

Artisanal processing of cassava and degradation of the living environment in the Guemon region-Côte d'Ivoire

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ABSTRACT: The processing of cassava in an artisanal manner remains the preferred means for better valorization of this product in Côte d'Ivoire and particularly in the Guémon region. The management of the waste that comes out is one of the concerns of environmental management, because it is one of the problems faced by all human establishments, particularly those in the informal and artisanal sector. This artisanal transformation of cassava into attiéké, paste (placali), tapioka, flour, gari, attoukou and starch induces the production of organic and liquid waste which is difficult to control in an urban environment. The objective of this study is to evaluate the management of waste from these artisanal cassava processing units and their impact on the living environment in the Guémon region. The method used was based on the use of documentary data, direct observations enriched by field surveys based on a questionnaire addressed to the population and semi-directive interviews with cooperatives. It appears from field investigations that these artisanal units are faced with the problem of managing solid waste and wastewater resulting from their activity. There is no involvement of local authorities, nor of the national waste management agency, the institution in charge of waste management. Only 20% of solid waste consisting of cassava peels is reused and the rest, as well as wastewater, are dumped uncontrolled into the natural environment. This management model impacts the living environment and induces environmental problems such as foul odors, unsanitary conditions, soil degradation and air pollution.

KEYWORDS: waste management, degradation, cassava, informal activity, urban.

1 INTRODUCTION

Cassava, considered a food crop, is one of the most important edible roots in Africa. It is a staple food for more than 500 million people worldwide and represents a food source for approximately 80 percent of people in sub-Saharan Africa (Rural 21, 2020, p4). This is why NEPAD (cited by USAID/ CORAF/ SANGHAI, 2010, p10) has, on the one hand, identified cassava as a crop aimed at reducing poverty and, on the other hand, developed an outlet strategy for the sub-sector based on the General Cassava Development Strategy (SGDM). This choice is partly due to the importance of the crop as a reserve in the event of famine, its production being relatively simple, and requiring fewer agronomic inputs, with little or no fertilization. Through its production, processing and marketing, cassava also constitutes a main source of income for households. In Ivory Coast, cassava cultivation is one of the most practiced activities in the different forest regions, particularly in the Guemon region. In 2017, Ivorian cassava production was 5,000,667 tonnes and was the second largest food crop after yam (CNRA 2021, p8). A staple food in Côte d'Ivoire, this crop is well integrated into several cropping systems. Indeed, the populations, to ensure their own subsistence, in the past, the production of cassava was done in association with other crops, notably rainfed rice in the Guemon region. This traditional system, with very little mechanization, has given way to a cropping system exclusively devoted to cassava which is considered today as a cash crop by the populations. The plantations are carried out on yam mounds. The most used varieties are *Bonoua*, *Yacé* and *Alindaagba* which are local cultivars from other regions of the country and which have a low yield ranging between 6 and 12 t/ha (CNRA, 2013, P1). The major production areas are the localities of Duekoué (17,000 ton), Guézon (13,000 tons), Guéhiébli (9,375 tons), Gbapleu (9,100 tons) and Bagohouo (8,840 tons). For the 2020 campaign, all varieties combined and for the entire Guémon Region, over an area of 2,215 ha, a total production of 57,590 tons was recorded, half of which was made from four very popular traditional local varieties with names in languages. terroir.

Cassava being a very perishable commodity, conservation and processing remain the preferred means for better valorization of this product. But this artisanal processing of cassava impacts the urban environment. This situation, the effects of which are visible to all, causes significant nuisance for residents and has harmful consequences on the health of populations, the environment and resources. Urban areas like Duekoué and Bangolo are large producers of cassava and processing is carried out by small traditional units. The complex Dove of Peace association in Bangolo and the dynamic women based in Duékoué are groups of women whose main activity is the artisanal processing of cassava into attiéké, placali, tapioka, attoukou and starch.

However, all cassava by-products all produce solid and liquid waste. These starch-based wastes cause foul odors, nuisances in their immediate environment. It is therefore appropriate to take into account these different dimensions of the degradation of the living environment linked to artisanal cassava processing and to put in place measures to limit the negative impacts on the environment and on the quality of life of the populations concerned.

2 METHODOLOGY

2.1 THE FRAMEWORK OF THE STUDY

The Guemon Region is located in the west of Cote d'Ivoire and extends over an area of 6695 km² or 2 % of the national territory. It is limited to the north by the Worodougou region, to the east by the Haut Sassandra region, to the west by the Cavally and Tonpki regions and to the south by the Nawa region. (figure 1). The region is subject to high rainfall with an annual average oscillating between 1500 And 2.000 mm of rain. The annual average temperature is 25 ° C with a maximum of 26.7 ° C in March.

It has a rugged terrain, dotted with hills and mountain ranges, the most important of which are the Peko Mountain (1004 m), the Klahoyo Mountain (1115 m) Between these mountains there are numerous plains which accomodate all agricultural activities.

The hydrographic connection between the Cavally River and the Sassandra River is dense and characterized by three Sub-watersheds, Which are: (i) the G u é m on Sub-basin draining the Duékoué, (ii) the N'Zo Sub-basin draining the G u i g l o area (note that the Guémon and N'zo are two tributaries of the sassandra river) and (iii) the N' ze Sub-basin draining the Z agan and Tai area. This watercourse, unlike the first two cities, is a tributary of the Cavally river.

The Region is located in an ecological Zone characterized by dense and humid forest vegetation of the Semi-deciduous type. It is very rich in marketable Species such as *sipo*, *le kossipo*, *Niangon*, *tiama*, *lingue*, *fraké*, Which unfortunately tend to disappear under the pressure of uncontrolled logging and Slash and burn type agriculture. And more and more extensive indue to high demographics. It is a mountainous region which enjoys a Baouleen type climate, with an equatorial regime of attenuated transition. This climate is an asset both for perennial crops (coffee, cocoa, rubber, palm oil, etc.) as well as for crops market gardeners. Thus, the population is showing increasing interest in the cultivation of cassava with the development of new varieties contributing to the change logic in production logic which is increasingly moving towards commercial agriculture. This is why today the income earned from this crop by producers is increasing (gross margin: 190,000 FCFA/ha), which could be a means of empowering women, the main actors in the value chain.



Fig. 1. Study zone, Guemon Region

2.2 OF COLLECTION AND ANALYSIS

The methodological approach was based on a document review, the realization of the semi - structured interviews and the administration of a questionnaire. The bibliographic review consisted there consultation of the various works (memory, theses, reports, etc.) and on the Internet. The participatory approach based on semi-structured interviews and questionnaires was used to obtain qualitative and quantitative data on the process of production, consumption, conservation and waste

management. Non-governmental organizations such as the women's group of the Colomb de la Paix association in Bangolo and the Dynamic Women association in Duekoué were the main targets of this study. The semidirective interviews concerned the managers of the units and the technical services of the Town Halls in order to understand the process of collection and management of solid and liquid waste from these artisanal cassava processing units. A questionnaire was administered to members of these associations (35 people) and households near the production units (5). Of the 35 people, 20 people come from the NGO Colomb de la Paix and 15 from the Dynamic Women unit of Duékoué. To this technique is added that of direct observation of practices and the environmental framework. During the observation, photographs were taken. The data collected was processed using Excel and Word software and QGIS 3.28.1. software, to create the map.

3 RESULTS

3.1 THE IMPORTANCE OF CASSAVA IN THE GUEMON REGION

3.1.1 ACTORS INVOLVED IN CASSAVA PRODUCTION

The main actors involved in the cassava sector in the Guemon region are: the regional directorate of the Ministry of Agriculture, Rural Development and Food Production, the national agency to support rural development, the National Research Center Agronomic, the office supporting the marketing of food products and private operators made up of input distributors, producers, transporters, individual traders or cooperatives and processors.

3.1.1.1 INSTITUTIONAL ACTORS

The activities of the regional directorates focus on the supervision of producers in the region, through their training in technical itineraries, support for securing their farms through the establishment of land certificates or medium-term rental contracts. or long term and to support the acquisition of processing and conservation equipment and materials (mill, press, conservation packaging, tricycle).

The national rural development support agency and the National Agronomic Research Center work together to set up trials and popularize research results and support cassava producers in the region.

The food products marketing assistance office supports producers in the marketing of cassava through the production of an information bulletin on prices and the search for outlets for the sale of production.

3.1.1.2 PRIVATE ACTORS

The private sector, made up of non-governmental organizations, supports certain organizations through some technical support (improved cuttings, tools and small agricultural equipment).

Concerning producers, individual or grouped in cooperatives, they are essentially made up of women who use part of the production for self-consumption and sell a large part in the form of tubers.

The processing units (processors), some of which use some motorized equipment consisting of grinders, presses and dryers for the transformation of cassava into paste for the manufacture of its by-products (attiéké, placali, foutou, toh, flour, starch, gari, bread, cake, etc.). The traders are made up of wholesalers and/or retailers.

3.1.2 CASSAVA PRODUCTION

The Guémon region has experienced significant developments in its cassava growing system. In the past, in order to ensure their subsistence, farmers practiced the cultivation of cassava in association with other crops such as rainfed rice. This traditional system, with little mechanization, has since given way to a growing system entirely dedicated to cassava, now considered an income-generating crop by the inhabitants of the region given its contribution to income. The major production areas are the localities of Duekoué (17,000 tons), Guézon (13,000 tons), Guéhiébli (9,375 tons), Gbapleu (9,100 tons) and Bagohouo (8,840 tons), see figure 2.

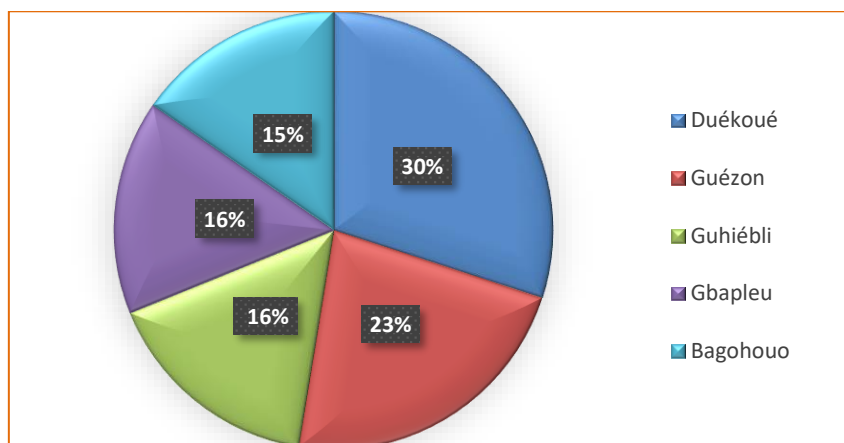


Fig. 2. Distribution of large production areas

Source: Our surveys, ANADER 2021.

It appears from our investigations that cassava is an easy, less restrictive and processing crop, because it is easy to cultivate and tolerates difficult climatic conditions well, which makes it a crop accessible to women, even with few resources or resources. agricultural experience. Additionally, cassava is a versatile crop that can be used as both a staple food and a source of income (processed or not), which provides women with the opportunity to add value to their harvest and diversify their sources of income. Cassava is known for its resilience in the face of climatic hazards, such as drought or poor soils.

3.2 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF TRANSFORMERS

3.2.1 GENRE

The artisanal processing of cassava in the Guemon region presents certain specific sociodemographic characteristics. They are, of course, mainly from rural areas where cassava cultivation is very widespread, but they work in urban areas. These people have family experience passed down from generation to generation in the field.

In terms of age, we observe a mix of young people and adults (figure 3). Young people are often involved in this activity to contribute to family income or as a first professional experience. Adults, for their part, have chosen cassava processing as a profession in its own right for some, and for others, it is carried out in addition to other agricultural activities.

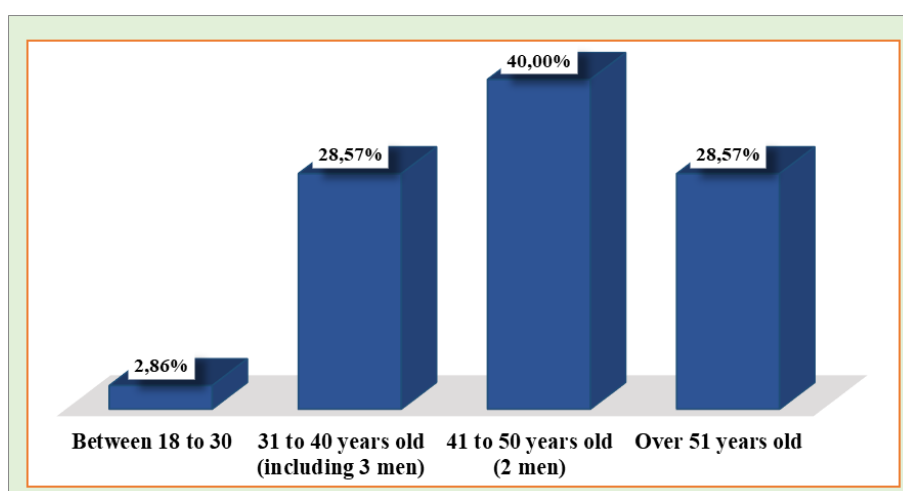


Fig. 3. Age group of artisanal processors

Source: Surveys, 2023

The analysis of Figure 2 shows that the largest age group is that between 41 and 50 years old, which represents 40% of the members. The age group between 18 and 30 years old are the least numerous and those between 31 to 40 years old and over 50 years 'old each represent 28.6% of the members of these units. This activity, practiced full-time, allows them to contribute to family expenses.

In terms of gender, cassava processing is dominated by women at 86%. Only 14% of men are involved in cassava processing in the Guemon region. The two units investigated only have five (5) men out of fifty-five (55) people. Regarding their marital status, the majority of transformers live as a couple (figure 4).

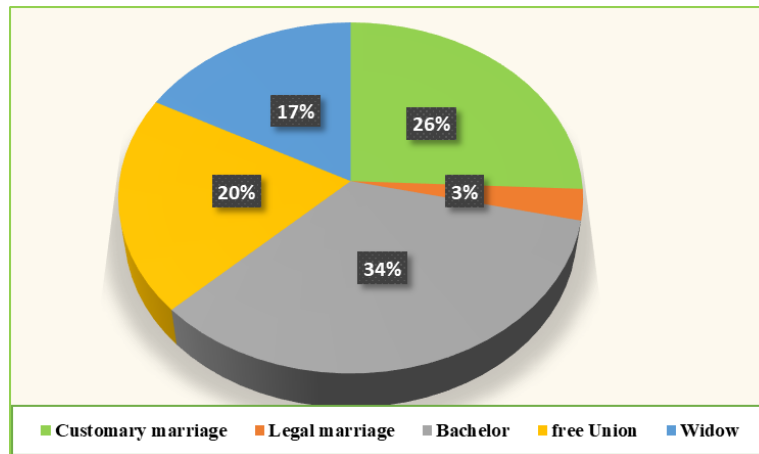


Fig. 4. Marital situation of producers of cassava products

Source: 2023 survey

The analysis of figure 4 shows that the number of people in a married situation is greater (63%) with 37% in formal marriage (customary and legal) and 26% living in a common-law union (living with their partners). On the other hand, women living in a widowed situation are not negligible with 17% of women concerned and single people represent 20%. In addition, widowed women have children between 4 and 8 in their care. This activity is therefore practiced by these women with the primary aim of being able to cover the numerous expenses they face daily and clearly explain their motivation to work in cassava processing although age is advanced for some.

Furthermore, the level of education remains very low (figure 5). They have varying levels of education, ranging from illiteracy to limited formal education. However, the skills needed for this cassava business are mainly acquired through practical experience and knowledge transfer within organizations.

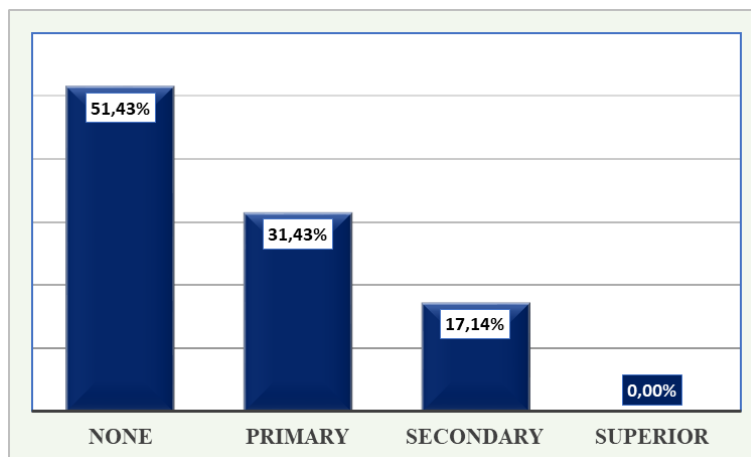


Fig. 5. Educational level of artisanal cassava processors

Source: 2023 survey

Figure 5 indicates that 51.43% of the members of these organizations are illiterate, with 31.43% having a primary level and 17.14% having a secondary level. None of the members have the

Undergraduate diploma. More than half of the women have more than 10 years in the cassava processing profession.

Regarding socio-economic status, cassava processors come from different socio-economic classes. Some are family farmers who process cassava for their own consumption or for sale on the local market, while others are in the entrepreneurial system who own small semi-motorized artisanal processing units.

3.3 THE ORGANIZATION OF WORK IN ARTISANAL CASSAVA PROCESSING UNITS

Cassava processing is mainly done in artisanal units by women organized in associations. It involves several steps, such as peeling, washing, grinding, fermentation, draining and drying. In artisanal production units, these steps are carried out by different people, each specialized in a specific task. This is the example of the non-governmental organization Colombe of Bangolo, whose president organizes and distributes roles. On the other hand, some work individually in alternation in the members' common space (case of the dynamic women of Duekoué). Of the 20 members of the Colombe non-governmental organization, a program of 10 people per week is established. One of the teams of 10 is made up of 7 women and 3 boys. Among the 7 women, 4 are involved in the process, from peeling to sieving and the other 3 women are involved in cooking. She employs daily workers to help the women of the association. As for the 3 boys, they are reserved to work only on the machine including grinding, transporting the material from the house to the grinding site and all activities requiring more physical energy. In fact, the non-governmental organization has some mechanized equipment, including a grinder, a spin dryer and a meal grinder (figure 6 &7). Which makes it a somewhat technologically advanced unit unlike the Association of Dynamic Women where the entire process is almost manual apart from the external grinding service.



Fig. 6. A meal grinder and a spinner the Colomb de Bangolo association



Fig. 7. Peeling and washing session

Shooting: Ouattara YR, November 2023

In short, the production of cassava derivatives remains artisanal in the towns of Duekoué and Bangolo, due to the equipment used with a convergence towards the semi-industrial, taking into account the efforts to optimize activities with some motorized tools (A grinder, spinners, a lump grinder and a semolina grinder).

3.4 CASSAVA, A BOON FOR WOMEN

Cassava processing provides important support for women. It grants them financial autonomy, especially for out-of-school and illiterate women. Women are involved in the production chain from cultivation to finished products. Indeed, cassava comes from various places, notably in the markets of the town of Bangolo, in the surrounding villages such as Logoualé and Douadé, both located on the Bangolo-Man axis; but also the fields of certain members of the group. During the rainy seasons, cassava is within easy reach because it can be found almost everywhere and at very reasonable prices. This favorable period for women cassava processors is generally between the months of July to September or even October. Over this period, the price of a 120 kg bag is between 6000F and 8000F on the market. Regarding unfavorable periods (lean season), it must be said that cassava is very rare so the purchase price which was either 6000 to 8000F for the 120 kg bag increases to 12000 or even 15000F depending on the rarity of the product. To compensate for this deficit during unfavorable periods, around ten women from the Colombe non-governmental organization (50%) invested in cassava cultivation as did 46.4% of dynamic women. They have cassava fields of approximately 1 to 2 hectares of cultivable land. This method allows women to always have raw materials. They are quite motivated for different reasons (figure 8).

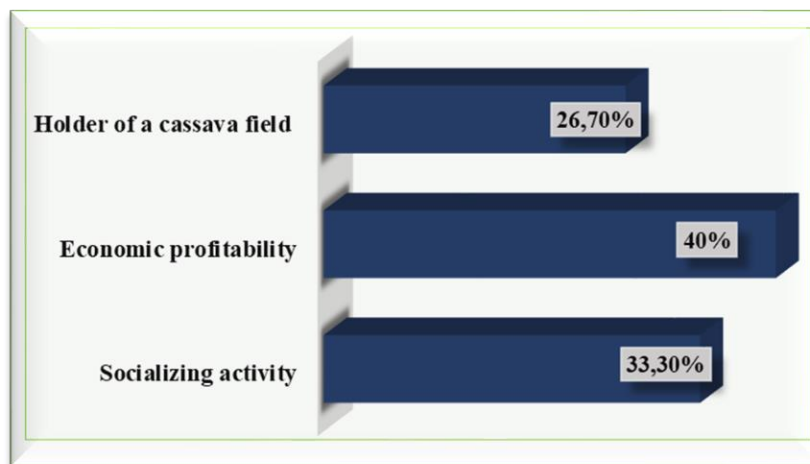


Fig. 8. Motivation of women to work in artisanal cassava processing

Source: Our Surveys, 2023

Women account for 40% of artisanal cassava processing because it is an economic boon for them. This is the way for them to do an income-generating activity. 33.3% of women come to this activity, because it is the only option available to them for financial independence. This activity allows them to integrate into a professional environment and contributes to their development. However, 26.7% of women process part of their farm production themselves, because they own cassava fields. Note that at the economic level, profitability is average. Indeed, for an investment of 25,000 FCFA for the purchase of cassava including transport (3 bags of cassava of 120 kg), the finished product is sold at 30,000 FCFA, i.e. a profit of 5,000 FCFA per production corresponding to 6 baskets of attiéké (the most produced derivative). However, this profitability depends on the seasonal nature of cassava cultivation, work in artisanal production units can vary throughout the year. Harvest periods are generally busier, while lean periods can be quieter.

In summary, the cultivation and processing of cassava offers women a certain autonomy and a feeling of empowerment. They offer women numerous opportunities for subsistence, income and autonomy. Its accessible culture, transformational opportunities, versatility and resilience make it a valuable resource that helps improve the lives of women and their communities.

3.5 MARKETING OF PRODUCTS DERIVED FROM CASSAVA FROM ARTISANAL UNITS IN BANGOLO AND DUÉKOUÉ

In the towns of Bangolo and Duekoué, cassava is processed in several forms, including attiéké, placali, gari and attoukou (figure 9). But the most important marketing objects are attiéké and placali. However, it should be noted that placali (cassava paste) is only made to order (02 to 03 bags of 50 kg per week).

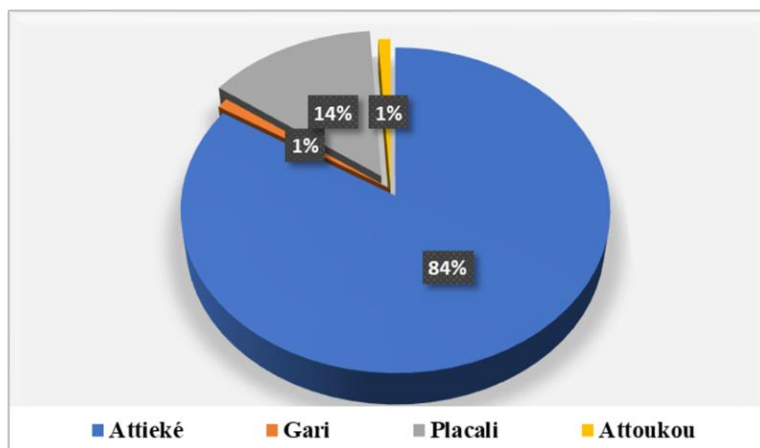


Fig. 9. Cassava derivatives sold by artisanal units in Duékoué and Bangolo

Source: Our survey, 2023

Figure 9 shows the share of each finished product from cassava. From this analysis, it appears that 84% of cassava processing is devoted to the manufacture of Attiéké compared to 14% for placali, 1% for each of the two products (gari and attoukou). Gari and attoukou are made to order, unlike attiéké which is the main derivative of cassava in the region. It should be noted that the high percentage of production of Attiéké is explained by the fact that it is the product most demanded by consumers, but also, according to women, seems to be less tiring. Regarding marketing, the dynamic women’s association of Duekoué sells 105 bowls/baskets of 20 kg per day, or 315 bowls of attiéké per week, which is equivalent to 37,800 kg per week. As for the complex peace dove association of Bangolo, it sells 400 kg per day, or 1200 kg per week. It appears that these two groups of women, comprising 55 people, produce on average 39,000 kg of finished products per week. These finished products, notably attiéké, are sold locally, in neighboring villages and a little in Abidjan (see figure 10).

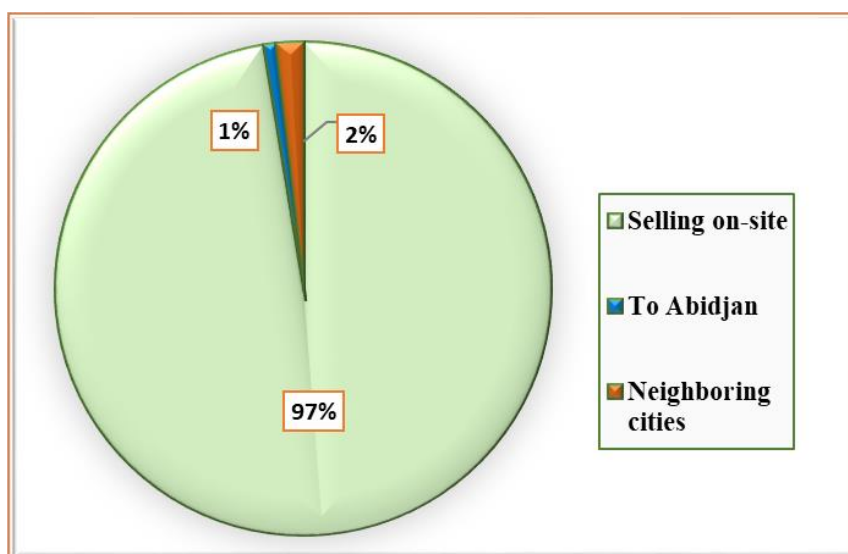


Fig. 10. Marketing of the sale of attiéké, Source: Our survey, 2023

Analysis of the graph indicates that 99% of the attiéké produced in the Guemon region is locally consumed. Only 1% is sold in Abidjan. It appears that attiéké is a very popular product in this region with an increasing production supply of cassava which is locally grown. In short, the region's production is intended for self-consumption and the finished products are sold on local markets.

3.6 MANAGEMENT OF WASTE FROM ARTISANAL CASSAVA PROCESSING

3.6.1 IDENTIFICATION OF WASTE BY DERIVATIVE

The process of transforming all the derivatives is almost identical, going from Peeling, Washing, Grinding, Fermentation, Pressing, Drying, Sieving and Preparation/Cooking for others (Table 1).

Table 1. Identification of waste from cassava derivatives

STAGE	WASTE			
	<i>Attiéké</i>	<i>Placali</i>	<i>Gari</i>	<i>Attoukou</i>
Peeling	Cassava peels			
Washing	used water			
Grinding	starched wastewater			
Fermentation	acid starched wastewater			
Pressing	acid starched wastewater			
Drying	Cassava fiber			
Sieving	Cassava fiber			
Preparation/Cooking	smoke	nothing	nothing	Smoke

Source: Our 2023 surveys

In the production process of cassava by-products, the quantity of wastewater discharged is produced in four stages of the eight stages of the process. 400 liters of water are used per day by the NGO Colombe in Bangolo and 2,800 liters by the group of dynamic women in Duekoué. These two artisanal units consume around 9,200 liters of water per week. Wastewater is composed of residual starch, organic acids, sugars and certainly other unknown organic substances.

Regarding solid waste, producers in the town of Bangolo produce 300 kg of cassava peels per day corresponding to 2.5 bags of 120 kg. Production takes place three (3) times per week, i.e. 900 kg of solid waste. Regarding those in the town of Duekoué, women produce 960 kg of waste per day, or 8 bags of 120 kg. The quantity per week is estimated at 2,880 kg of waste. It appears from the study that the artisanal processing of products derived from attiéké produces a lot of solid waste which is estimated at 4% of raw cassava (Table 2).

Table 2. Quantification of liquid and solid waste

	Quantity cassava in Kg/week	Solid waste in kg/week	Liquid waste in Liter / week
Duekoué Group	7200	2880	2,1
Bangolo Group	2,25	900	1,2
TOTAL	9,45	3,78	3,3

Source: Our 2023 surveys

Analysis of the table shows that the two groups of women produce 3780 kg of solid waste and 3300 liters of liquid waste per week for 9450 kg of processed raw cassava.

3.6.2 MANAGEMENT OF WASTE FROM CASSAVA ACTIVITY

In the organization and process of artisanal processing of products derived from cassava, no window is reserved for the treatment of waste by the production units. For them, it is a normal fact to get rid of bulky liquid and solid waste without precaution. The management of solid waste from cassava processing units in Duékoué and Bangolo boils down to the discharge of 16% of solid waste into nature (figure 11) and the sale (84%) of dried peelings (figure 12) to breeders. Therefore, the only option for recovering this waste remains the use of the peels for cattle feed. When the rejected solid waste becomes bulky, it is incinerated in the open air and near the units.

As for liquid waste, it does not benefit from any prior treatment. They are 100% dumped into nature.

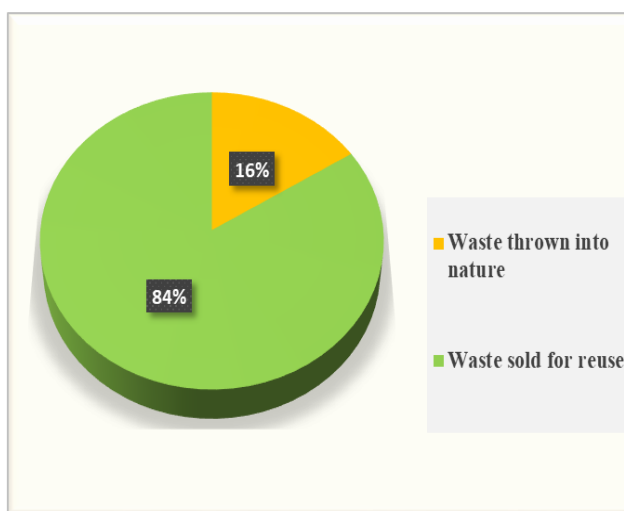


Fig. 11. Waste utilization rate



Fig. 12. Dried pile of cassava peelings

3.7 DETERIORATION OF THE ENVIRONMENTAL FRAMEWORK AND HEALTH RISK

The artisanal processing of cassava can have a significant impact on the surrounding living environment. As the results of the present study show, artisanal cassava processing requires the use of large quantities of wood for cooking. This contributes to deforestation and air pollution. The smoke emitted by these fires may contain harmful substances, such as fine particles and greenhouse gases, which can impact air quality and the health of people living nearby.

Since most of the waste consists of peelings and starched water, discharges are made without prior treatment or special arrangements. This method makes the environmental environment unsanitary with the stagnation of wastewater (figure 13

and 14) and becomes a source of bad odors. A wastewater disposal system is non-existent. Thus, there appears to be an inadequacy of a drainage system which accentuates the ugliness of the view in the towns of Duekoué and Bangolo, which can affect the quality of life of local populations with nauseating odors.



Fig. 13. Waste water from washing and pressing cassava



Fig. 14. State of the working environment of the women's group in Duekoué

Shot: Ouattara, November 2023

From a health point of view, it appears that women continue to use firewood for cooking on a daily basis despite access to butane gas. They inhale smoke all day long. This way of doing things impacts the health of producers. Furthermore, these units are not subject to any control in terms of hygiene and health standards by the environmental services. They are not subject to any analysis that can guarantee the quality of the finished products. Consequently, the stagnation of starched pressing water along the streets and in nature constitutes significant health risks. These waters pollute the surrounding soil and air.

In short, we note a precariousness in waste management at the level of artisanal cassava processing units; which poses numerous environmental and health problems. At the end of the various interviews with the town hall services as well as those of the regional environment and sustainable development department, the following reasons were mentioned which explain this unpleasant waste management situation:

- Lack of awareness and training: Artisans are often unaware of the harmful consequences of poor waste management. They have not received any awareness on good waste management practices

- Lack of adequate infrastructure: The artisanal units do not have the necessary infrastructure for effective waste management, such as proper sanitation systems. This makes the living environment unsanitary
- Economic or financial constraint: Artisans, because of their status, often consider that digging a soakaway well or a septic tank to collect wastewater, or even purchasing modern equipment for cooking, are additional expenses and should not be able to spend it. This is why they most often settle in less populated places or along the tracks. This is why we observe inadequate waste management practices, such as open burning or the discharge of liquid waste in rainwater drainage channels and in the surroundings of artisanal units
- Lack of coordination and support: Lack of coordination and support from local authorities or organizations is also one aspect of not implementing more effective liquid and solid waste management systems. Thus, lack of access to resources and information channels can make it difficult to improve waste management in these urban areas

4 DISCUSSION

Artisanal cassava production in the Guemon region is mainly carried out by small-scale processing units managed by women. Cassava processing is often considered an activity traditionally reserved for women. The organization of work in these units may vary depending on available resources, technical skills and regional cultural practices. It appears from the study that the level of education of managers and employees of cassava processing units is low with 51.43% illiterate and 31.43% who have a primary level. However, this activity is a great boon for women in these secondary towns. 40% of women work in artisanal cassava processing and economically, 33.3% of their financial resources come from this activity. The study by AMOA Amlan et al (2023, P495) corroborates this. According to the said study, the processing and sale of fresh cassava and its derived products allow women to be financially independent. Thanks to these activities, we notice a change in social status at the household level.

Even though this artisanal activity improves the financial condition of these women, the fact remains that the transformation process remains largely manual, therefore artisanal, with the request for external services at the grinding level. Despite the introduction of some motorized equipment (crusher, spinners, semolina), the process remains informal. In Côte d'Ivoire, the cassava value chain is very poorly organized with domination of the informal sector at all links (ILO, 2019, P17). The studies of Mendez del Villar et al. (2017, p.159) highlighted the artisanal processing rate which is 75%. This artisanal production generates a lot of waste. It appears from this study that the waste produced in the artisanal cassava processing process is cassava peelings or peelings and starched wastewater. The two artisanal production units produce 3780 kg of peelings per week and 3300 liters of wastewater per week. The only way out of solid waste management is sales to breeders. According to Kouakou N'Guessan Stanislas KOBENAN et al (2023, P539), the peelings are valued in pigs, cattle and sheep/goats after having undergone or not processing methods such as drying in the sun, cutting and/or processing. addition of salt or associated with other agricultural by-products such as corn and rice bran, low rice flour, banana peelings, yam peelings.

In terms of degradation of the living environment, the ground is polluted by stagnant water around the pressing and washing points. Olfactory pollution characterized by nauseating odors and the presentation of an unsanitary environment. These effluents constitute a significant source of environmental pollution (KANKU André, 2019, p19). This unhealthy environment exposes populations to health risks linked to the creation of mosquito nests. This assertion confirms the study by YAO Kouassi Ernest Géographe (2021, p27), which indicates that the waste produced by the processing of cassava degrades the soil and pollutes the air and their environmental impact is undeniable.

It is important to take measures to remedy this situation of unsanitary conditions and pollution. This could include raising awareness and training of artisans on good waste management practices, establishing or improving waste management infrastructure, developing clear regulations and their effective enforcement, as well as supporting and coordination of the various stakeholders involved. Adequate waste management in artisanal production units is essential to preserve the environment and the health of communities.

5 CONCLUSION

The presence of artisanal cassava processing units in the Guemon region and particularly in the towns of Duekoué and Bangolo is due to the development of this crop in the region. The soil, vegetation and climate are suitable for this. The derivatives that come out of it give cassava a strong economic and food potential. Indeed, the artisanal and semi-industrial processing of cassava contributes to meeting socio-economic needs in the region. Cassava processing is a traditional skill passed down from generation to generation. Techniques and knowledge are shared within the family or community, thus ensuring continuity in artisanal production. The production of cassava-derived products is, of course, an income-generating activity, but also an activity that creates solid and liquid waste. If a sort of recovery of solid waste is carried out through the drying of the

peels and their sale to breeders, liquid waste, for their part, constitutes a significant source of nuisance and environmental degradation. Considering the diversity of by-products resulting from the artisanal processing of cassava, the technological development of equipment is essential as well as efficient management of solid and liquid waste to make these micro cassava processing units viable in secondary towns.

It should be noted that some artisanal production units may also adopt more modern approaches using motorized equipment or more advanced processing techniques to improve efficiency, productivity and waste management.

The study recommends promoting the valorization of organic waste such as cassava skins and fibrous residues as raw material for the production of compost or biomethane. These products can be used as fertilizers or as a source of renewable energy. It is also essential to put in place measures to reduce the quantity of waste generated at source. This can be achieved by optimizing processing processes, using more efficient equipment, adopting cleaner technologies to minimize air and water pollution to encourage sustainable production practices across the modernization of equipment.

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