INFLUENCE OF SUNDRIED CASSAVA VARIETIES ON FUNCTIONAL PROPERTIES OF CASSAVA FLOUR

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ABSTRACT
The aim of this study was to compared Influence of cassava varieties on functional properties of cassava flour. Freshly harvested white cassava tuber and yellow cassava tuber of High-yielding, low-cyanide cassava roots of improved cultivar TME 419, TMS 01/1368, TMS 98/0505 (yellow) and TMS 30572 were obtained from the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria. Cassava roots (2 kg) were peeled manually with stainless steel knife, washed and cut into small pieces and then sun dried for 5 days. Dried samples were milled, sieved and packaged in air tight container prior to analyses. Functional properties were evaluated using a standard procedure. TME 419 (0.68g/cm^3) was higher in bulk density when compared with other samples. TMS 30572 was higher in pH (6.23) with least pH in TMS 01/1368 variety (6.13). Emulsion activities were significantly higher in TMS 98/0505 (yellow) (10.16%) with least emulsion activities in TMS 01/1368 (5.71%). Water retention was lesser in TMS 01/1368 with higher water retention in both TME 419 and 30572 varieties. Water absorption capacity was significantly higher in TME 01/1368 with least water absorption. Oil retention was significantly higher in cassava TMS 30572 with least value in TME 419 cassava. Oil absorption capacity was higher TME 30572 cassava flour which is significantly lower in TMS 01/1368. The study revealed that the significant varietal differences in the properties of various flours use, shows a potential for a wide end use.
Keywords: Cassava Varieties, functional properties, flour**,** pH and bulk density

INTRODUCTION
Cassava roots have a short shelf life due to postharvest physiological deterioration that occurs shortly after harvesting (Ayetigbo 2019). It causes discoloration of the roots making them unsuitable for consumption or being used as a raw material in the food industry. Moreover, the presence of hydrogen cyanide (HCN) in roots limits its usage in the food industry. Proper storage conditions have not yet been developed to overcome the high postharvest losses of cassava roots. Immediate channeling of the harvested cassava roots to form value-added materials is worthwhile to consider it as one of the ways for maximizing its utilization. Making flour is one of the best ways to prevent the short shelf life.
However, certain properties of cassava flour and starch, such as physical, chemical, physicochemical, pasting, and thermal parameters are important for their being useful in food industries. More so, some functional characteristics have been reportedly correlated with certain key qualities of the products produced from such flours (Ponzio *et al*., 2008; Linlaud *et al*., 2009).
Therefore, this study aimed to evaluate the functional properties of flour from selected cassava (*Manihot esculenta Crantz*) Varieties**.**

MATERIAL AND METHODS
Freshly harvested white cassava tuber and yellow cassava tuber of High-yielding, low-cyanide cassava roots of improved cultivar TME 419, TMS 01/1368, TMS 98/0505 (yellow) and TMS 30572 were obtained from the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria. Other materials for the study were obtained from the Animal Products and Processing Laboratories of the Departments of Animal Production, Faculty of Agriculture, University of Jos, Plateau State, were the study was carried out.

Flour production

Cassava roots (2 kg) were peeled manually with stainless steel knife, washed with 25 litres of potable water to remove adhering soil, and cut into small pieces and then sun dried for 5 days. Dried samples were milled, sieved (sieve size of 180 µm) and samples were packaged in air tight container prior to analyses.

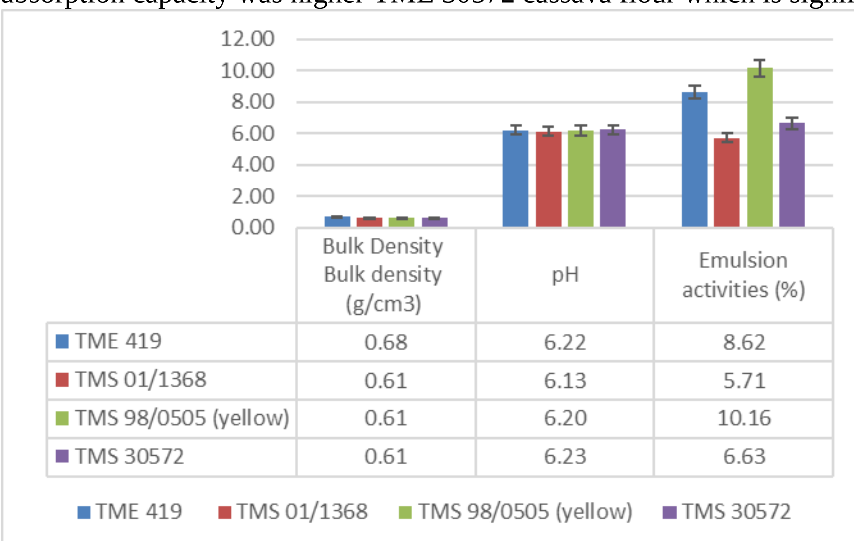
Functional Properties

Functional properties was done according to Bera *et al. (*1989) as modified by Odedeji *et al.* (2011)

RESULTS

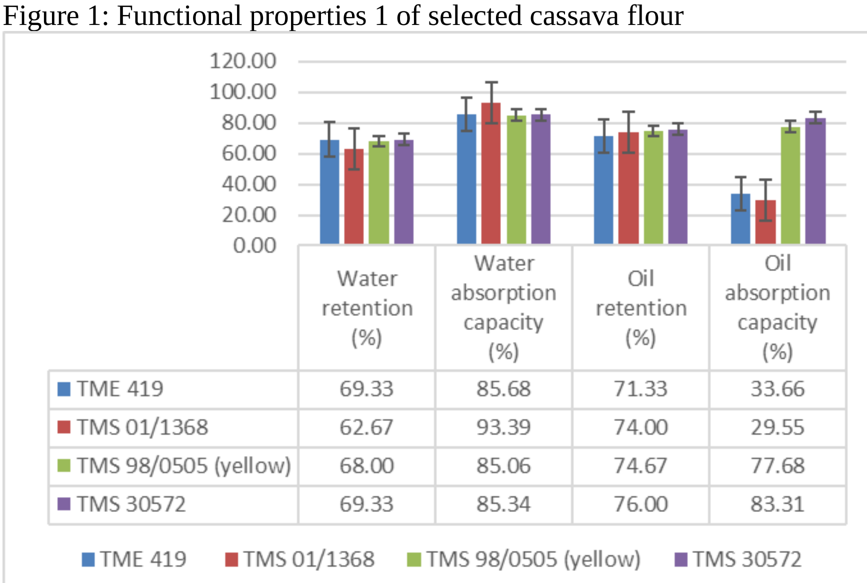
Figure 1 and 2 shows the functional properties of selected cassava flour. Bulk density was higher in TME 419 (0.68g/cm^3) compared with others. TMS 30572 was higher in pH (6.23) with least pH in TMS 01/1368 variety (6.13). Emulsion activities was significantly higher in TMS 98/0505 (yellow) 10.16% with least emulsion activities in TMS 01/1368. (5.71%).

Water retention was lesser in TMS 01/1368 with higher water retention in both TME 419 and 30572 varieties. Water absorption capacity was significantly higher in TME 01/1368 with least water absorption. Oil retention was significantly higher in cassava TMS 30572 with least value in TME 419 cassava. Oil absorption capacity was higher TME 30572 cassava flour which is significantly lower in TMS 01/1368.



	Bulk Density Bulk density (g/cm3)	pH	Emulsion activities (%)
TME 419	0.68	6.22	8.62
TMS 01/1368	0.61	6.13	5.71
TMS 98/0505 (yellow)	0.61	6.20	10.16
TMS 30572	0.61	6.23	6.63

Figure 1: Functional properties 1 of selected cassava flour



	Water retention (%)	Water absorption capacity (%)	Oil retention (%)	Oil absorption capacity (%)
TME 419	69.33	85.68	71.33	33.66
TMS 01/1368	62.67	93.39	74.00	29.55
TMS 98/0505 (yellow)	68.00	85.06	74.67	77.68
TMS 30572	69.33	85.34	76.00	83.31

Figure 2: Functional properties 11 of selected cassava flour

DISCUSSION

The bulk density is a reflection of the load the flour samples can carry, if allowed to rest directly on each other. The porosity of food products is determined by bulk density (BD) Nilusha *et al.* (2021). The BDs of the four flour samples were not significantly different (Figure 1). Klang *et al* (2020)., Dereje *et al.* (2020), and Anosike *et al.* (2020), mentioned that flours with BD lower than 1 g/mL can be used in manufacturing low-bulk weaning foods and high-energy foods. Hence, increase in bulk density increases the sinkability of powdered particles which in turn aids wetting by aiding their ability to disperse. pH is the acidity or alkalinity of substance. TMS 30572 cassava was higher in pH (6.23) with least pH in TMS 01/1368 variety (6.13). this could be due to the less acid in the cassava flour. Emulsion activities (EA) related to the ability of flour to bind water and fat together. Emulsion activities were influenced by protein solubility. The present study shows that TMS 98/0505 (yellow) cassava, had significantly higher emulsion activities (EA) values than Other cassava flours There is a positive correlation between protein content and EA (Nilusha *et al.*. 2021). This statement does agree with the present results as TMS 98/0505 (yellow) cassava flour showed high EA and it contained high amount of protein. This may be due to the high adsorption of protein to the oil-water interface of the emulsion. Oil retention is the ability of flour to hold on oil which could be influenced by bulk density of the flour. Oil retention was significantly higher in cassava TMS 30572 with least value in TME 419 cassava. The result obtained could be due to the amount of moisture content (Oshibanjo, 2017). The WAC is an indication of the amount of water absorbed by flour under minimum water supply (Dereje *et al.*, 2020). A greater level of starch crystal destruction (Lu. *et al.*, 2020). may attribute to higher WACs, and as mentioned beforehand granule architecture, amylose and amylopectin may influence the WACs of cassava flour. The OAC is an indication of protein and fat interaction in food formulations (Lu. *et al.*, 2020). Physical binding of oil by capillary attraction and hydrophobicity of proteins is an important phenomenon in oil absorption (Dereje *et al.*, 2020). High OACs facilitate the flavor retention and improve the palatability of foods (Jisha *et al.*, 2010).

CONCLUSION

The study revealed that the significant varietal differences in the properties of various flours use, shows a potential for a wide end use.

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