocoyam Chips

Fermented Cocoyam flour

Cooked Paste from Cocoyam flour

Table1: Effect of Steeping time and drying temperature on functional properties of fermented cocoyam flour

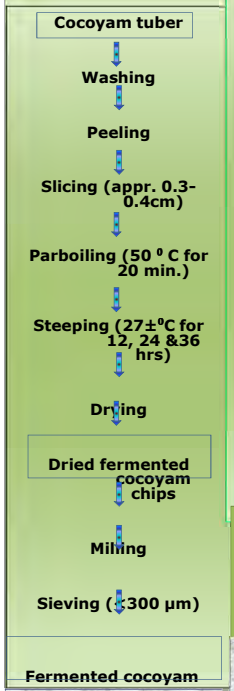
Steeping Time (h)	Drying	Bulk Density (g/ml)	Water Absorption Index (g/g)	Water Solubility Index (%)	Dispersibility (%)	Swelling Power (%)
12	Sun	0.73^{a,b}	1.47^{h}	8.95^{c,d}	28.50^{b}	5.21^{h}
12	Oven 50^{o}C	0.79^{c,d}	1.27^{e}	8.77^{c}	28.00^{b}	5.40^{i}
12	Oven 60^{o}C	0.72^{a}	1.22^{d}	10.36^{g}	25.50^{a}	4.42^{c}
12	Oven 70^{o}C	0.84^{e}	1.38^{f}	10.14^{f}	31.00^{c,d}	4.60^{d}
24	Sun	0.73^{a}	1.24^{d}	9.09^{d,e}	28.50^{b}	4.37^{c}
24	Oven 50^{o}C	0.78^{c}	1.11^{a}	9.27^{e}	32.50^{d,e}	7.10^{k}
24	Oven 60^{o}C	0.82^{d,e}	1.42^{g}	10.12^{f}	31.50^{d}	5.13^{g}
24	Oven 70^{o}C	0.90^{f}	1.73^{i}	8.88^{c}	31.00^{c,d}	4.23^{b}
36	Sun	0.83^{d,e}	1.13^{a,b}	6.64^{b}	32.50^{d,e}	4.93^{e}
36	Oven 50^{o}C	0.84^{e}	1.15^{b,c}	6.55^{b}	29.50^{b,c}	5.54^{j}
36	Oven 60^{o}C	0.83^{d,e}	1.23^{d}	6.57^{b}	34.50^{f}	5.04^{f}

Table2: Sensory evaluation of the cooked paste produced from fermented cocoyam (*Xanthosoma sagittifolium*) flour

Steeping (h)	Drying	Colour	Texture	Aroma	General Acceptability
12	Sun	7.11^{c,d}	7.25^{c,d}	7.19^{c,d}	7.08^{c}
12	Oven 50^{o}C	5.22^{b}	6.03^{b}	5.78^{b}	5.83^{b}
12	Oven 60^{o}C	7.08^{c,d}	6.78^{b-d}	6.83^{c,d}	6.97^{c}
12	Oven 70^{o}C	6.56^{c}	6.92^{c,d}	6.81^{c,d}	6.81^{c}
24	Sun	6.56^{c}	7.11^{c,d}	6.78^{c}	6.75^{c}
24	Oven 50^{o}C	6.86^{c,d}	6.56^{b,c}	6.89^{c,d}	6.64^{c}
24	Oven 60^{o}C	4.31^{a}	5.22^{a}	4.97^{a}	4.67^{a}
24	Oven 70^{o}C	6.69^{c}	6.72^{b-d}	6.92^{c,d}	6.86^{c}
36	Sun	7.64^{c,d}	7.39^{d}	7. 50^{d}	7.50^{c}
36	Oven 50^{o}C	6.56^{c}	6.69^{b-d}	6.81^{c,d}	6.69^{c}
36	Oven 60^{o}C	7.03^{c,d}	6.86^{c,d}	7.00^{c,d}	6.75^{c}
36	Oven 70^{o} C	7.08^{c,d}	6.83^{c,d}	7.03^{c,d}	7.22^{c}

Table 3:Effect of steeping time and drying temperature on pasting properties of fermented cocoyam (*Xanthosoma sagittifolium*) flour

Steeping (h)	Drying	Peak (RVU)	Trough (RVU)	Breakdown (RVU)	Final Viscosity (RVU)	Setback (RVU)	Peak Time (Min)	Pasting Temp (°C)
12	Sun	239.63^{b}	184.21^{d-f}	55.42^{c}	285.96^{c-e}	101.75^{d,e}	4.97^{e,f}	85.60^{a,b}
12	Oven 50^{o}C	241.25^{b}	181.71^{d,e}	59.55^{c,d}	277.88^{c,d}	96.17^{b,c}	4.86^{b-d}	84.53^{a,b}
12	Oven 60^{o}C	245.46^{b}	185.42^{d-f}	60.05^{d}	292.17^{d,e}	106.75^{f}	4.89^{c-e}	85.08^{a,b}
12	Oven 70^{o}C	244.67^{b}	174.71^{c,d}	69.96^{f}	272.42^{c}	97.71^{c,d}	4.76^{b}	84.18^{a}
24	Sun	207.75^{a}	170.72^{c}	37.58^{a}	275.20^{c}	104.17^{e,f}	5.13^{g}	87.40^{c}
24	Oven 50^{o}C	238.88^{b}	189.34^{e-g}	49.55^{b}	295.67^{e,f}	106.34^{e,f}	5.05^{f,g}	85.90^{b}
24	Oven 60^{o}C	212.92^{a}	144.42^{a}	68.50^{e,f}	225.75^{a}	81.34^{a}	4.62^{a}	84.83^{a,b}
24	Oven 70^{o}C	207.13^{a}	160.17^{b}	46.96^{b}	253.05^{b}	92.88^{b}	4.89^{c-e}	85.93^{b}
36	Sun	259.46^{c}	190.88^{e-g}	68.59^{e,f}	296.71^{e,f}	105.84^{e,f}	4.91^{c-e}	85.23^{a,b}
36	Oven 50^{o}C	270.21^{c}	205.75^{h}	64.46^{e}	317.17^{g}	111.42^{g}	4.91^{c-e}	84.73^{a,b}
36	Oven 60^{o}C	262.50^{c}	195.13^{f-h}	67.38^{e,f}	298.96^{e,f}	103.84^{e,f}	4.84^{b,c}	85.00^{a,b}
36	Oven 70^{o}C	266.46^{c}	199.96^{g,h}	66.50^{e,f}	307.21^{f,g}	107.95^{f,g}	4.96^{d-f}	81.1^{a,b}



Processing of Fermented Cocoyam flour

DISCUSSION

- Bulk density of fermented cocoyam flour was higher than both modified and native starches reported by Ojinnaka *et. al.,* (2009). Fermented cocoyam flour would exhibit better packaging properties than cocoyam starches
- Increase in water absorption index with steeping time suggests a better performance in texture of the sample, better digestibility and the maintenance of the freshness of its reconstituted paste
- Longer steeping time produced fermented cocoyam flour with better dispersibility value which indicates better reconstitution ability of the fermented flour (Shittu and Lawal, 2007)
- The cooked pastes prepared from all the fermented samples were acceptable to sensory panellists. Most preferred cooked paste was paste of sun-dried flour steeped for 36 hours
- Final viscosity of the fermented cocoyam flour showed that the flour would form a stable, higher thickening paste that will resist shear force during cooling. (Adeyemi and Idowu, 1990)
- The ability to withstand retrogradation increased as the steeping time increased in the samples dried at lower temperature as it is shown in the setback viscosity
- High pasting temperature of fermented cocoyam flour suggests the stability of its gel during processing, but also at a high cost of energy for preparation of its paste
- Fermented cocoyam flour processed by steeping for 36 hours, oven dried at 50°C has the highest peak, trough and final viscosities. This is an indication of flour with a better pasting quality

RESEARCH BENEFIT

The processing of the novel fermented cocoyam flour with acceptable cooked paste would add variety to food menu in Africa

CONCLUSION

Steeping for 36 hours and oven-drying at 50°C could be adopted for production of fermented flour from cocoyam (*Xanthosoma sagittifolium*) for an acceptable cooked paste

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