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Characterization Of Craft Ginger Processing Technologies In The City Of Ngaoundere (Cameroon)

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Abstract – Craft processing of agricultural products is an effective way to reduce post-harvest losses, guarantee food security and contribute to poverty reduction for populations in middle-income countries. In view of the emergence of the ginger-based product processing sector in the city of Ngaoundere in Cameroon, a survey was conducted to characterize craft ginger processing technologies. Data was collected from 47 processors through a diagnostic survey using a questionnaire. The results show that the ginger rhizome processing activity is carried out by women (100%). It recruits operators from the under-educated social stratum and is characterized by a lack of grouping of producers. Three main types of products are present on the market: juice, syrup and powder. Although the activity is flourishing, it is subject to several constraints. Providing training on modern processing techniques and developing standard production processes would help guarantee the quality of processed products.

Keywords – Craft technologies, processing, ginger, Ngaoundere.

I. INTRODUCTION

In many Sub-Saharan African countries, ensuring that the population has access to sufficient quantities and quality of agricultural products and reducing post-harvest losses remains a major concern for governments. Increasing the processing of agricultural products contributes to reducing poverty and ensuring food security, with the aim of achieving the Sustainable Development Goals by 2030, which are integrated into the National Development Strategy 2020-2030 in Cameroon [1]. Cameroonian agriculture context is more marked by the promotion of value chains and the emergence of second generation agriculture which involves the local processing of agricultural commodities for added value and the reduction of post-harvest

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losses. Thus, a significant proportion of agricultural products are processed through agri-food crafts. This processing sector employs mostly women in both rural and urban areas [2]; [3]. Commercial food processing and preparation activities have a considerable economic impact on the savannah zone in West and Central Africa, in terms of food security, job creation, income distribution and reduction of social inequalities [4]; [5]. These products are the result of craft food processing. Agro-processing technology is characterised by manual food processing with arduous and unhygienic operations to provide consumers with a range of products based on cereals, tubers, legumes, oilseeds, fruits and vegetables [6]. Ginger (Zinginber officinale Rosc.) is one of the most important spices worldwide [7] and of major economic importance [8]. It contains secondary metabolites such as gingerols, gingerdiols and gingerdiones [9]; [7]. These compounds have a high antioxidant activity [10]. The refreshing aroma and pungent taste make ginger an essential ingredient in most of the world's cuisines and food industries [11]. Its processing in Cameroon is still essentially artisanal and is growing rapidly in the city of Ngaoundere, Adamaoua Region. However, despite the interest of the population in ginger cultivation, very little national scientific and socio-economic data on its production and processing are known. This study aims to characterise the craft ginger processing technologies in the city of Ngaoundere.

II. METHODOLOGY

II.1 Study area

The questionnaire was administered in the town of Ngaoundere in June 2020. The choice of this town as the study area is justified by the fact that various products resulting from the processing of ginger are widely traded in the streets and markets of the town. Figure 1 shows the location of the study area in the Adamaoua Region.

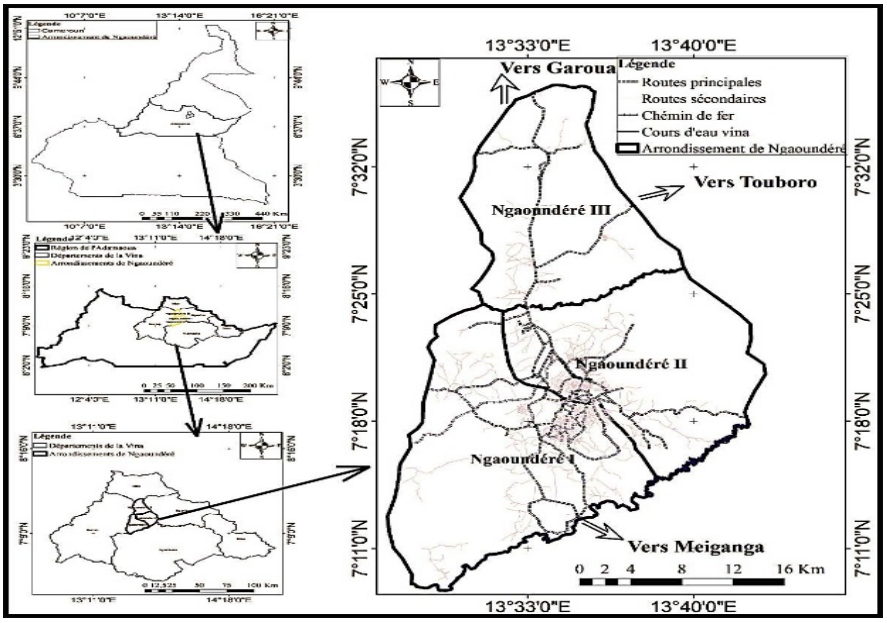


Figure 1: Location of the study area

Source: Cameroon administrative map

II.2 Methodology

The methodological approach adopted in this study consisted in the identification of counting areas, the development of the data collection tool, the collection of data in the form of a survey / interview, the data collected analysis and exploitation.

The data was collected in survey forms from 47 actors in the ginger processing sector, located and identified in the three (03) districts of the city of Ngaoundere. In the absence of recent national statistical data on the ginger production and processing sectors, the survey methodology used was a random and totally inclusive approach for all manufacturers of ginger-derived products.

The questionnaire focused on the indicators making it possible to obtain the socio-demographic characteristics of the processors, characteristics of the ginger processing activity and the identification of the different ginger processing processes used in the city. As a result, a pair of interviewers was formed for data collection, the administration of questionnaires and the proper conduct of field surveys.

2.2. Data analysis

The data collected in the field were checked, grouped and then processed with the Sphinx software and the figures obtained from Excel 2013.

III. RESULTS

III.1. Socio-demographic characteristics and status of respondents

In order to characterise the various operators involved in the processing of ginger into derived products, information on them was collected. Table 1 shows the different socio-demographic characteristics collected.

Table 1: Socio-demographic characteristics and status of respondents

Characteristics		Proportion of respondents (%)
Gender	Male	0
	Female	100
Age group (years)	≤ 20	10,7
	21-30	21,4
	31-40	25,0
	41-50	25,0
	51-60	14,3
	≥ 60	3,6
Marital status	Single	32,1
	Married	67,9
	Divorced	0
	Widowed	0
	None	10,7
Educational level	Primary	28,6
	Secondary	57,1
	University	3,6
Membership of an association	Yes	10,7
	No	89,3

From this table, it appears that the operators are women, aged between 31 and 50, married and not belonging to any women's association. This reflects the fact that women are mostly involved in food processing.

III.2 Characteristics of the ginger processing activity

III.2.1. Seniority of women processors in the activity

In order to determine the time taken to process ginger, the seniority of women processors in the activity was evaluated (Figure 2).

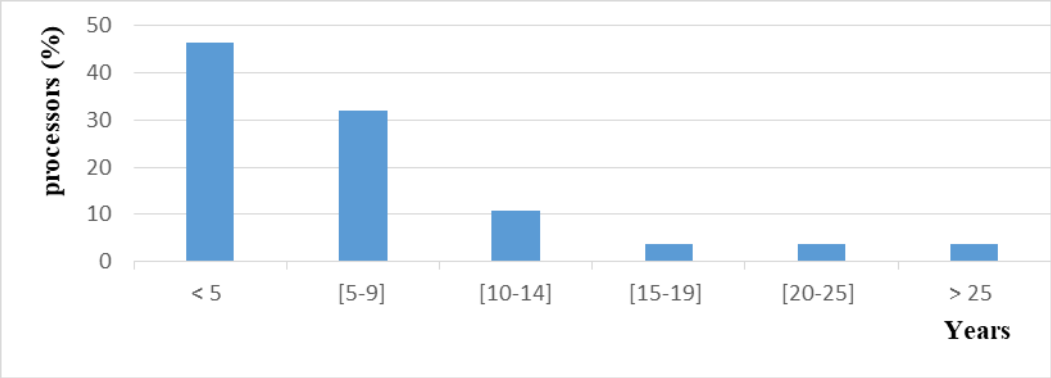


Figure 2: Seniority of processors in the business

Figure 2 shows that 46.4% of the processors have been in the business for less than five years. 32.1% have been in the sector for 5 to 9 years.

III.2.2. Frequency of production

The production intensity of each operator was evaluated. Figure 3 shows this production frequency as a function of time.

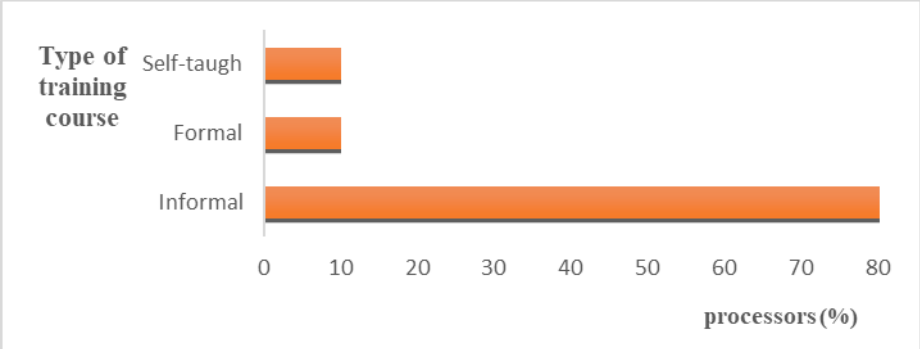


Figure 3: Production frequencies of ginger products

This figure shows that 71.4% of the respondents produce ginger-based products on a daily basis and only 28.6% on a seasonal basis.

III.2.3. Type of processor training

In order to evaluate the skills of the different operators in ginger processing, the type of training obtained by them was investigated (Figure 4).

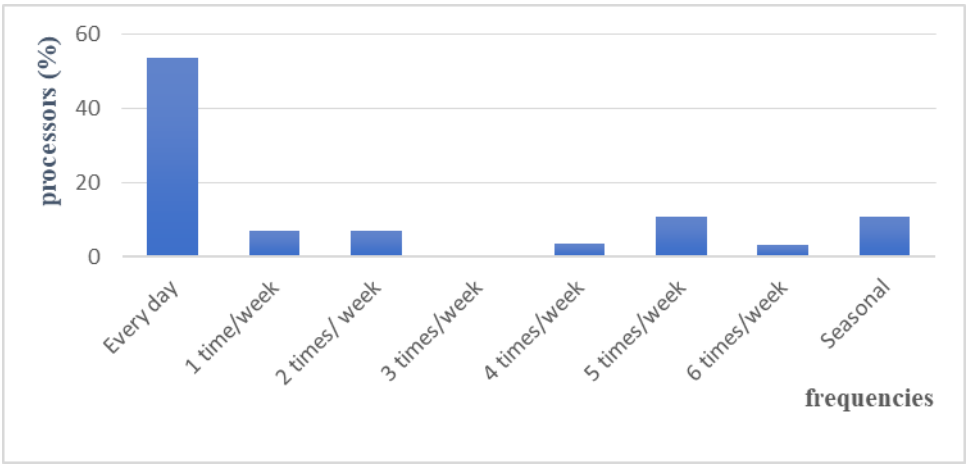


Figure 4: Types of agro-processing training received

From figure 4, it can be seen that craft ginger processing is carried out mostly (80%) by women who have received training from a family member already engaged in the activity, (10%) self-taught and (10%) certified training.

III.2.4. Sources of raw material

The sources of supply of ginger rhizomes that will constitute the raw material were investigated (Figure 5).

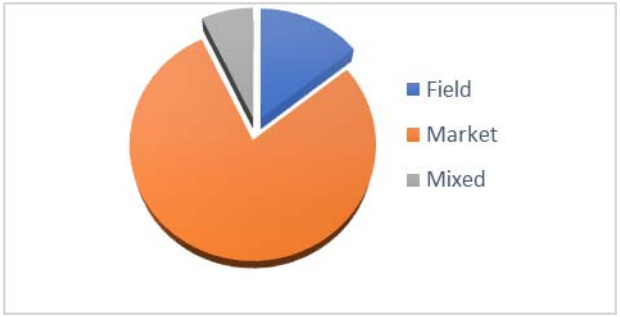


Figure 5: Sources of ginger

According to Figure 5, markets are the main source of supply of fresh ginger roots for (78.6%) of the processors of derived products. However, in 14.3% of cases, processors obtain ginger rhizomes from their fields and can be considered as ginger producers/processors.

III.2.5. Added ingredients

Ginger processing requires the addition of ingredients. These ingredients enhance the taste of the derived products. For this reason, the various ingredients involved in processing were investigated (Figure 6).

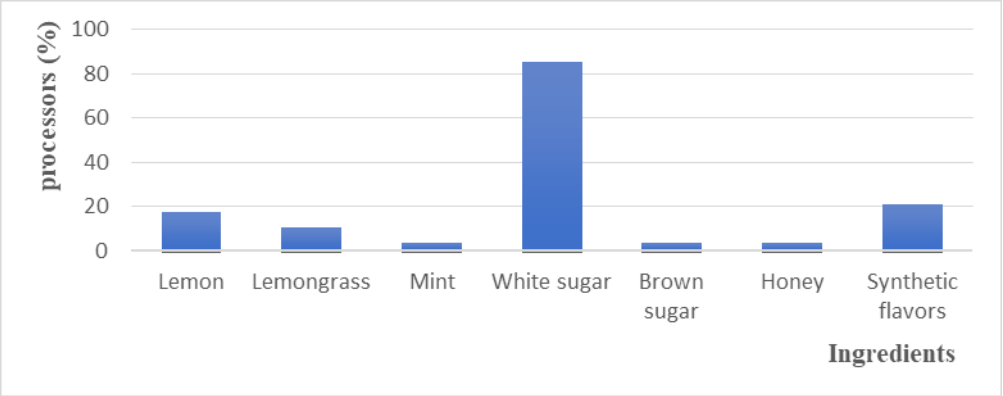
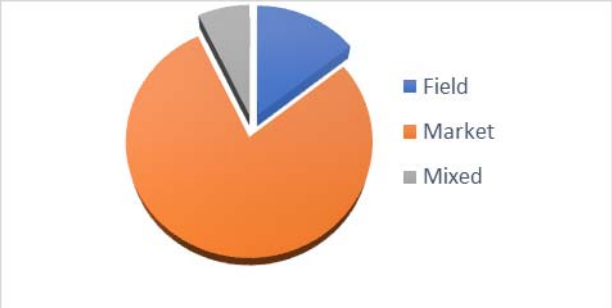


Figure 6: Ingredients associated with ginger during processing

According to table 6, white sugar is the main ingredient (85.7%) added to the raw material.

III.3. Shelf-life parameters of processed products



The shelf life of ginger-derived products is very variable and depends on the appreciation of each actor and the type of product. Thus, the conservation parameters of the by-products were evaluated by the operators. These parameters are evaluated for each operator (Table 2).

Table 2: Storage parameters for processed products

Parameters	Products		Proportion of respondents (%)
Type of packaging	Juice / Syrup	Plastic bottles	96,4
	Powder		3,6
		Plastic bags	
Storage methods	Juice / Syrup	Fresh	100
	Powder	Room temperature	100
Storage periods (days)	Juice/ Syrup	< 5	40,7
		]5-10[	14,8
		>10	14,8
	Juice / Syrup / Powder	Not determined	29,6

III.4. Cost of the raw material

The operators who do not have a ginger field buy the raw material from the traders. Thus, the prices are listed in figure 7.

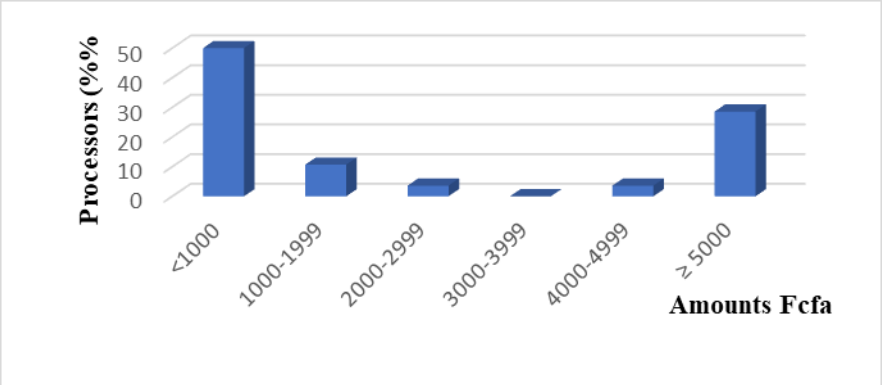


Figure 7: Cost of acquiring ginger roots

With regard to the cost of acquiring the raw material, (53.6%) of the actors in the sector spend less than 1,000 CFA francs per production and (28.6%) more than 5,000 CFA francs according to this figure.

III.4. Ginger processing

The main by-products of ginger processing are listed in figure eight.

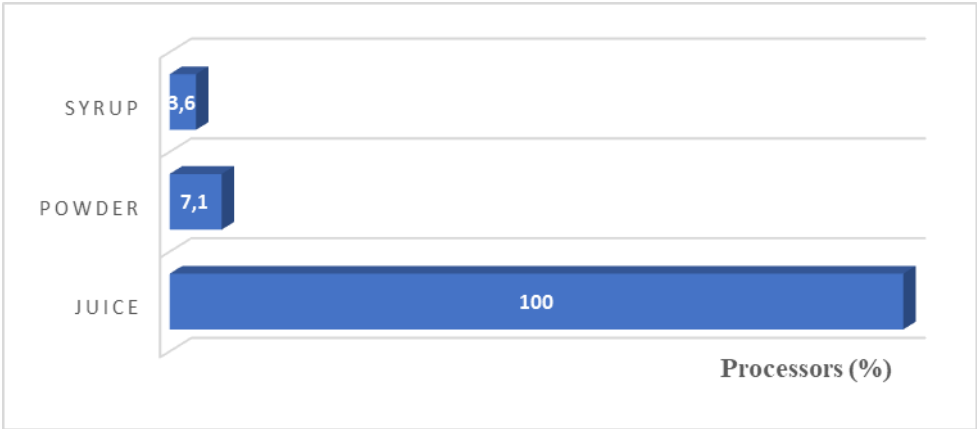


Figure 8: Different processed products

Figure 8 shows that three (3) main types of products are processed. The drink "juice" (100%) is the main speculation resulting from the processing of fresh ginger roots. There are also two main marginal derivatives, namely powder (7.1%) and syrup (3.6%).

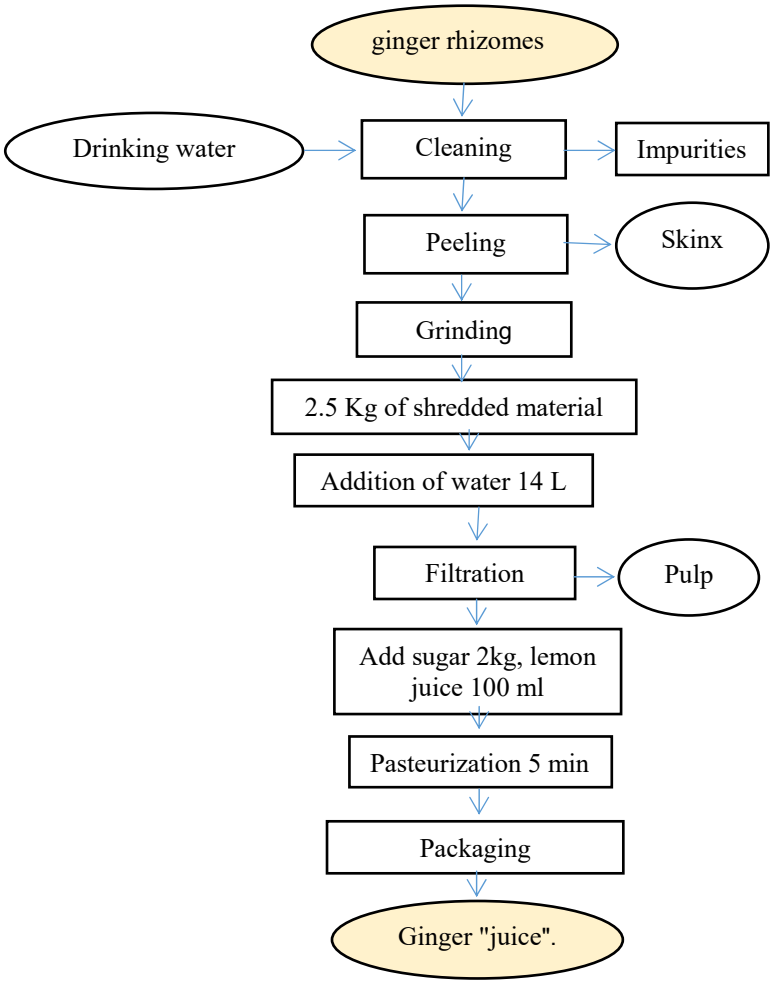


Figure 9: Technological diagram of craft production of ginger "juice

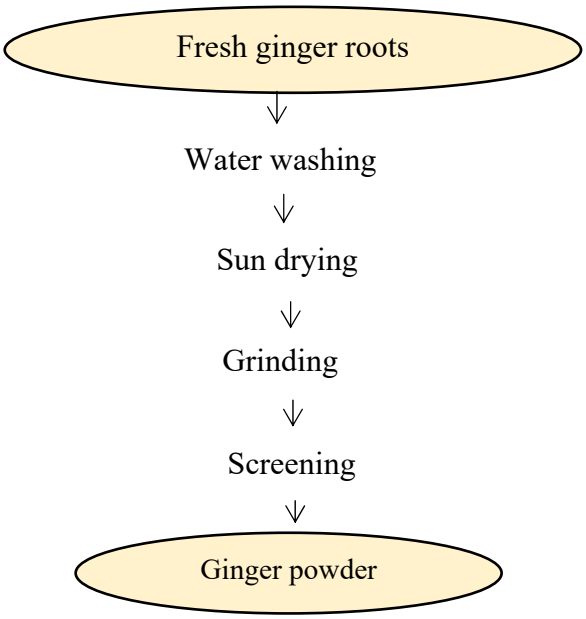


Figure 10: Technology diagram of craft manufacture of ginger powder

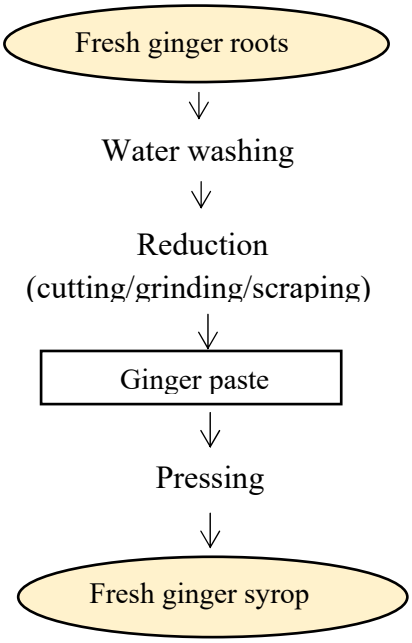


Figure 11: Technology diagram of craft production of ginger syrup

IV. Discussion

The aim of this study was to characterise the artisanal ginger processing technologies in the town of Ngaoundere. The survey data reveal that the artisanal food processing of ginger rhizomes in the town of Ngaoundere is carried out exclusively by women (100%). This result is similar to those of [5] and [12] which showed that the processing of agricultural products is mainly carried out by women, respectively (82%) and (84%).

It also appears that the activity of processing ginger roots mainly involves women. Most of whom are between 31 and 50 years old (50%), married (67.8), with a secondary level of education (57%), and with a low level of association of women producers

(association, GIC, cooperatives). With regard to length of time in the business, 46.4% of women processors have been in the business for less than five years. 32.1% have been in the sector for 5 to 9 years. This suggests that interest in the processing of ginger roots (into juice specifically) is fairly recent in Ngaoundere. This would be due to the fact that the population is increasingly integrating it into their food consumption habits because of its therapeutic value. The data collected show that 71.4% of the women processors make the ginger-based drink commonly known as 'juice' on a daily basis throughout the year, and 28.6% on a seasonal basis.

With regard to the type of training in agri-food processing received by the women processors, it appears that the activity is carried out in majority (80%) by women who have received informal training from a family member already engaged in the activity, (10%) self-taught and (10%) in an approved training course. This information suggests that ginger rhizome processing technology is carried out by the low-income urban folk. Markets are the main source of fresh ginger roots for (78.6%) of the processors. This shows that very few ginger producers process their own production. Indeed, ginger fields are generally found in rural areas. This leads to a separation between the production of ginger rhizomes in rural areas and the processing in urban areas.

In addition to ginger rhizomes, other ingredients are used in the manufacture of the products. White sugar (85.7%) is the main ingredient added to the raw material. Other marginal carbohydrate sources are also used (brown sugar, honey). Natural or synthetic flavours are often added.

The shelf life of ginger products varies greatly and depends on the appreciation of each player and the type of product.

With regard to the gross cost of acquiring the raw material, (53.6%) of manufacturers spend less than 1000 CFA francs per production and (28.6%) more than 5000 CFA francs. Indeed, the actors produce relatively small quantities of juice that they are able to sell quickly and this also guarantees the quality of the product for consumers by reducing the shelf life. On the other hand, untimely load shedding and long periods of power cuts do not guarantee better conservation conditions, which leads the actors to be more cautious.

Constraints

The activity of artisanal processing of ginger rhizomes is confronted with certain constraints that hinder its development. The following have been identified

- A lack of organisation of the actors in the sector (producers, processors);

- A lack of partnership between actors;

- Lack of control of the physico-chemical, hygienic and microbiological qualities of products;

- The manufacturing processes are empirical;

- A difficult supply of packaging, generally made up of recycled material.

- Low purchasing power of processors to modernise production structures.

V. Conclusion

The objective of this study was to characterise the ginger root processing activity in the town of Ngaoundéré, with a view to improving and standardising the processing procedures. It was found that the majority of ginger processing is carried out by young women. The activity is mainly carried out by women who have not received any training in modern agri-food processing techniques. As a result, although flourishing, the production conditions remain uncontrolled, unhygienic and can cause damage to consumer health. Three main types of products are produced from the processing, namely juice drinks, syrup, and ginger powder.

VI. Acknowledgment

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