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Research Article

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Assessment of Brown Sugar Processing in Kaduna State

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Abstract Nigeria is one of the major sugar cane producing countries in the world with average yield over 45 to 75% tones, however, sugar is an essential commodity used by consumers in Nigeria. The processing of the conventional sugar cannot meet up with the demand of the people, which estimated at about 1.4 million tons while the local production only has the capacity of less than 10% of the national requirement. The study was conducted to assess brown sugar processing in Makarfi, Kubau and Soba LGAs. Data were collected from a total of 45 respondents using structured questionnaire and interview schedule. The results showed that the age of 21 and above are the majority and 85% of the respondents were married. Some of the constraints facing the brown sugar processors in this study areas were insufficient capital to expand their businesses, lack of improve facilities, market links were the major problems. It is recommended to the Government and NGOs should come in and make available fund to the processors in form of soft loan. With the improve in the processing facilities it will reduce the drudgery.

Keywords Assessment, Brown sugar, Processing, Kaduna state

1. Introduction

Brown sugar called **(***Mazarkwaila)* in Hausa india also called *cure* in India, *panela* in South America, *Desi* in Pakistan and *Jaggery* in many parts of Africa and Asia, stills is a common sugar product in the northern part of Nigeria where it is used as a traditional sweetener. Sugar has been the most widely used sweetener for commercial purposes by human. Sugar is consumed by households and particularly the industries where it serves as raw materials for companies in the foods and beverages industry. Brown sugar historically was used to sweeten drinks, bake breads and pastries, and make candies sauces. It is now used to add the rich flavor of molasses to baked goods and other recipes, and light brown sugar can still be used as a substitute for white sugar in almost every case.

Sugar extracted from sugar cane is processed to become raw sugar at sugar mills and then further purified to refined white sugar in a sugar refinery, using energy intensive processes. Brown sugar is made from sugar cane; cane stalks are cut and squeezed for their juice, which is then boiled until it thickens to form molasses. The process of making brown sugar traditionally is by using horse-driven crushers, motor cycle, diesel crushers and manual juice extraction which is not so common. In Nigeria, males and females are engage in agricultural activities, but the major involvement of a particular gender varies with the culture and religion. [1] explained that processing of Gari and groundnut are mainly in the hands of women while brown sugar and palm oil are mainly processed by men. The level of farmers participation in traditional brown sugar processing in the study area varies between the male and female, most of the work done is dominated by the male farmers because it is labour intensive, men who processed it use either horse, motor cycle (boxer), diesel-powered crushers and

electric motor while the women who processed brown sugar do it manually [2]. Sugarcane is the raw material used for manufacturing in Nigeria which accounts for about 61% of the total world sugar production [3]. Brown sugar processing begins form the moment the sugar cane is harvested. Harvest commences when the leaves turn yellow, green, purplish, reddish or when cane punches show that there is a sufficiently high content of sucrose and this occurs between 10 and 14^{th} or 4-8 and 12^{th}months after planting [4]. Two types of sugarcane are grown in Nigeria – industrial and soft (chewing) cane. The industrial cane is the hard or tough type generally processed into sugar by the sugar estates. The soft cane is mainly chewed raw for its sweet juice. Some of it is also processed into different crude sugar products. Local farmers grow soft cane all over Nigeria. Soft cane production accounts for about 60% of total sugarcane production in many years in Nigeria [5]. The exact total land area currently under cane cultivation and the total production in Nigeria is not specified, but it is estimated between 25,000-35,000 hectares, out of which soft cane covers 18,000 hectares. Average yield of soft cane on farmer's plots varies between 45-75 $\times$ 10^3 kg/h depending on management, varieties and inputs used [6]. Globally the major use of the crop is in the manufacture of sugar. Major industrial users of the product include the pharmaceutical industries, the food and beverages industries, bakeries, soft drinks bottling plants as well as biscuit and other confectionery manufacturers. Domestically, it is used in large amounts as a table sweetener. Nigeria's accumulated import of sugar and sugar products in the last 50 years is valued at $8.18B (N1267.6B) showing that much of the sugar needs have been met through importation.

In spite of its large areas of cultivatable land suitable for the growing of sugar cane and some recent investments in the sub-sector, Nigeria still imports 90% of its sugar Flexible sugar industry (FSI, 2008). Sugar is one of the products gotten from the processing of sugar cane and one such consumer goods that is consumed by virtually everyone because it has little or no substitute. Although there are variants of sweeteners– honey, saccharine, and others, these are seldom used by the industrial consumers of sugar.

Method of survey approach

The survey was conducted over the period of August 2019. During this period 3 Local Government area out of 23 were selected in the state and each Local Government with one village were visited for the purpose of identifying the process of brown sugar production (Makarfi at Nasarawan Doya = 15, Kubau at Anchau = 15 and Soba at Danwata = 15). That is total of 45 repondents were interview and 70% are practice brown sugar processing.

Description of the Study Area

The survey was conducted in three villages, Nasawan Doya, Anchau and Danwata in Kaduna State.

Kaduna State is one of the thirty six state in Nigeria, including Abuja Federal Capital Territory Kaduna is in the northern part of the country and shares common borders with Zamfara, Katsina, Niger, Kano, Bauchi and Plateau States, as well Federal Capital Territory, Abuja. The location of the state is between longitude of 60 east and 90 10'of the Greenwich meridian and between latitude 09010‖ and 11030‖ north of the equator. The State occupies an area of approximately 48,473.2 square kilometers and a projected population of 7,805,131 in 2014 based on the 2006 census figure of 6,066,562 on annual population index of 3.2% [7]. Kaduna State is the third most populous State in the federation after Lagos and Kano State and represents a major focus and Centre of political and economic activities in the nation.

Method of Data Collection

Primary data were used for this study. The primary data were obtained using interview method with well-structured interview schedule administered among the respondents. Data were collected from brown sugar processors characteristics such as age, sex, marital status, education, years of experience in brown sugar processing, household size, income generated, and type of labour, were collected from the respondents.

Nasarawan Doya: it is located about 30 kilometers south west of Makarfi town in Makarfi Local Government area. The population of the village is about 35,000 of which majority of the people are brown sugar processors.

Anchan: The village is about three hundred kilometers, north – east of Kaduna state and is headquarters of kubau Local Government area. The population of the village is about 50,000 and majority of indigenes are hausa and 70% involved in brown sugar processing and farming.

Dan wata: it is located about 30 kilometers north – east of Soba Local Government area. The population of the village about 10,000 and majority of them involve in sfarmingand sugar processing.

Age distribution

The ages of the respondents were studied in order to find out the age group mostly involved in brown sugar processing activities. The result reveals that majority of the respondents were between 21 and above followed by those in the age bracket of 16 - 20 years.

Process of Brown Sugar

The various processes involved in the production of brown sugar from sugar cane are similar for both the villages. The process as observed in the production is as follows:

Extraction

One to four stalks of cane are fed at a time into the mills while it is running either in diesel engine; boxer motor cycle or electric motor. Juice is collected from a drainer into a large metal basin usually made from oil drums, cut into halves. The common cane type used in Makarfi, Anchau and Soba is *"yarcharaje; farin Rake"* (White cane) or "*lamarudiya"* called in Hausa.

Juice boiling and concentration

This is carried out in a pair of open pans (*Murhu)* called in Hausa made from cutting oil drums into halves and placed on permanent clay, furnaces or burners.

Cooling

The *madin-rake* is collected and poured into an earthen pot (*Kwatanniya)* called in Hausa and stirred gradually using a wooden stirrer *(muciya).*

Dispensing into molds

Before the thickened syrup hardens completely, it is dispensed using a calabash spatula (*Ludayi*-Hausa), into small metal molds where the brown cake *(Mazarkwala)* finally cools then hardens.

Line process chart for brown sugar processing

[Start]

[Extraction of sugar cane juice]

40 lit of juice 100 kg

Is poured in to two pans

Juice boiling and concentration

Each pan taking 20 lit (30 mins to 2 hours)

Madin rake is colleted and poured into earthen pot

Cooling (10 mins)

Dispensing into molds

TOTAL TIME REQUIRED = 130 min

From the above line chart, it seen that juice boiling required more time than any other activity.

Economics of Brown sugar processing

From the table below, it is observed that profit varies. Certain factors were mention by the processors as having effect on profit. These include: time waste during processing, gumming or turn to dark in color, sugar cane maturity and price.

Table 1: Some possible profit margins observed

Location	Cost associated with whole process (N)	Profit (N)
Makarfi	5150	1500 - 2000
Kabau	6000	1000 - 1500
Soba	5500	1000 - 1500

Tools used for in Brown sugar processing

Tool used presently for brown sugar processing includes: diesel engine: boxer motor cycle, electric motor, drums, open pans, furnaces or burners, bucket, plate, earthen pot, spatula, scraper or sickle and container (including calabash). These are same equipment they use for processing work. Material efficiency using these tools for brown sugar processing was quantified 80%. This is good enough. However, there need to improve on some activities of brown sugar processing. It might not necessarily be redesign of the equipment, but could be upgrading or improvement to achieve greater productivity and reduce drudgery of work.

Problems

The major problems of these processors were associated with working equipment and tools. The equipment and tools they used for processing sugar cane were traditional in nature. They were and are still energy sapping and crude. Lack of inadequate of these tools and equipment their output was low, income accrued from them was low.

In agricultural processing, they were contained especially because they did not have access to modern processing equipment. Where such equipment was available, they were often expensive as a result most processors could not afford them.

It is suggested that attempt developing or improving present method of brown sugar processors should be after adequate understanding of the existing process.

Conclusion

The work has provided and overview of the activities of brown sugar processors in three villages. It also enumerated the problems and the needs of them to improve.

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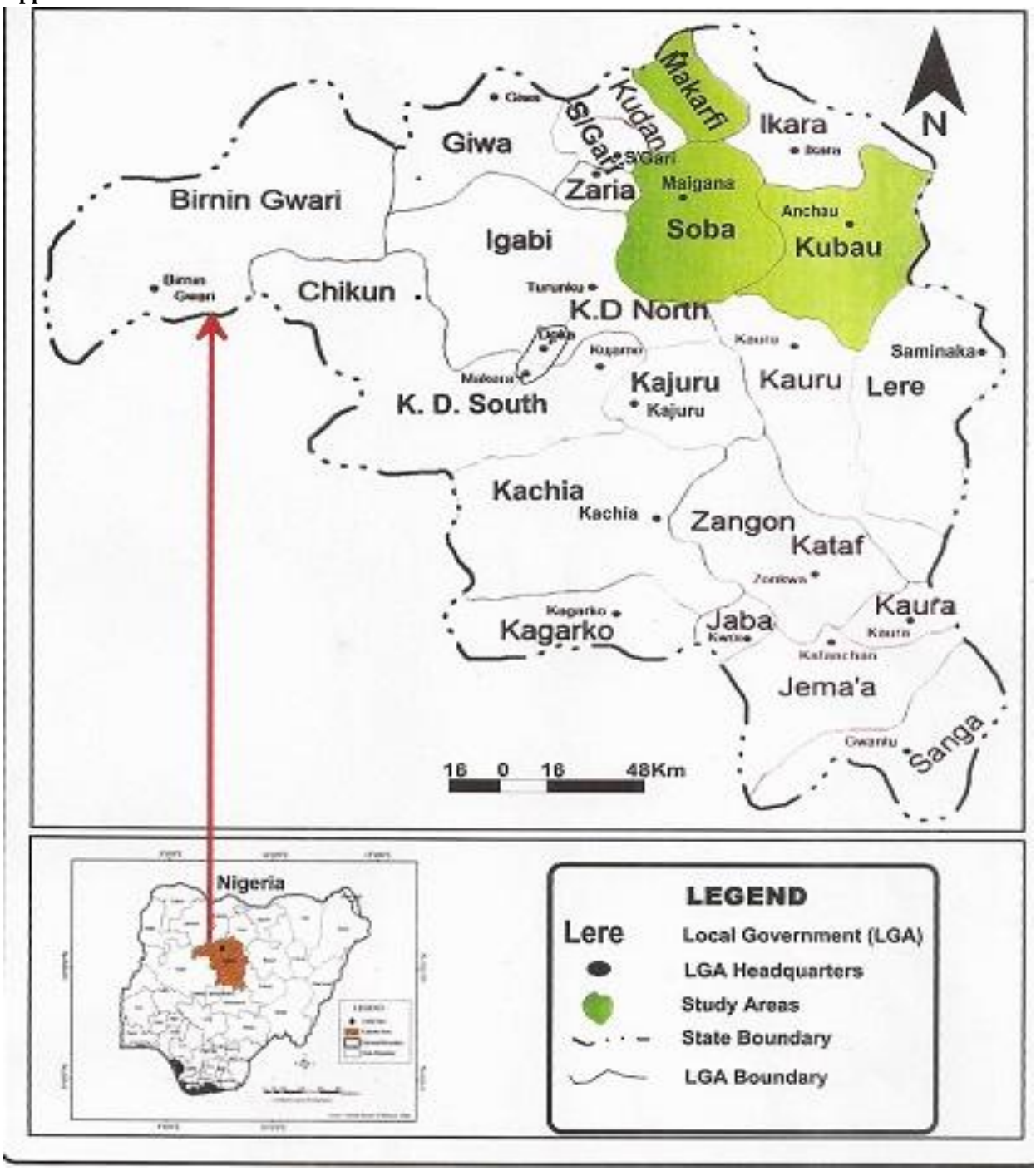
Appendix



Source: Lyocks., J. S (2016) [7]