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Studies on the Processing Technologies of Some Selected Local Soft Drinks in North-Western Nigeria

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Abstract: *On health grounds, experts recommend consuming fresh juices that are freshly and neatly prepared at home, which are free from preservatives and artificial colours than the carbonated ones. Nigeria is richly blessed with abundant sources of fruit juices and other sources of soft drinks, which are yet to be harnessed to satisfy and quench the thirst of the nation in that direction. This study identifies 23 fruit juice that are freshly prepared in the North-western part of the country with the view to laying foundations for developing a scientific and mechanized system(s) for processing the drinks hygienically and amply. Interviews were carried out with some soft drinks' producers and/or sellers in Birnin Kebbi, Zaria, Kano and Kaduna on the menus involved and the market potentialities of the drinks. The drinks were classified into three – based on their major ingredients and processing technologies; viz. cereals/nuts drinks, fruit juices and other refreshing drinks. One from each of the three categories was selected and their traditional menus were respectively experimented practically in order to understand their units of production and have an informed decision on designing a mechanized system for processing any of them, as well as the ones with common recipes with them. The study succeeded in understanding: the great need for developing a scientific, mechanized and hygienic system for processing the local soft drinks. The marketability of the perceived machines and their beverage products also underscore how to approach the anticipated design of the local soft drinks processing machines in question.*

Keywords: *Procession, Technology, Drinks, Juices, Local*

INTRODUCTION

The sunflower Nigeria is an agrarian economy (Magaji, 2016; Ismail and Akanni, 2017) and has been blessed with many food crops and commodities from which various kinds of traditional foods and drinks are processed. Moreover, being a multi-religious and multi-ethnic country; by observation, foods and drinks are produced and happily consumed based on the ethno-religious norms of the Nigerian communities or regions, depending mainly upon the regionally available food stuff. As

quoted by Ado (2017), some of the general marketable agricultural commodities in Nigeria are mentioned in Table-1:

Table-1 Some major marketable agricultural commodities in Nigeria (Ado, 2017).

Zone	Unprocessed	Processed
North central	Soybean, yam, cassava, beniseed, groundnut, neem fruit, honey, mango, cashew, palm kernel, maize, sorghum, cowpea, citrus.	Soya oil and meal, canned fruit, orange juice, vegetable oil, Yam flour, cassava flour, maize flour.
North east	Vegetable production (tomato, pepper, onion, etc), oil seeds production (groundnut), gum Arabic production, cereals and cotton.	Vegetable processing (tomato, pepper, onion, etc), cotton lint, gum Arabic products, cereals flour, canned fruits.
North west	Ginger, tomato, cotton, sorghum, groundnut, garlic, gum Arabic, soybean, melon, sesame, maize, cowpea and wheat.	Textiles, malt, beer, groundnut oil, soya oil, tomato paste, resin, leather, biscuits, bread, smoked fish, dried vegetables (pepper, tomatoes, okra).
South east	Oil palm, cassava, yam, poultry, cocoyam, plantain, banana, vegetables, ginger, timber, cashew nut, cocoa, maize, melon, rubber oil and copra (coconut meat from which oil is extracted).	Palm oil, cassava chips, cassava toasted granules, (*gari*), yam flour, fruit juices, canned fish, cocoyam chips, vegetable oil, cassava flour, honey, plantain flour, rubber products, cashew products, and kola nut.
South-south	Cocoa, palm fruit, rubber, timber, cassava, crayfish and shrimps (river prawn), non-timber forest products.	Cassava chips, palm oil, latex (rubber), cassava toasted granules (*gari*), cocoa powder, and chocolate, palm kernel oil and cake.
South west	Cassava, yam, poultry, palm produce, plantain, cocoa, kola, timber, oil palm, fish and shrimps.	Cassava toasted granules, cassava chips, plantain chips, fish and shrimps. Yam, timber, cassava and chocolate.

Fruit juices are mainly produced locally from the fruits and other parts of trees. It is produced mainly from other plants like mango (*Mangifera indica L.*), pineapple (*Ananas comosus L.*), orange (*Citrus aurantium*), Roselle (*Hibiscus sabdariffa L.*) and ginger (*Zingiber officinale Roscoe)* among others (Begum Das and Karmoker, 2018, NAFDAC, 2007). Though the table above is silent about much of the juice bearing trees and other plants that are so much available in the North- western part of Nigeria; to the best of what is known and by observation, they quite exist and from them, juices, other drinks and beverages are produced. Some of these trees and plants include mango, guava, cashew, ginger, Roselle, Moringa, tiger-nuts and water melon. A manual on "Agriculture in Kebbi State" (n.d.) is also true to that. Moreover, it was mentioned in Gotomo (2009), Alegbejo *et al,* (2003) and Mera (2004) that Roselle crop (used for producing *Sobo* drink) is widely grown in fifteen (15) states in Nigeria – namely: Niger, Kogi, Kebbi, Oyo, Kaduna, Bauchi, Gombe, Kwara, Kano, Jigawa, Sokoto, Zamfara, Plateau, Borno and Katsina states.

Fruits are good sources of essential elements that are very important for our body to function properly; such as water, vitamins (A, B1, B2, C, D and E), minerals (Ca, Mg, Zn, Fe, K etc) and organic compounds (Okwu & Emenike, 2006; Dosum, *et al.,* 2009, Begum Das & Karmoker, 2018). On health grounds also, consuming fruit juices, that are freshly made at home and free from preservatives, artificial colours and flavours is healthier than consuming bottled or canned ones that contain artificial colours, preservatives

and flavours (Salunkhe 2018; Gotomo 2000; Abubakar 2001; Ezeala *et al.* 2012). This research work tries to identify and classify the known local or traditional soft drinks in North - western Nigeria and then study the processing technologies of some few selected ones among them.

MATERIALS AND METHODS

2.1 **Identification**

About twenty-three (23) soft drinks (non-alcoholic) were identified through investigations, surveys at kiosks, restaurants, drinks selling points, literature reviews and interviews with the drink's producers and/or sellers in some identified cities in the region, like Birnin Kebbi, Kano, Kaduna and Zaria.

2.2 Classification

From the data gathered, the local soft drinks were classified into three, based on their major ingredients and processing technologies; thus:

a. Cereals /Nuts drinks
b. Fruit juices
c. Other refreshing drinks

2.3 Selection Procedure

The most popular acceptable or marketable ones were selected from categories "a" and "c" (thus, Tiger-nut and *Sobo* drinks); while the most cheaply available one was considered under category "b" (thus, Water melon juice). Then, their local processing menus were experimented respectively.

Local Menus for Processing the Aforementioned Juices/Drinks
Traditional Menu for Processing of Cereals/Nuts Drink (*Kunun Aya* = Tiger-Nut Porridge)

Plate-1 Washed tiger-nuts ready for processing into porridge; Birnin Kebbi, Nigeria.

Aim

To prepare 10 litters of *Kunun Aya* (Tiger nut porridge).

Ingredients

i.	Tiger nut measure (dried basis)	-	1 *mudu* (2kg)
ii.	Dates	-	15 units
iii.	Cocoanut	-	1 unit (1 ball)
iv.	Granulated sugar	-	¼ measure (0.8kg)
v.	Flavouring agent (Pineapple & Cocoanut)	-	12g
vi.	Clean water	-	20 litres

vii. Ice blocks - 4 x 50cl

Apparatus

i. 20 litre plastic bucket - 1 no.
ii. 5 – litre plastic bucket - 1 no.
iii. Plastic containers - 2 nos. (10 litre, 4 litre capacities)
iv. Stainless steel big spoon - 30 cm long
v. Filtering cloth (muslin cloth)
vi. Milling machine
vii. Table knife
viii. Blender
ix. Pan balance

Packaging jars/cups/containers (as available)

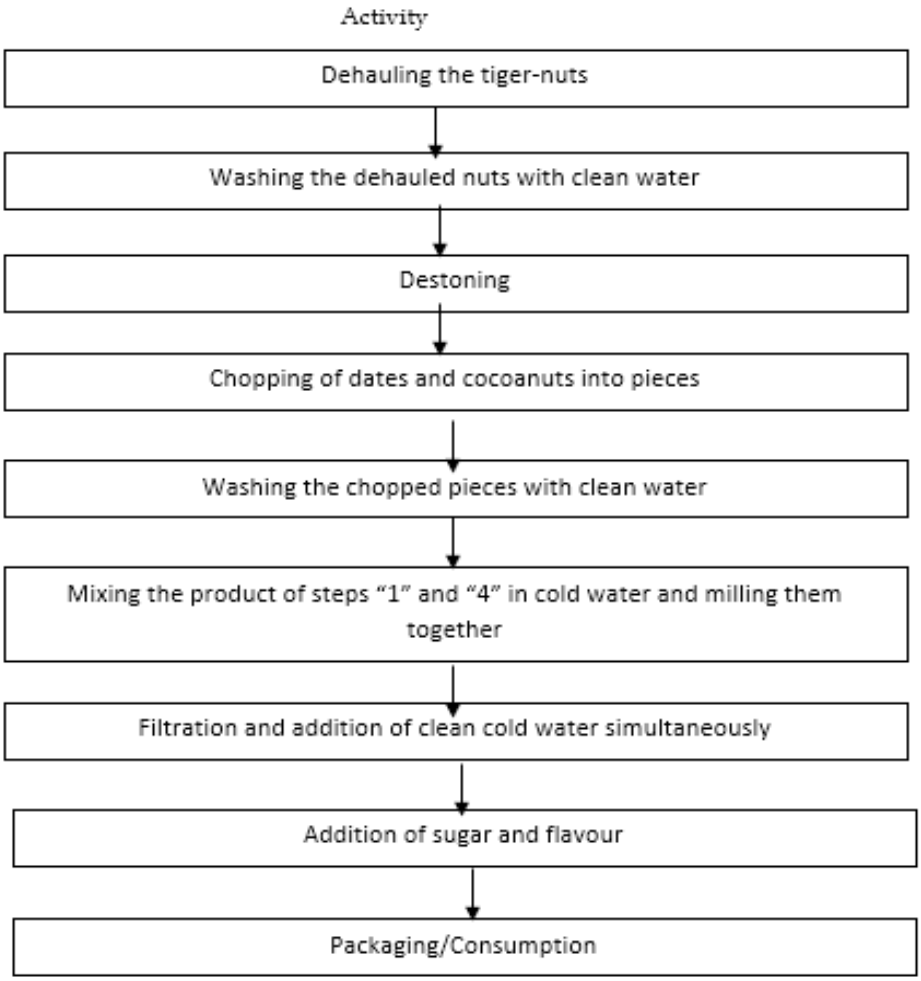

Fig. 1 Flow chart of the *Kunun Aya* (Tiger nut porridge) local menu

2.4 Traditional Menu for Processing of a Fruit Juice

2.4.1 Kankana (Water Melon) Juice

Plate-2 shows the fresh water melon balls in Birnin Kebbi, Nigeria.

Plate-2 Fresh water melon balls in Birnin Kebbi, Nigeria

Aim

To prepare 1 litre of *Kankana* (Water Melon) juice

Ingredients

i.	Water melon	-	1 big ball
ii.	Cocoanut	-	2 units
iii.	"Peak" milk	-	1 (150ml) tin (optional)
iv.	Clean water	-	10 litters
v.	Sugar and flavour	-	(optional)

Apparatus

Same procedure as shown above.

Procedure

Fig. 2 shows the flowchart of local Water melon juice menu.

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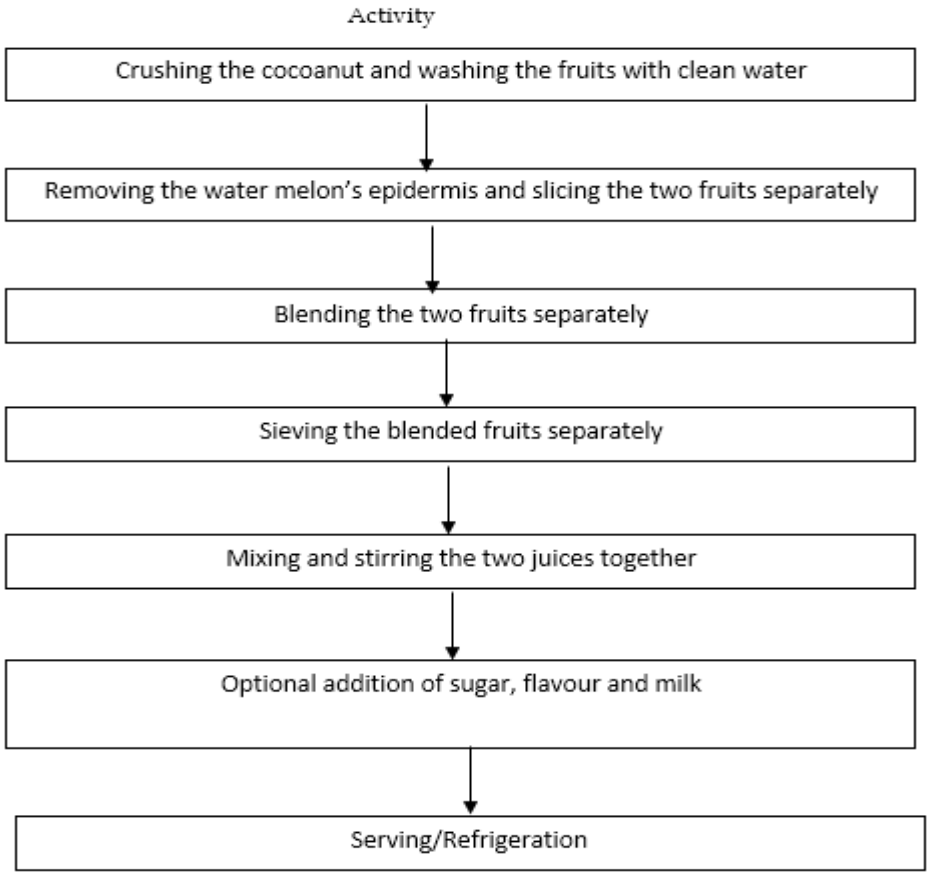

Fig. 2 shows the flowchart of local Water melon juice menu

2.4.2 Local Menu for Sobo (Zobo) Drink Production

Plate-3 shows a measure of dried squeezed *Sobarodo* (Roselle) calyces, the major ingredient for *Sobo* drink; Zaria, Nigeria

Plate-3 A measure of dried squeezed *Sobarodo* (Roselle) calyces, the major ingredient for *Sobo* drink; Zaria, Nigeria

Fig. 3 shows the flowchart of a local menu for Sobo drink production, Nigeria.

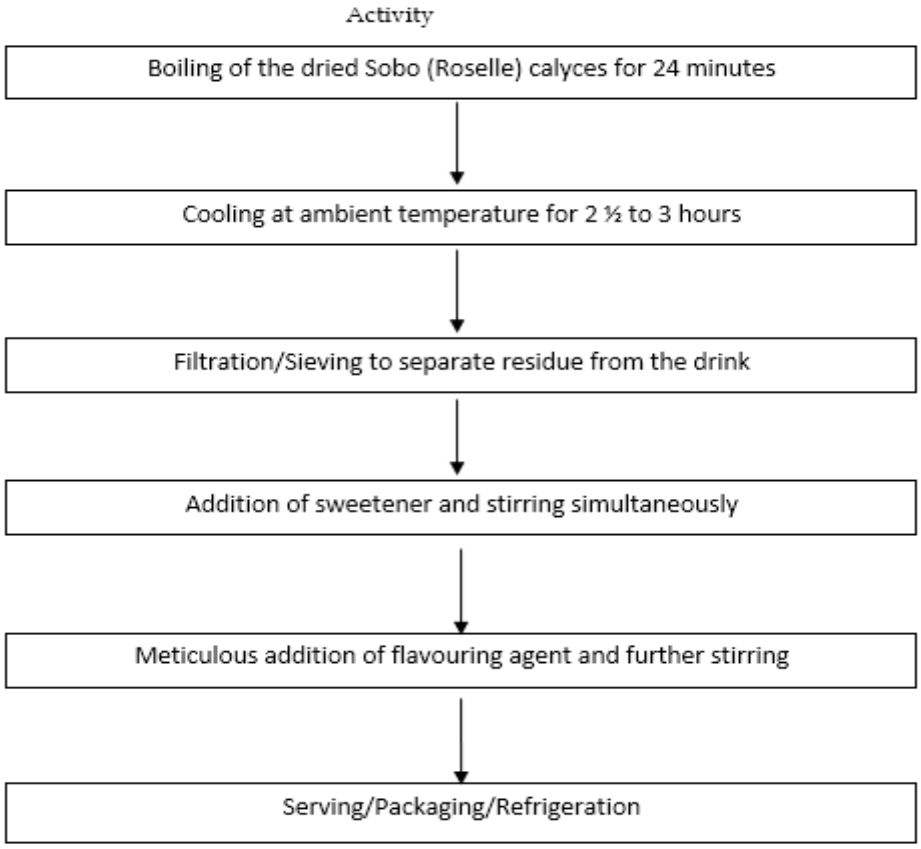

Fig. 3 The flowchart of a local menu for Sobo drink production, Nigeria

RESULTS AND DISCUSSION

3.1 Local Soft Drinks Identified

From the present study, the following local soft drinks have been identified in North – Western Nigeria, mostly produced by housewives in their matrimonial homes, either for family consumption, ceremonial occasions or market demands:

i. *Sobo (Zobo)* drink
ii. Ginger drink
iii. *Fura*
iv. *Farau – Farau* (Highly diluted fura)
v. *Koko* (Pure porridge without any grain particles)
vi. *Kunu/ Kunu mai kaca* (porridge with suspended grain particles or formed flour granules of about 10mm diameter)
vii. *Kunun Aya* (Tiger-nut porridge)
viii. *Kunun Zaki* (Sweet porridge)
ix. *Kunun Tsamiya* (Tamarind porridge)
x. *Kunun Sobarodo* (Roselle porridge)
xi. "Muhalib" (Simply orange juice + sugar + flavour) drink
xii. *Dantsurku* (Simply lemon juice + ginger + sugar) drink

xiii. Tamarind juice
xiv. "*Lemun Kankana"* (Water-melon juice)
xv. *"Gwadda"* (Pawpaw) and Carrot drink
xvi. Guava juice
xvii. Guava of orange juice
xviii. Pineapple and milk juice
xix. Pineapple and cocoanut juice
xx. Ginger and lime juice
xxi. Fruit salad (combination of fruit juices)
xxii. Milk – shake (Milk + flavour + sugar) drink
xxiii. Ice tea (pure tea extract + sugar + lemon)

3.2 The Drinks Classified

These local soft drinks could be classified into three, based on major ingredient(s) and processing techniques:

a. Cereals/Nuts drinks
b. Fruit juices
c. Other refreshing drinks

(a) Cereals or Nuts Drinks

These include:

i. *Fura* (Very popular thick drink obtained by processing cereal flour into balls, crushing the balls and finally mixing with water, milk and sugar (optionally)).
ii. *Farau-farau* (Highly diluted *fura*)
iii. *Koko* (Pure porridge)
iv. *Kunu* (Porridge with small cereal granules)
v. *Kunun Aya*
vi. *Kunun Zaki*
vii. *Kunun Tsamiya*
viii. *Kunun Sobarodo*

(b) Fruit Juices

i. *Muhalib*
ii. *Dantsurku*
iii. Tamarind juice
iv. *Lemun kankana* (Water melon juice)
v. Guava juice
vi. Guava of orange juice
vii. Pineapple and milk juice
viii. Pineapple and cocoanut juice
ix. Ginger and lime juice
x. Fruit salad (Combination of fruit juices)

(c) Other Refreshing Drinks

i. *Sobo (Zobo)* drink
ii. Ginger drink
iii. *Gwadda* (Pawpaw) and carrot drink
iv. Milk-shake (Milk + flavour + sugar) drink
v. Ice tea (Pure tea extract + sugar + lemon)

3.3 The Selected Drinks Produced Locally

A. Tiger-Nut Porridge
Plate-4 shows the locally processed tiger-nut porridge

Plate-4 Locally processed tiger-nut porridge

B. Roselle (Sobo/Zobo) Drink
Plate-5 shows a locally processed sobo drink

Plate-5 shows a locally processed sobo drink

C. Water Melon (Kankana) Juice
Plate-6 shows a locally processed water melon juice

Plate-6 Locally processed water melon juice

It could be seen that about 23 local refreshing drinks exist in the region under review, which constitutes Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto and Zamfara states of Nigeria. However, it was noted that there was less known literature in the past dedicated for their register, save for Buhari (1999). However, nowadays, much booklets (mostly sub-standard in many respects) exist – both in hard and soft copies on the treasure of knowledge in question.

It could also rightly be noted that these soft drinks are produced from different agricultural products (as contained in Table 1). Some are produced from cereals or nuts, some from fruits and some from other parts of plants like the calyces (Sobo drink). One could also note that the apparatus for Tiger-nut porridge processing, as well as those of the Water Melon juices are the same; but the menus are mostly different. However, the processes of washing or cleaning, filtration, mixing and sweetening are common to all. Considering the recommended daily dietary (RDD) need of each person, with respect to fruit juice, as captured in table 2, as well as Nigeria's annual national demand for fruit juices that was estimated at 550 million litres, vis-à-vis the only available 135 million litres –representing less than 25% of the demand (Musa, 2000; Nwachukwu *et al.* 2007; RMRDC), 2018, Omolayole, 2022); it is evident that much effort needs to be done in producing the natural fresh juices locally in or der to meet the national demand!

Table-2 People's Daily Recommended Fruit Juice Requirements

S/N	CLASS	AGE	AMOUNT
1	Children	2-3 years old	1 cup
		4-8 years old	1 to 1.5 cups
2	Girls	9-13 years old	1.5 cups
		14-18 years old	1.5 cups
3	Boys	9-13 years old	1.5 cups
		14-18 years old	2 cups
4	Women	19-30 years old	2 cups
		31-50 years old	1.5 cups
		51+ years old	1.5 cups
5	Men	19-30 years old	2 cups
		31-50 years old	2 cups
		51+ years old	2 cups

The cup count varies from one fruit to another. There are specifications to that effect. However, a small cup is considered to be 50mm diameter and about 100mm height (Adopted from USDA), 2018). Moreover, from the above mentioned RMRDC (2018 and FAO, 2019) statement, as well as the interviews carried out with the drinks' retailers, it is understandable that the market exists for the commodities in question. Therefore, their business is optimistically lucrative!

CONCLUSION

The present study hereby concludes that over 20 refreshing soft drinks are produced locally and consumed in North-western Nigeria, yet, their processing techniques remain crude and undeveloped scientifically. There is much need for developing scientific and mechanized systems for producing the said soft drinks, especially the most popular ones like *Sobo* drink, Ginger drink and Tiger nut drink. The market seems favourable for simple devices or mechanized systems that can be developed for processing the native fruit juices and other local soft drinks hygienically, that could be used for small and medium scale enterprises (SMEs); whose contributions have been recognized as the main sustenance of any economy, due to their capacities to enhance economic output and human welfare.

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CONFLICT OF INTEREST

The authors declare no competing interest

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