

**THE DRYING KINETICS AND PROPERTIES OF DRIED UNRIPE
DWARF BANANA (CARDABA) FLOUR**

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ABSTRACT

The effect of processing variables (drying temperature and blanching) on the drying kinetics of cardaba banana slices and regular plantain were examined. The physico-chemical, rehydration properties, pasting and functional properties of the flour were determined and the sensory acceptability of the reconstituted flour was also evaluated with a view to expanding the utilization base of the cardaba banana.

Cardaba banana and plantain fruits were defingered, peeled, cut into 5 mm thickness and weighed. A portion was blanched at 60 °C for 10 minutes while the others were not blanched. The blanched and unblanched portions were divided each into three: the first portion was sun-dried, second portion was oven-dried at 50 °C and the third portion was oven-dried at 70 °C. Sample thickness and weight were monitored every hour till drying was complete and drying rate curves were generated. The dried samples were milled, sieved and packaged. Samples of flour were reconstituted into “*amala*” for sensory evaluation.

Results showed that the higher the temperature of drying, the faster the drying, the shorter the drying time, the greater the rehydration capacity and the greater the shrinkage of the cardaba banana and plantain slices. Cardaba banana flour had higher protein (4.73 to 9.92 %), moisture (7.67 to 11.33 %), fibre (1.67 to 2.88 %), iron (1.14 to 1.61 mg/100g), potassium (44.76 to 52.88 mg/100g) content than plantain flour. Oil and water absorption capacities, swelling power, setback viscosity, pasting temperature and time were also higher in cardaba banana flour than in plantain flour. Carbohydrate and bulk densities of the cardaba banana flour increased with blanching treatment while ash and fat decreased. Iron content, potassium content, swelling power, absorption capacities, pH and dispersibility reduced with blanching. Pasting temperature and time decreased

with blanching for cardaba banana flour, peak, trough and breakdown viscosities reduced with blanching and were higher in plantain than in cardaba banana. DPPH, TPC, FRAP and Metal chelating abilities were higher in cardaba banana (89.77 to 99.18 %, 15.00 to 46.00 $\mu\text{gGAE}/100\text{g}$, 0.28 to 0.69 $\text{AAE}\mu\text{g/g}$ and 38.90 to 96.53 %) than in plantain (91.32 to 98.17 %, 10.00 to 34.00 $\mu\text{gGAE}/100\text{g}$, 0.28 to 0.52 $\text{AAE}\mu\text{g/g}$ and 33.71 to 94.98 %) respectively. In overall acceptability, *amala* from blanched and unblanched cardaba banana flour were preferred to *amala* from blanched and unblanched plantain flour.

The study concluded that flour processed from cardaba banana could be used to produce *amala*, a staple food among the Yorubas of Western Nigeria. The flour is comparable in terms of functional, pasting, physico-chemical and sensory properties to plantain flour.

Keywords: Drying kinetics, dwarf banana, potassium, Yoruba, Nigeria

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The word “banana” is a general term embracing a number of species or hybrids in the genus *Musa* of the family Musaceae (Islam *et al.*, 2012). A banana is an edible fruit, botanically a berry, produced by several kinds of large herbaceous flowering plants in the genus *Musa*. Bananas and plantains (cultivars of banana having firmer and starchier fruit) are grown today in every humid tropical region and constitute the second largest fruit crop following the citrus fruits of the world (Haque, 2008). Banana fruit is rich in minerals (potassium, magnesium and phosphorus), dietary fibre, and various antioxidants, such as vitamin A, vitamin C, vitamin E, and β -carotene (Kanazawa and Sakakibara, 2000).

Cardaba banana (Plate 1:1), a dwarf banana is a cultivar classified within the Saba subgroup (Porcher, 1998; Sequeira, 1998 and Dela Cruz *et al.*, 2008). Saba banana is a triploid hybrid (ABB) banana cultivar originating from the Philippines. It is primarily a cooking banana though it can also be eaten raw. It is one of the most important banana varieties in Philippine cuisine. The Saba Banana is a triploid (ABB) hybrid of the seeded banana *Musa balbisiana* and *Musa acuminata* (Porcher, 2002). Saba is otherwise known as Cardaba, Sweet plantain, Compact banana, and Papaya banana. The fruits provide the same nutritional value as potatoes (Temanel, 2007). The waxy, green leaves are also used as traditional wrappings of native dishes in Southeast Asia. Fibers

can also be taken from the trunk and leaves and used to manufacture ropes, mats, and sacks (Temanel, 2007).



Plate 1.1: Cardaba banana

Source: Cantila (2004) .

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