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Palm Oil Production and Marketing in the Municipality of Houeyogbe in South-West Benin

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Abstract

The agricultural sector play important role in the development of Houeyogbe municipality. This study aims to analyze the production and marketing of palm oil in Houeyogbe. The methodological approach is based on data collection, processing, analysis and interpretation. A total of 294 farmers were interviewed and, the data collected was processed using Excel software. Finally, the SWOT analysis was used. The results reveal that, oil palm exploitation is an activity carried out primarily by women. 30% of the earnings from the sale of palm oil are intended for home-consumption and the remaining 70% for sale and export. In addition, for a production of 15 liters of palm oil in the dry season, the producers make a revenue from 135000 FCFA (245.45 $) to 330000 FCFA (600 $) with an estimated expense of 80000 FCFA (145.45 $). The profit margin varies from 55000 FCFA (100 $)to 250000 FCFA (454.54 $)in the dry season. In the rainy season, the processing of 200 measures of palm nuts yields a quantity of 150 liters of red oil, the selling price is 9000 FCFA (16.36 $) per 25 liter can, which gives a revenue of 135000 FCFA (245.45 $) with an estimated expense of 60000 FCFA (109.9 $). The profit margin is 75000 FCFA (136.36 $). Retail marketing of palm oil is not developed in Houeyogbe's municipality. Most retail marketing is directly linked to consumption. Most of the wholesalers are beginners who come from urban areas

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with trucks to buy palm oil in bulk. They sell for the most part in the markets of Lokossa, Azovè, Dogbo, Athiémè, and sometimes in Cotonou. It is recommended that actors at various levels take into account the various constraints that constitute bottle necks so that appropriate solutions are provided to improve the performance of the various actors in the palm oil sector in the commune of Houéyogbé.

Introduction

The growth of the Beninese economy is largely dependent on the agricultural sector.[1] The oil palm, native to West Africa is widely cultivated and yields a vegetable oil used in cooking and in the manufacture of margarine and soap.[2] The massive production of palm fruits in Benin has continued with a flourishing of projects aimed at its development.[3] In general, in Benin particulary in the departments of Mono and Couffo, agricultural activities are at the fore front of economic activities. They are practiced by the rural population, reaching 78% and 79% respectively.[4] Indeed, palm oil production is one of the main sources of wealth in the Mono Department in general and the Ouedeme district in particular.

Palm oil is the most produced vegetable oil in the world.[5] It accounts for 34.4% of global vegetable oil production. The oil palm is the most productive oil seed plant, with average yields of around 6t/ha and more than 10t/ha in the best genetic trials. This oilseed plant is 7 to 10 times more productive than its direct competitors grown in temperate countries (soya, rapeseed and sunflower). Oil palm represents only 7% of oilseed agricultural land, while those devoted to soybeans, rapeseed or sunflower are respectively 61%, 18 % and 14%.[6]

Palm oil is a vegetable oil extracted from the fruit of the palm tree (Elaeis guineensis), native to West Africa and now widespread in tropical regions of America and Southeast Asia. Currently, it is the most consumed vegetable oil in the world.[6,5] Crude palm oil is called red palm oil, because of its red color linked to its richness in carotenoids.[7] Although red palm oil is recognized for its nutritional benefits,[8,9,10] manufacturers prefer deodorized and discolored palm oil, for the purpose, refining is mandatory. Refining leads to by-products such as palm olein (rich in oleic acid) and palm stearin (rich in saturated fatty acids).[11] Red palm oil and palm olein are widely used in African, South American and Asian cuisines. In other countries, the most consumed refined product is palm stearin.[6]. Red palm oil and palm olein are rich in saturated fatty acids (SFAs), which make up about 50 % of total fatty acids. Monoun saturated fatty acids (MUFA) and poly unsaturated fatty acids (PUFA) represent respectively 40 % and 10 % of total FA.[7,12] Palm stearin, which is in solid form, contains 52 to 76 % SFA.[7]

In the commune of Houeyogbe, the transformation of palm nuts into oil is widespread among all socio-cultural groups. The production of oil, which was once intended for self-consumption, has now become a main income-generating activity, unlike most other agri-food processing activities in the area.[13] It is entirely artisanal and is largely carried out by women, sometimes assisted by family members. However, these women use entirely manual techniques. The production of palm oil is a source of income for the producers as well as its marketing. It contributes to the good atmosphere of the Commune's markets as well as reducing the unemployment rate among young people.[14] Certainly, palm oil is an important product for the local market but it plays a significant role socially because of these multiple benefits in the manufacture of margarine, soap and vegetable oil used in cooking.[2] According to,[15] the development of agriculture in general and of oil palm in particular remains conditioned by climatic and pedological parameters on the one hand and by production techniques and systems on the other. For several decades, this production has experienced a profound degradation resulting from a combined action between natural and anthropological factors.[15] The commune of Houeyogbe, which is the focus of this research in the Department of Mono, has a large expanse of natural palm groves, which constitute the main species of vegetation and are even found in the concessions. The production and marketing of palm oil occupy an important place in

the economic and social activities of the populations in the study area. Palm oil, produced by traditional methods, has a prominent place in the population's diet and is the main source of edible fat. It is therefore necessary to think of a revalorization of this sector to improve the economy of the locality or even the country.

Materiel and Methods

Area Study

The Commune of Houeyogbe is located in the department of Mono and lies between 6°20' and 6°40' north latitude and between 1°45' and 1°57' east longitude. With a surface area of 320 km², it extends over 16.25 km from north to south and 13.75 km from east to west. It is bordered to the north by the Commune of Lokossa, to the south by the Commune of Come, to the southwest by the Commune of Grand-Popo, to the east by the Commune of Bopa and to the west by the Commune of Athieme (figure 1). It comprises six (06) district (Dahè, Doutou, Honhoué, Houéyogbé, Sè and Zoungbonou) and includes thirty-nine (39) villages and twenty-one (21) neighborhoods.[17]

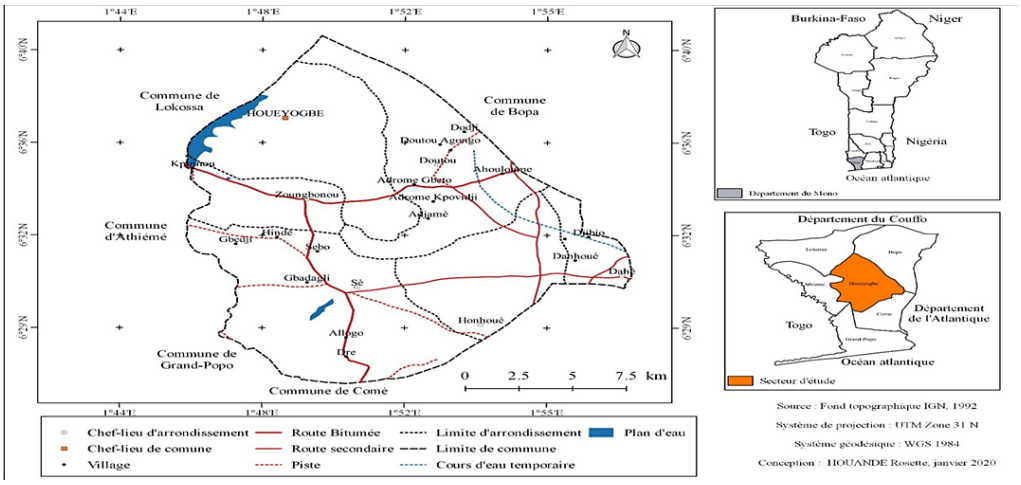

Fig. 1: Localisation of area study.
Source:IGN topographic fund, 2012 and field survey, January 2020

Methods

The data used for this research are essentially demographic statistics from 1979 to 2013 (RGPH) collected at the National Institute of Statistics and Economic Analysis (INSAE). They are used to analyze the demographic evolution of the population of the commune of Houeyogbe and the involvement of this population in the production and marketing of palm oil; data on oil palm production obtained from the ATDA (Territorial Agency of Agriculture Development) followed by the profitability of earnings from the marketing of oil palm by-products collected from producers in order to analyze the economic profitability of the production and marketing of palm oil in the study area.

In addition, techniques such as semi-structured or direct interviews were also conducted individually. An observation grid was also used to monitor the evolution of the different cropping systems. Similarly, the data collection equipment used in this research was a digital camera for taking pictures in the field; a GPS (Global Positioning System) that allowed us to determine the surface area of the fields; and a sound recorder for recording the interviews. The data collected was then analyzed, classified, grouped and presented in the form of tables and figures. The information collected was then processed using Word 2010 for the texts, Excel 2010 for the tables and figures, and Arc view 3.2 for the curves and maps. The SWOT model (Strengths, Weaknesses, Opportunities, and Threats) was used to summarize the results.

Method for Determining the Profitability of Palm Oil

The profitability of palm oil production and marketing is determined by the formula of [18] which is as follows:

TR=(VS-TC)/TC

TR = Rate of Return;
VS = Amount of sale of palm oil;
TC = Total amount of production cost.

Sample Size Determination

The study area covers the entire commune of Houeyogbe. However, in order to better understand and appreciate the problems related to the production and marketing of palm oil in the aforementioned commune, the field surveys took into account the different districts of the commune of Houeyogbe, namely. Dahe, Doutou, Honhoue, Zoungbonou, Houeyogbe and Se. To this end, the choice was made on targets such as: agricultural households; communal authorities; and agents of the SCDA (Sector Communal of Agriculture Development) of Houeyogbe. Indeed, given that agricultural households are the priority targets, they must meet certain criteria as follows. Be at least 18 years old or older, since they must be mature enough to speak appropriately about the various aspects of the oil palm sector and, by extension, the palm oil that comes from it; and have at least ten (10) years of experience in the agricultural field. This criterion was retained because with these years of experience, these people could provide reliable information on the subject, reside in the village or city district for the past fifteen (15) years. This criterion was retained because these people can better speak about the realities of the area, be a palm oil producer for the last five (05) years in order to be able to provide reliable information. The size of the sample in the commune of Houeyogbe was determined according to the probabilistic theory of.[19] Thus, the formula for determining the sample size is as follows

$(z^2 \times p\ (1-p))/i^2$

Let:
X = sample size;
t = deviation set at 1.96 corresponding to a confidence level of 95%;
P = n/N; P = proportion of farm households in the commune of Houeyogbe (n) to the total number of farm households in Mono Department (N);
and i = margin of error which is equal to 5%.

Thus, the following numerical application gives:
t2 = (1.96)2 = 3.841
P = 9689 /37639 = 0.2574192
q = 1-p = 0.7425808
$e2 = (5\ \%)^2 = 0.0025$
N = 293.73 or 294 people

The table 1 summarizes the sample size and by rounding.

Table 1: Sample size and by District

Rounding	Number of farm households	Sample size	Rate (%)	Resource persons
Dahé	2840	86	29	1
Doutou	2505	76	26	1
Honhoué	1078	33	11	1
Zoungbonou	661	20	07	1
Houéyogbé	531	16	05,5	1
Sè	2074	63	21,5	1
T**otal**	**9689**	**294**	**100**	**06**

Source: Field survey results, June 2020

Thus, a total of 294 farm households were selected for the survey. In addition to these households, seven resource persons were interviewed for the survey. These were the mayor and seven (7) district chiefs.

Results

Human factors

They take into account the characteristics of the populations living in the study area as well as the economic activities they carry out.

Demographic Factors

The evolution of the population of Houeyogbe according to the General Population and Housing Census (RGPH) carried out in 1979, 1992, 2002 and 2013 is presented in Figure 2.

The Commune of Houeyogbe is experiencing a very rapid increase in population. Indeed, the results of the various General Population and Housing Censuses (RGPH) show exponential population growth (an increase of 58% in the space of 34 years, i.e., the period from 1979 to 2013). This increase is due to the natural growth of the population (high birth rate) and to migration in the Commune of Houeyogbe, which favors the availability of labor and a good consumption market for palm oil and its derivatives.

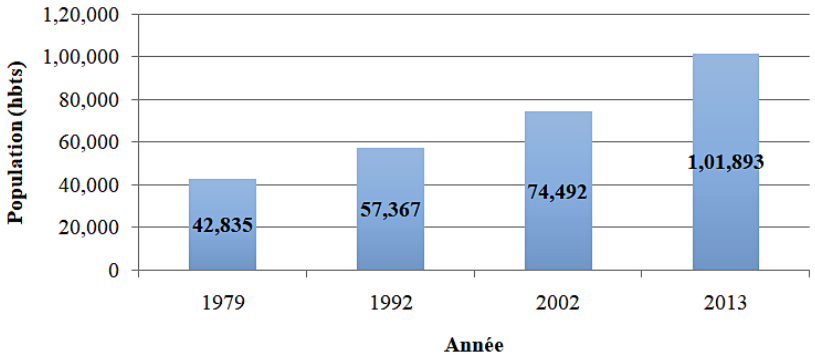

Fig. 2: Population trends in the Commune of Houéyogbé from 1979 to 2013
Source:INSAE data processing, June 2020

Socio Demographic Characteristics of the Workforce of Actors Selected for the Survey

In order to display the socio-demographic characteristics of the players in the production and marketing of palm oil in the commune of Houéyogbé, aspects relating to age, level of education, and the average area of land inherited from survey respondents.

Age

The results obtained regarding the age of the people selected for the survey are presented in the tables 2 below.

Table 2 : Evolution of the age of the actors selected for the investigation.

Age	Number of actors	Percentage (%)
From 15 to 20	54	18,36
From 21 to 41	109	37,07
From 42 to 62	94	31,98
From 63 and more	37	12,59
Total	294	100

Source: Results of field surveys, July 2017

According to the field surveys of the producers and traders selected for the survey, it appears that the average age of the latter is between 15 and 62 years old. Thus, on reading the data in this table,

it appears that at least 240 producers and traders, i.e. 81.63% of the entire workforce of actors selected for this survey, are of a sufficiently mature age likely to constitute a hand. Cheap labor for the production and marketing of palm oil. As for the information provided in relation to the level of education, the farm size of producers and traders, the results obtained in the field are presented in table 3.

Table 3 : Distribution of the level of education of the actors selected for the survey.

Level of education	Number	Percentage (%)
Primary	142	48,29
secondary	127	43,21
University	25	08,50
Total	294	100

Source: Results of field surveys, July 2017

According to the field surveys, it appears that the majority of these producers have reached either the primary level (48.29%) or the secondary level (43.21%) with a strong preponderance of producers who have reached the primary. All of this can negatively impact the yield of palm oil production since those producers who have reached the primary level may be less receptive to the adoption of new technologies to boost production. It should also be noted that the size of the farm may vary from one farmer to another, which is shown through the table 4.

Table 4: Average area of land inherited and by gender

Boroughs	Average area of land inherited	Share of men (%)	Share of women (%)
Dahé	05	0,75	0,25
Doutou	04	0,75	0,25
Honhoué	02	0,64	0,36
Zoungbonou	01	0,67	0,33
Houéyogbé	01	0,67	0,33
Sè	03	0,81	0,19
Total	02,33	0,71	0,28

Source: Results of field surveys, July 2017

The analysis of Table 4 clearly shows that women are disadvantaged in the sharing of land in the commune of Houéyogbé with only 0.28% as the average share of inheritance for all of the 06 districts considered. Indeed, women are generally deprived of the inheritance since they are destined for another family according to field surveys. However, this trend is beginning to be reversed, proof that the notion of gender is beginning to gain ground in families, even if pockets of resistance still persist. Furthermore, the difference between the areas inherited in the two different arrondissements is explained by the density of the population, which is higher in some arrondissements than in others.

Agricultural labor

Agricultural labour is a very important parameter in the palm oil production system in the Commune

of Houeyogbe. Three types of labor are identified. These are family labour, salaried labour and self-help groups.

Oil Palm Cultivation Techniques

The cultivation of oil palm goes through several stages. It is essentially about the nursery, the transplanting, the trouaison, the plantation and the maintenance.

Nursery

According to the field surveys, the nursery phase includes the lifting of dormancy that leads to pre-sprouting. This is an operation that consists in pouring the nuts of interesting phenotype (well sized, without perforation) in hot water for 24 hours before proceeding to the pre-sprouting. This requires watering twice a day for six to eight weeks to obtain pre-sprouted.

Transplanting

According to the field surveys, the transplanting phase is a sensitive operation that requires a lot of attention from the nurseryman. Before starting the transplanting of the pre-sprouted plants, it is necessary to sieve the soil, disinfect it with nematicides and potting in polyethylene bags followed by their alignment under the shade and transplanting the pre-sprouted plants at the rate of one plant per pot. Then, it is necessary to water them during two months before transplanting them in pots bigger than those previously mentioned. Finally, it is necessary to ensure their maintenance during three to four months to have young plants ready to be planted. It is an operation that lasts 7 (seven) to 9 (nine) months.

Planting

Before planting, the land must be cleared (mowing, grubbing, endrainage) before the actual demarcation of the plot according to the producers selected for the survey. To install the oil palm plantation, it is necessary to set up a staggered arrangement of 9 * 7.82 m sides and 7.82 m height (Zola, 2014).

Trouaison

According to the producers selected for the survey, the hole is the stage that illustrates strongly the oil palm plantation. It is the last and most important step. This operation is done before or after a heavy rain while respecting the size of the pots, i.e. 40*40 (40 cm deep and 40 cm square). The plantation itself consists in moving the young plants in pot towards each hole and to delicately remove the polyethylene bag in order to introduce the young plant with a clod of ground in each hole followed by the re-corking. After the plantation, it is necessary to materialize each plant with its stake and if possible, with its torn polyethylene bag to be sure that the young plant is not buried with the polyethylene bag.

Palm Oil Production

According to field surveys in the Commune of Houeyogbe, the palm oil production technique is artisanal. It involves two stages, namely the supply of raw materials and the preparation of the palm oil.

Supply of Raw Materials

The price of palm nuts is set by the producer according to the cost of oil on local markets. The supply of raw material remains a limiting factor. In the study area, palm oil producers do not have a fixed place to obtain palm nuts. The supply is done at the market, in the fields and even at home by palm nut producing partners. The sale of palm nuts is done by measure (autoca, in the Sahouan language). The price of the measure varies between 150 and 300 FCFA depending on the period. Figure 3 shows the palm nuts from the destemming process.

Figure 3 is a partial view of some palm nuts obtained after destemming and ready to undergo the cooking stage in the district of Dotou.

Fig. 3: Partial view of some palm nuts in Doutou Source: Picture Kadjegbin, June 2020.

According to the field surveys, the preparation of palm oil involves several stages, namely. cooking,

mixing and pulping, separation of by-products and aqueous extraction or recovery of the oil-water mixture.

Cooking is done in a barrel heated with wood on a hearth generally composed of three stones. To cover the stones on the fire, they use another old basin with an open base.

The kneading of the palm nuts with the help of an artisanal machine consists in pressing the palm nuts in order to extract the red oil and the cake. It should be noted that in the study area, blending is also done on foot in the commune because of the lack of equipment. The interest of this machine allows to save time and human energy.

Water is added to the paw obtained after mixing so as to double the volume and to dilute the mass in order to be able to separate the nuts and the fibers from the creamy-oily emulsion released by the pulping.

The nuts and fibers drawn from the mass with a large mesh basket are brushed against the wall of the basket. The walnuts, free of fibers, are placed in a pile. At the end of the process, the fibers are taken back to be washed in a circular hollow pit with a cement floor. After the fibers are washed in a mortar to detach the few particles called "kpèlèbè" (in the Sahouan language) which are not used in the process. (Sahoui language) that adhere to them, they are compressed into balls that are stored and generally marketed. Instead of putting them into balls, some women prefer to spread them out in baskets and add the water from the separation to obtain another paste. This last one stays for several days in the sun. After this stay in the sun, it becomes a little solid and is then spread on walls to give cakes that are also marketed. Photo 2 shows the cakes spread out on a rack.

Figure 4 shows a partial view of the drying of oilcake at Zoungbonou. Thus, after mixing, water is added to the paste resulting from this operation. From then on, the oil will float on the surface of the water. The supernatant or raw juice called "Amikpon" (Sahouè language) is collected in a small basin and then put on the fire, often in a barrel. Photo 4 shows the juice recovery stage.

Fig. 4: Partial view of the drying of oil cakes in Zoungbonou
Source: Picture Kadjegbin, June 2020.

Obtaining the Red Oil (colais)

According to field surveys, after the separation of products, the oil obtained on the surface is put on fire in a barrel. The duration of this operation is sometimes 7 or 8 hours; this also depends on the pace of the fire, which forces them to control especially at the level of fire to maintain a good quality and color of oil. A few moments later,

the oil is obtained which will be sifted afterwards. The sieving is a very important phase in the preparation of palm oil. It is removed after some time from the barrel and filtered through the basket or a sieve that acts as a sieve that retains the few fibers entrained and coagulants. Without this phase, it is without quality and that the consumption is also impossible because of the waste that it contains. After the sieving, the oil is heated to reduce the amount of water it contains. Figure 5 shows the stages of the recovery of the juice.

Figure 5 shows a woman extracting palm oil from oil cakes in Dahe. This is the recovery of the oil-water mixture that she pours into a barrel for the preparation and thus the obtaining of the finished oil that is ready to be consumed.

Fig. 5: Different stages of juice recovery at Dahe
Source: Picture Kadjegbin, June 2020.

Obtaining the "Zomi" Oil

According to field surveys, a series of operations are observed in the process of obtaining palm oil, commonly called "zomi" (in the Sahuè language). Long before the palm nuts selected and destined for the preparation of "zomi" are put on the fire, it is dried before being prepared and the water that was used to boil the nuts is put aside. After sifting the oil obtained, it is kept on the fire and requires a lot of attention and speed. All this is done to avoid the possible calcination of the "zomi" oil. The addition of water which is set aside is necessary to increase the density of hydrophilic compounds by which it is detached from the fatty phase. This addition of water depends on the amount of oil in the fire. It is this mixture that is added to the preparation gradually under moderate heating. This is a time-consuming step that requires special attention from the person who performs it, as it is the decisive phase of the preparation. It is it which gives to the oil obtained, its perfume which confers its refined character to him. After a few hours of heating, the mass obtained is poured into a basin or container reserved for this purpose and is subjected to a decantation at the end of which one obtains the "zomi". The oil is obtained on the surface and a red and brown sediment in depth. This sediment is called "amikpon" (Sahouan language). It is collected to be consumed or sold. At the end of this preparation, the women package their product for sale.

Usefulness of Palm Oil

Palm oil, rich in palmitic acid, is used largely for food. According to the producers, two types of red oil are possible. Unrefined red oil is partially consumed. Its main outlet is the soap industry, as it is used to obtain foaming products. Refined red oil is only useful for consumption. The production of palm oil is a source of income for the producers as well as its marketing. It contributes to the good atmosphere of the markets of the Commune as well as to the reduction of the unemployment rate. Thus, the production and marketing of palm oil are activities that provide beneficiaries, especially women, with income that enables them to meet their various needs despite certain constraints.

Socio-Economic Effects of Palm Oil Production and Marketing in the Commune of Houéyogbe

This sub-heading addresses the socio-economic effects of palm oil production and marketing in the commune of Houeyogbe.

Marketing of Palm Oil

According to the field surveys, the processors and collectors transport the oil to the market by bicycle or motorcycle. The actresses select their own cans and sometimes resell them to soap manufacturers. They market the product mainly when their usual supplier is out of stock, or does not yet want to sell their product. Indeed, these collectors are often contacted by processors, traders and other products.

The wholesalers are grouped in several places in the sales outlets. They have their eyes riveted on the access roads to the different sites, looking for potential customers. Some of them move around the market in order to be the first to see the customer. As for some retailers, they walk around the market from time to time with their merchandise in order to increase their chances of selling. Customers come from surrounding towns and villages such as Lobogo, Comè, Kpinnou, Lokossa, Dogbo, Azovè, and even from Togo. Figure 6 shows the palm oil marketing circuit in the commune of Houeyogbe.

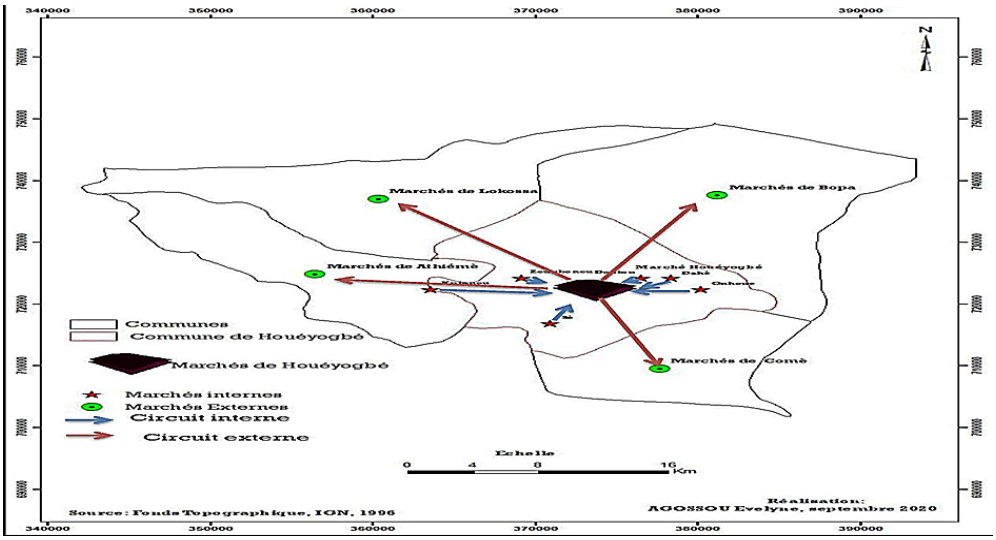

Fig. 6: Palm oil marketing circuit in the commune of Houeyogbe

Analysis of Figure 6 shows that the commune of Houeyogbe has two palm oil marketing channels. These circuits are divided into internal and external circuits. The internal circuit includes the districts of Dahé, Doutou, Honhoué, Zoungbonou, Sè and the district of Kpinnou, which is in the commune of Athiémé. As for the external circuit, it is noted that agricultural products leave the markets of the commune of Houeyogbe for destinations such as the markets of Comé, Athieme, Lokossa and Bopa. Sometimes, these products also land in Cotonou and go beyond our borders, i.e. to Togo, etc. Thus, due to its geographical location, the commune of Houeyogbe has a marketing circuit that is quite extensive. All this is a favorable asset for agriculture in general and for palm oil production in particular because palm oil can be marketed in neighboring countries like Togo. Palm oil is sold either in retail or wholesale according to the producers selected for the survey.

In the commune of Houeyogbe, retail marketing of palm oil is not developed. Most retail marketing is directly linked to consumption. Most of the wholesalers are beginners who come from urban areas with trucks to buy palm oil in bulk. They sell for the most part in the markets of Lokossa, Azovè, Dogbo, Athiémè, and sometimes in Cotonou.

According to field surveys, the commune of Houeyogbe does not have special transporters to carry palm oil. Small retailers transport their products by motorcycle, bicycle, tricycle and sometimes on their heads. As for wholesalers, most come with their trucks from the urban centers, while others rent trucks in the area.

Table 5: Profitability of palm oil production and marketing

Period	Quantity	Selling price in FCFA	Expenses in FCFA	Revenue in FCFA (R)	Profit in FCFA (B)	Ratio Revenue / Profit (R/ B)
Dry season	15 L	9000 up to 22000	80,000	135,000 up to 330,000	55,000 up to 250,000	2,45 and 1,32
Rainy season	15 L	9000	60,000	135,000	75,000	2,25

Source: Producer Survey Results, November 2020

Profitability of Palm Oil Production and Marketing in the Commune of Houeyogbe

The analyse of profitability of palm oil production and marketing in the commune of Houeyogbe is appreciate towards the table 5.

The production and marketing of palm oil is profitable depending on the season. According to the field surveys with is precise in the table 5, it was noted that in the rainy season, this activity is not as profitable as in the dry season. Indeed, during this dry season, palm nuts are very rare to find and everything is expensive, even derivatives. The transformation of 200 measures (autoca) of palm nuts in the Sahouè language gives a quantity of oil equivalent to 150 liters and 6 cans. The selling price varies according to the production period (availability of nuts). It varies from 9000 FCFA (16.36 $) to 22000 FCFA (40 $) per 15-liter can. This gives a revenue of 135000 FCFA (245.45 $) to 330000 FCFA (600 $) with an estimated expense of 80000 FCFA (145.345 $). The profit margin varies from 55000 FCFA (100 $) to 250000 FCFA (454.54 $) during the dry season. The ratio of income to profit (R/B) varies between 2.45 and 1.32 in the dry season. In the rainy season, the processing of 200 measures (autoca in the Sahouan language) of palm nuts yields 150 liters of red oil and 6 cans. The selling price is 9000 FCFA per 15-liter can, which gives a revenue of 135000 FCFA(16.36 $), with an estimated expense of 60000 FCFA (109.09 $). The profit margin is 75000 FCFA(136.36 $). The ratio of revenue to profit (R/B) is 2.25 in the rainy season. In sum, during the period of nut abundance, the price of the profit margin is much lower than during the period of scarcity.

Destination of Earnings from the Production and Marketing of Palm Oil in the Commune of Houeyogbe

It is based on the ability of producers to take care of their basic needs and those of their families, in particular. food, health, children's schooling, the purchase of a motorcycle and reinvestment in the sector.

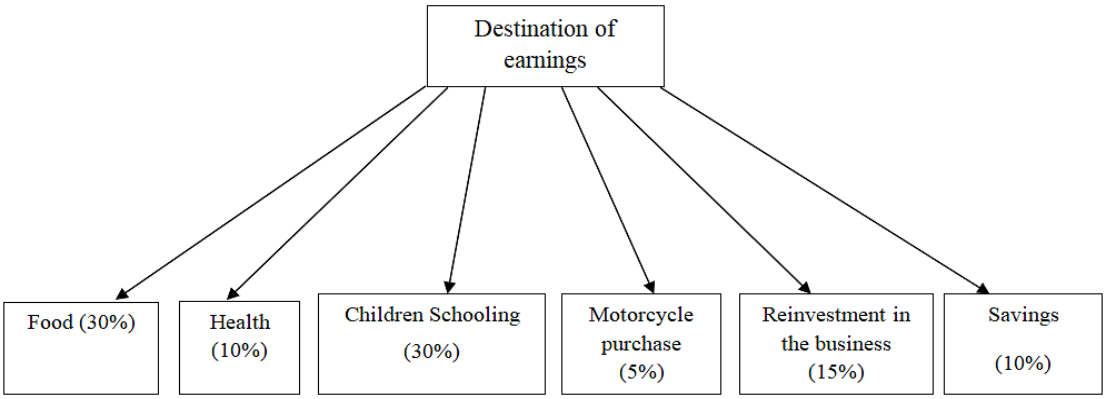

Fig. 7: Destination of earnings from palm oil production in the commune of Houéyogbé. Source:Field survey results, June 2020

Indeed, the production of palm oil requires a lot of financial means. It is a very profitable activity. In addition, this production requires a lot of labor, and it appears to be a crucial activity in relation to the challenges of food security and the fight against poverty. The producers believe that the sale of oil can contribute to the improvement of their living conditions (Figure 7).

Analysis of Figure 7 indicates that earnings from production are used for food (30 %), health (10 %), children's schooling (30 %), reinvestment in the activity (15 %), the purchase of a motorcycle (5 %) and savings (10 %).

Constraints Related to the Production and Marketing of Palm Oil

The problems related to the production and marketing of palm oil in the commune of Houeyogbe are of several kinds. The first constraint is related to the supply of raw materials. Thus, the supply points are not fixed. This forces the women to travel a very long distance, sometimes 10 to 25 km and even more, on foot or by motorcycle, and the transport is naturally done by motorcycle. This depends on the place of supply chosen by the women, leaving their children behind. In addition, some women do not receive any moral or financial support from their husbands. Women palm oil producers are left to their own devices in their activities, since they have no support in terms of modern processing tools other than the malasseur. They are also subject to the problem of technical supervision. The owners of palm groves are also confronted with the problem of supervision or agricultural training. Women also have difficulty selling their products because of the poor condition of the roads, especially during the rainy season. For the retailers, they are obliged to run after the motorcycle-taxis in order to sell a little. Sometimes, they experience poor sales at the approach of the holiday season and the beginning of the school year.

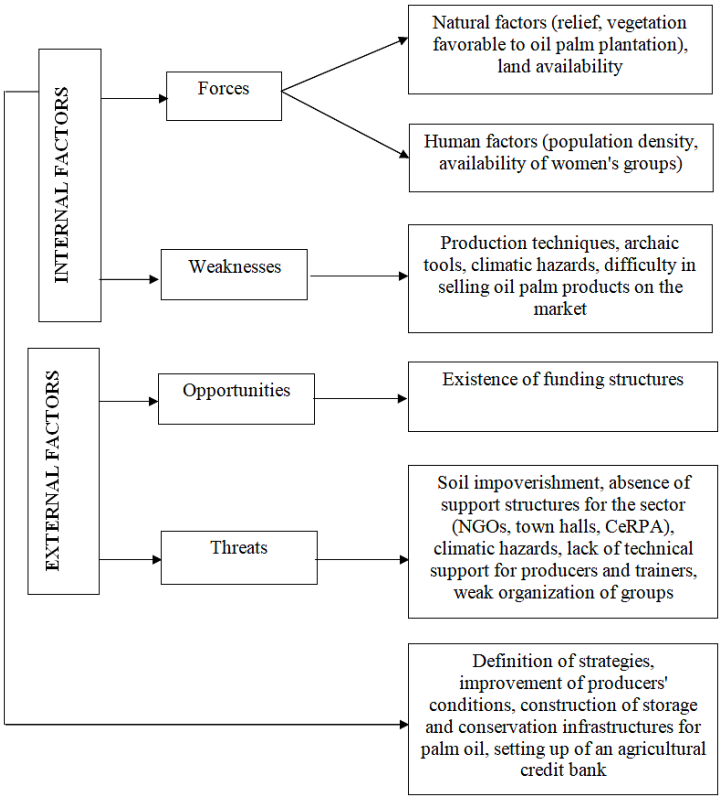

Fig. 8: SWOT analysis model applied to the socio-economic impacts of palm oil production and marketing in the commune of Houeyogbe
Source: Field survey results, June 2020

In view of all these aspects and for a better appreciation of the situation in the study area, the SWOT analysis model was used. The results of this model are presented in Figure 8.

The analysis of Figure 8 shows that the commune of Houeyogbe has strengths (availability of women's groups; relief and vegetation; availability of land; availability of labor that is favorable to oil palm planting), weaknesses (archaic production techniques and tools, climatic hazards; difficulties in marketing products, etc.), opportunities (existence of financing structures, threats (impoverishment of the soil, absence of support structures for the sector such as NGOs, the mayor's office, the ATDA, climatic hazards, lack of access to credit, etc.), and weaknesses (lack of access to financial resources, lack of access to credit, etc.), opportunities (existence of financing structures), threats (soil impoverishment, absence of support structures for the sector such as NGOs, the town hall, the ATDA, climatic hazards, lack of technical support for producers and trainers, weak organization of groups) and strategies for strengthening the sector in order to have a good yield (improvement of producers' living conditions, construction of infrastructure for storing and preserving palm oil, establishment of a bank for agricultural credits).

In order to remedy the problems facing the sector, and to allow for its proper development in the commune of Houeyogbe, it should be emphasized that producers would like to see, above all, the granting of short- or long-term loans, technical assistance, the provision of processing machinery, the availability of inputs, and the creation of input sales outlets in each district at least. It would also be desirable for the good of all to maximize the strengths and opportunities.

Discussion

The results of the field surveys on palm oil production and marketing in Houeyogbe showed that palm oil production generates significant income and is therefore of great economic and social importance to the producers. Despite the substantial income generated, palm oil farmers face a number of constraints. These include financial and technical constraints.

These results obtained in Houeyogbe are similar to those obtained by the,[20] which considers agriculture to be the main activity and one of the most important sectors of the Beninese economy.

The same is true of,[21] according to whom oil palm is the most productive perennial oil plant per unit area per year in ecologically favorable areas. Nevertheless,[22] who finds that oil palm was the first crop through which Dahomey (Republic of Benin) entered international trade and was a major commercial port in the palm oil trade during the 1830s. It occupied an important place in exports. The development of oil palm cultivation has declined in recent years, whereas in the past the economic life of Benin was identified with this crop.[23] for his part, addressed the issue of the processing of all oil palm derivatives. He did not fail to address the fundamental role that oil palm production has played in the national economy after identifying the impacts of the establishment of private nurseries on the strengthening of this promising sector. In fact, for the cultivation of oil palm, the ecological point of view is an integral part of the agricultural landscape in South Benin.[24]

Also,[25] finds that it is a plant that is part of the life of the inhabitants and provides a shrub cover that is essential for the ecology.[14] agrees and believes that oil palm cultivation brings in significant income and ensures the fertility of the soil in the fields.

The results found in the Houeyogbe commune also agree with those found by Mitchikpe and Fournier (2000) according to which a high proportion of Beninese consumers have a preference for oil extracted from the fruits of natural palm trees. Consumer surveys have shown that 56% of respondents find the oil produced from the fruits of natural palm trees better, and all of these people are even willing to pay more for this type of oil. However, due to its high SFA content (50 %), particularly palmitic acid, palm oil is accused of being potentially harmful to health.[26; 27; 28; 29]

The results of[6] nonetheless remain, who showed through these studies that oil palm is the planet's leading supplier of vegetable fats, ahead of soybeans and is grown for its two edible oils,

red palm oil (18–26% of fresh bunch weight) and palm kernel oil (2-3 % of fresh bunch weight).[30] Traditionally used as cooking oil, palm oil is now used through its many derivatives and is found in thousands of products. Although red palm oil (crude oil) is recognized for its nutritional benefits,[9,8,10] manufacturers prefer to produce deodorized and decolorized palm oil, using refining procedures. This refining can be based on chemical methods (treatment with alkalis or acids),[31] or physical methods (steam refining, inert gas stripping, molecular distillation, etc.).[32,33,34] on the other hand, found that in the 1990s, the demonstration of the role of trans fatty acids in the occurrence of cardiovascular disease (CVD) considerably reduced the use of partially hydrogenated oils containing trans fatty acids, advantage of palm stearin which does not contain it. Initially considered as refining waste and used mainly by the cosmetics industry for the manufacture of soap, palm stearin is therefore very popular with the food industry. As a result, global palm oil production has increased exponentially. It increased from 20 million tons in 2000[20] to 64.495 million tons in 2017. 90 % of this global production is intended for consumption and 80 % for the food industry.[11]

Therefore, palm oil is found in many products to which it guarantees a neutral texture, fragrance and taste. bakery products, candies, cakes, cheese analogues, crisps, chocolates, confectionery fats, cookies, donuts, frozen meals and products (pancakes, pies, pizzas, potatoes, etc.), instant meals, etc.[35] Oilseeds are widely consumed in Burkina Faso, and edible oil based on oilseed products occupy a large part of the country's agro-industrial activities. The national production of edible oil, estimated at more than 65,000 tons on average between 2010 and 2014,[36] comes mainly from seed cotton, the industrial production of which was ensured by two units until the mid-1990s and which has since experienced sustained growth.[37] Edible oil is sold in 20 liter cans at wholesale level, and 1 liter and 3 to 5 liter cans at supermarkets. There are also sales in retail sachets at the store level. In terms of calorific intake, edible oils and oleaginous products occupied the second position in Burkina Faso in the mid-2000s after cereals with an intake share estimated at 11.9 %.[38] And in terms of consumption budget, expenditure on oils and oilseeds represented 5.3 % nationally, 6.7 % in urban areas and 4.9 % in rural areas. Compared to the mid-1990s, this share has remained stable in urban areas, while it has fallen slightly by 1.2 % in rural areas.[38]

Conclusion

At the end of this research, it should be noted that the annual rainfall required in the research area, the climate and the type of soil are favorable to oil palm production. Similarly, field investigations have shown that the exploitation of palm oil generates an important income, and is therefore of great economic and social importance for the various actors involved. This trend is an indicator of development.

It is important that this palm oil sector, which provides many jobs, significant income and ensures the economic and social well-being of the population, be developed in the commune. Despite the substantial income generated, palm oil farmers are faced with a number of problems. Through the operating account of the production units at different scales, the units producing one can of palm oil are not profitable. On the other hand, those that produce two (02) to five (05) cans of palm oil per week are profitable. They allow the women processors to obtain income after the sale of the processed products. This income plays a significant role in meeting the daily needs of these women and their households, thus contributing to poverty reduction. The analysis of the profitability of palm oil production reveals that palm oil processing is a profitable activity carried out mainly by women.

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Conflict of Interest

The authors do not have any conflict of interest.

References

1. Afouda F. Essais de culture de la Passiflore (Passiflora edulis var flavicarpa) à Parakou au Nord-Bénin : résultats préliminaires et pistes d'amélioration. Bulletin de la Recherche Agronomique du Bénin. 2006, pp 1-8.
2. Tidjani A., Production et commercialisation des produits agricoles dans la Commune d'Adja-Ouèré. Mémoire de maîtrise en Géographie, DGAT/FLASH/ UAC, 2013. 85p.
3. Fatoumbi. H. Transformation et commercialisation des produits du palmier à huile dans l'Arrondissement d'Ikpinlè. Mémoire de maîtrise de Géographie, DGAT/ FLASH/ UAC, 2007. 87 p.
4. INSAE. Troisième Recensement General de la Population et de l'Habitation (RGPH3). Direction des Etudes Démographiques, Cotonou, 2002. 490 p.
5. USDA, Foreign Agricultural Service, Office of Global Analysis. February, 2017. 36p.
6. Mba O. I. Dumont Mari-Jàsé.; Ngadi Michel., Palm oïl : Processing, characterization and utilization in the food industry – A review Food Bioscience, 2015. 10, pp 26-41.
7. Sambanthamurthi R, Sundram K, Tan Y, Chemistry and biochemistry of palm oil Prog Lipid Res. 39 (6), 2000, pp 507-518.
8. Ong A.S, Goh S.H., Palm Oil : A healthful and cost-effective dietary component, Food Nutr. Bull. 2002. 23, pp 11-22.
9. Edem D. O. Palm Oil: Biochemical, physiological, nutritional, hematological, and toxicological aspects: A review. Plant. Foods Hum. Nutr. 2002. 57: 319-341.
10. Sen C. K., Khanna S., Roy S, Parker L. Molecular basis of vitamin E action : Tocotrienol potently inhibits glutamate-induced pp 60c-Src kinase activation and death of HT4 neuronal cells. J. Biol. Chem, 275, 2000. 13049-13055.
11. Dufour M., Regard d'expert sur l'huile de palme. Mirova, 2014. 17p.
12. Sundram K, Sambanthamurthi R, YA T, Palm fruit chemistry and nutrition. Asia Pac J clin Nutr. 12 (3) : 2003. 355-362.
13. Agossou N. Production et commercialisation de l'huile de palme raffinée et parfumée dite Zomi dans la Commune de Houéyogbé, cas de l'Arrondissement de Sè. Mémoire de maîtrise en Géographie, DGAT, FLASH, UAC, 2009. 88 p.
14. Bossou S., Production et commercialisation de l'huile de palme à Djanglanmey. Mémoire de maîtrise en Géographie, DGAT / FLASH / UAC, 2017. 81 p.
15. Thiékoro C., La transformation des produits agricoles en zone tropicale. Edition Karthala, Paris, 1991. 335 p.
16. Yérima S. Problématique de la production vivrière dans la Commune d'Athiémé. Mémoire de maîtrise en Géographie, DGAT / FLASH / UAC, 2009. 72 p.
17. Mairie de Houéyogbé. Monographie de la commune de Houéyogbé. Bénin, 2006. 61 p.
18. Antraigue D., Financial Diagnosis, Edition GEA, Paris, 2004. 15 p.
19. Schwartz D, Méthodes statistiques à l'usage des médecins et des biologistes. 4ème Edition (Édition Médicale Flamarion), Paris, 1995. 314 p.
20. PNUD, Rapport mondial sur le développement humain. Au-delà de la peignerie pouvoir, pauvreté, et crise mondiale de l'eau. Programme des Nations Unies pour le Développement, Benin, 2006. 422 p.
21. Fatoichan B. Caractérisation agro morphologique en pépinerie des jeunes plants de trois populations de palmier à huile (Elaeis guineensis) tolérantes à la fusariose. Mémoire de maîtrise en Agronomie, FSA, 2003. 76 p.
22. Quenum E, Rôle du palmier à huile dans l'économie des familles paysannes du Plateau Adja. Mémoire de maîtrise en Agronomie, FASJEP / SE / UNB, 1988. 168 p.
23. Soumaïla C, Etude de l'impact des implantations des pépinières privées sur le renforcement de la filière du palmier à huile (Elaeis-guinénsis) en République du Bénin. Mémoire pour l'obtention du DEAT, DGAT / FLASH / UAC, 2000. 87 p.
24. Koossoulou F. Production et commercialisation de l'huile de palme à Adja-Ouèrè. Mémoire de maîtrise en Géographie, DGAT / FLASH / UAC, 2015. 81p.

25. Houndé-Vagnon S. G, Analyse du bilan hydrique dans les associations: palmier à huile cultures annuelles. Thèse soutenue pour l'obtention du diplôme d'Ingénieur Agronome, FSA / UNB, 2000. 166 p.
26. Bester D, Esterhuyse A, Truter E.J., van Rooyen J. Cardiovascular effects of edible oils: A comparison between four popular edible oils. Nutr. Res. Rev. 2010. 23: 334-348.
27. Fattore E, Fanelli R. Palm oil and palmitic acid, A review on cardiovascular effects and carcinogenicity. Int. J. Food Sci. Nutr. 2013. 64: 648-659.
28. Fattore E, Bosetti C, Brighenti F, Agostoni C., Palm oil and blood V lipid-related markers of cardiovascular disease: A systematic review and meta-analysis of dietary intervention trials. Am. J. Clin. Nutr. 2014. 99: 1331-1350.
29. Odia J., Ofori S., Maduka O. Palm Oil and the heart: A review. World J. Cardiol. 2015. 26: 144-149.
30. Dronne Y, Forslund A. Le rôle croissant des huiles tropicales sur les marchés internationaux : principaux acteurs et produits. OCL 2009; 16 (4): 184-192.
31. Čmolik J, Pokorný J. Physical refining of edible oils. Eur. J. Lipid Sci. Technol. 2000;102: 472-486.
32. Gunstone FD. Vegetable Oils in Food Technology: Composition, Properties and Uses, 2nd édition; Blackwell Publishing Ltd.: West Essex, UK, 2011; 25-133.
33. Mozaffarian D, Katan M.B, Ascherio A, Stampfer M.J, Walter C, Willett WC. Trans Fatty Acids and Cardiovascular Disease. N Engl J Med 2006; 354 : 1601-1613.
34. Iqbal MP. Trans fatty acids - a risk factor for cardiovascular disease. Pak J Med Sci 2014; 30 (1): 194-197.
35. Mancini A., Imperlini E., Nigro E., Montagnese C., Daniele A., Orrù S., Buono P., Biological and Nutritional Properties of Palm Oil and Palmitic Acid: Effects on Health. Molecules. 2015; 20 (9) :17339-61.
36. Ahsan, H.; Ahad, A.; Iqbal, J.; Siddiqui, W. A. Pharmacological potential of tocotrienols: a review. Nutrition & metabolis,2014, 11, 52.
37. N.A., "État des lieux du secteur de l'huile Au Burkina Faso." Bobo-Dioulasso, Burkina Faso. 2010. p 58.
38. VOA / AFP. "Burkina Faso : Saisie d'au moins 18.000 litres d'huile toxique présentée comme anti-cholestérol." March 25. 2015. http://www.voaafrique.com/a/burkina-faso-saisie-d-au-moins-18000-litres-d-huiles-toxique-presentee-comme-anti-cholesterol/2694857.