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NON-INDUSTRIALIZED FARMS OF OIL PALM (ELAEIS GUINEENSIS JACQ. LILIOPSIDA ARECACEAE) TO SONGON IN SOUTHERN CÔTE D'IVOIRE: ANALYSIS AND PROSPECTS

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ABSTRACT

This work explains the activity of smallholder's oil palm, the area of Songon in the south of Côte d'Ivoire. It highlights the different areas studied; reveal the impact of the size and age of the palm on the parameters related exclusively to productivity. These include frequency of weeding, pruning, weeding cost, the cost of pruning and yield of plantations studied. It highlights the elements that lead to poor performance of the latter. These include the orchard aging, lack of regular maintenance of some plantations because of their large size and lack of motivation of some farmers who lack material resources, financial, and so on to attend regularly on their plantations.

Keywords*: palm oil, weeding, pruning, yield, Songon, Côte d'Ivoire*

Introduction

The culture of oil palm (Eleis guineensis) in Côte d'Ivoire dates back to 1960. This tree virtues are valued by consumers, has attributes that make it a plant of global dimension. In the early 20th century, studies on the cultivation of palm oil and its development showed that the expansion of palm is due to human migration throughout tropical Africa (Jacquemard, 1995). It serves food (White, 1979) commodities (Rugalema et al. 1994), and building materials (Sullivan et al. 1994). Cultivation of oil palm has really developed in the world tropical climate there is that half a century (Gascon, 1989). Oil palm production is a source of palm oil and palm kernel oil. Global consumption of palm oil could reach 40 million tons in 2020, against 22.50 tonnes in 2010 (Anonymous, 2010). The results of studies by Rouzière (1995) showed that the palm produces five times more oil than peanut and nine times more than soybeans. For plans that have between 4-5 years, the yield per hectare is 5 to 6 tons. The palm is the most productive oil seed in the world providing an average of 3.5 tonnes per hectare.

At the national level, the oil palm plantations are divided into two categories. The first category concerns the State plantations.

The second category relates to village plantations which are the subject of our study. Between 1963 and 1985, 27 500 hectares of village plantations were established between 1985 and 1995, 41,060 others were created. The result of this policy has led other villagers became interested in the culture of oil palm. Today, 25,000 oil palm planters have 190,000 hectares of plantation village in southern Côte d'Ivoire.

Despite these encouraging results and motivating issues of economic and financial born in the late 1990s and put in the wrong industry. The state gives more aid to village producers and the price regime fell without ceasing (Surre et al. 1963). The consequences are immediate: abandonment of village plantations in poor condition, hence the low yield and low productivity. The objective of this study was to determine the effects of age and size on productivity parameters, frequency of weeding and pruning, weeding costs and pruning and yield of plantations. It will therefore be necessary to calculate the various average annual productions, the correlations between the factors of productivity, age and plantation areas.

Study Environment

The study was conducted in the sub-prefecture of Songon, a town in southern Côte d'Ivoire about 27 km from Abidjan. It is part of the region of lagoons and extends over an area of 52 km ². The climate is attieen with four seasons, two rainy seasons, and two dry seasons. The average annual rainfall is 2100 mm and the vegetation is covered with green trees. The main areas of cultivation of oil palm are as follows: the area of Bago includes nine producers, the producers of Kossihouen 3 and 6 producers Kodiakro area (Fig.1). There are therefore 18 oil palm growers in this region of Songo. The three areas are discussed separately.

I. Material and Methods

1.1 Hardware plant

The studied species is native to West Africa, the Gulf of Guinea (Tomlinson, 1990). It is the oil palm Elaeis guineensis or three varieties are: pisifera, tenera and dura. Tenera variety is a hybrid cross between the variety and the variety Dura pisifera. The fruit has a thin shell Tenera 2 mm in diameter. This variety has a pulp abundant and better performance. Its oil is used less than the range Dura. Dura variety is the most cultivated. It is characterized by a fruit and with a cover, more than 2 mm thick and a pulp abundant. The variety Pisifera is characterized by the absence of shell (Cochard et al. 2001). These three varieties are separate from each

other by the thickness of the shell of the seed. This species is a perennial plant belonging to the family of Palmaceens. Palm nuts are grouped into several regimes. A diet door between twenty (20) and one hundred (100) seeds which are the fruits contained in the plan. The palm fruit also called palm seeds are used to produce palm oil (Fig. 2).

In general, the seed consists of the kernel and the shell. Almond also called kernel consists of a thin, adherent coat, cartilaginous albumen containing about half of the oil known as oil kernel and finally an embryo (Karleskind, 1992). The oil extracted and marketed contains several nutrients.

2. Methods

2.1. Survey and Data Collection

Preliminary interviews were conducted on a sample of 4. These interviews have details of the data to be collected to better conduct the investigation. The survey was conducted in plantations early in the morning between 7 and 8 hours before the commencement of work. Eighteen (18) oil palm planters were interviewed during this investigation. She yielded qualitative and quantitative data. Data collection took place during interviews after the session's explanatory context of the study. Those involved in data collection are composed mainly of farmers to get an overview of the different tasks carried out in the plantations. Archives were also consulted in order to understand and analyze the evolution of plantations since 2003, over a period of 6 years. The parameters measured in this study are: the number of palms (np), the frequency of weeding (fw), the cost of weeding (cw), the frequency of pruning (fp), the cost of pruning (cp) return (yield) and production (cprp).

2.2. Direct Observation in the field and sampling

the oil palm plantation belonging to both the sample and production areas are as follows. In the area of Bago, nine (9) producers and in the Kossihouen, three (3) producers and area Kodiakro, six (6) producers, Or eighteen (18) growers. But the observation was carried on fifteen (15) productive plantations (PP) due to 5 plantations by production area (P1, P2, P3, P4 and P 5) for 8 months. The number of bunches harvested from plantation was assessed monthly. The progress of work on the plantations is weeding, fertilizer around the palm trees, harvesting and counting the number of schemes was done daily.

2.3. Data Analysis

SAS software (1999) was used for statistical analysis. He measured the parameters studied on different plantations. To do this, an analysis of variance with two factors (ANOVA 2) was performed to compare the Average regimes between plantations. The same software was used to determine correlations between age and the area of plantations (P1, P2, P3, P4, and P5) and parameters related to production in each production area.

3. Results

3.1 Determination of different correlations in different study areas

3.1.1 Correlation between quantities produced and the different parameters: age and area in the region of Bago.

The age of the plantations is between 5 and 25 years. The palm older was created over large areas. Quantities obtained by year plans and planting (P1, P2, P3, P4, and P5) are between 48 tons and 450 tons. The frequency of pruning and the performance of each plantation are related to age and maintenance factors. The table 1 shows the evolution of bunches harvested depending on the age of the plantations (P1, P2, P3, P4, and P5). Figure 3 shows the quantities of obtained systems based on plantation areas. The average annual production (PMA) 5 plantations obtained is equal to 550.60 tons. The correlation between age and the amount of pension products is: R1 = 0.52.

Yield curve regimes are increasing from 5 to 17 years. It shows a production peak between 17 and 18 years. These are the ages of maturity during which the palms are able to provide more and more plans. The figure 4 below shows the quantities produced and plantation areas.

The evolution of the production curve above shows the amount of pension per year obtained functions plantation areas. The curve shows the result of the production function variables are the quantities of annual products and systems that are consistent plantation areas. The correlation coefficient is R2 = 0.49. The table (2) below presents the study is to Kossihouen the second zone.

3.1.2 Correlation between quantities produced and the different parameters: age and area in the region of Kossihouen

In this area, the ages of the plantations (P1, P2, P3, P4, and P5) are between 7 and 26 years. The area is located in the range of 8 hectares to 15 hectares. They do not vary. Other parameters studied are listed in the table variables: these include amounts regimes obtained, the frequency of weeding and pruning and annual yield. The graph (fig. 5) below shows the evolution of productions.

The curve above is the expression of the relationship between the variables: amount of pension products, and ages of plantations (ap). It shows a peak production at 12 years. Production is insignificant at age 26. The correlation coefficient is: R1 = - 0.19. The graph (fig. 6) below shows the relationship between the quantities produced and plantation areas.

The curve of Figure 4 shows a snaking shape. The variables are the quantities produced and plantation areas studied provide a production function. Peak production (PP) is equal to 890 tons of plans for an area of 11 hectares. The correlation coefficient obtained by highlighting the quantity of products based systems area is R2 = 0.48. The table (3) below shows the results of the study in the area which is the last Kadiokro study area.

3.1.3 Correlation between quantities produced and the different parameters: age and size in the area Kodiakro.

According to the results of the table above, the age of the plantations (P1, P2, P3, P4, and P5) varies from one plantation to another. Planting P4 is the youngest and P3 is the oldest and the least. Average Annual Production (AAP) in this area is equal to 551.33 tons. Plantation areas and the cost of weeding and pruning are invariable. Other parameters listed in the table are variables. The figure 7 below shows the evolution of quantities regimes obtained according to the age of plantations.

Between 9 and 14 years yield curve is increasing. It then decreases until the age of 24. Peak (pp) production is 14.50 years. The correlation coefficient of the quantities of the products to schemes age is: R = - 0.06. The graph (fig. 8) shows quantity of produced regimes by year.

The correlation coefficient of quantities produced with respect to the surface is: R = 0.69. The curve of quantities of products regimes shows a snaking shape, with a peak production of 1003, 2 tons per year plan for an area 12 hectares.

Discussion

To provide some answers to the problem and the goal that was set at the beginning of this research, different means and correlations, the cost of weeding and pruning were calculated for each study area. In the area of Bago, the study on plantations (P1, P2, P3, P4 and P5) notes that the Annual Average Production (PMA) is 550, 60 tons and correlation coefficients (cc) compared to age and size named R1 and R2 are successively: (R1 = 0, 52 and R2 = 0.49). Correlation is positive and the quantities produced depending on the age and sizes are moderately correlated: R2 and R2 <1 in both cases.

The curve of the amounts of pension products shows that plantations whose ages are between 15 and 18 have a fairly good performance. Planting P3 (15) produced 850 tons annually for maintenance cost of 105 millions F CFA. The annual yield of the plantation P2 (10 years) is 560 tons with annual maintenance costs of 1 120 000 F CF. Planting P5 (25) gave an annual production of 450 tons with a maintenance cost of 000 FCFA in 1050. As a result: the yield is higher than the yield P3 P2 and P5 and P2 yield is higher than the yield P5; so RP3> RP2 and RP2, and RP5> RP5. It is therefore apparent that the quantities produced are not necessarily related to the area of plantations but at the age of plantations. Ribier and Rouzière (2000) made the same observation for coconut. They explain that the production of coconut palms per hectare decline due to aging orchards.

In the area of Kossihouen Production Annual Average (PAA) were planting is equal to 462.52 tons and correlation coefficients for age and area of plantations are successively: = R1 - R2 = 0.19 and 0.48. The correlation between the production and plantation age is negatively correlated. Between the production and area planted is positive. R1 and R2 <1. Planting P1 aged 13 with an area of 10 hectares and produces 825 tons per year, or 4.6 times the performance of P2. This exceeded the age limit is capped at 25 years. Despite its old state, the owner continues to maintain. The annual cost of weeding is equal to 350 000 F CFA and the pruning 140 000 F CFA. Is an annual maintenance cost of 490 000 F CFA. The annual yield is equal to 175, 7 tons. On planting P3 operator obtains 424.5 tons per year for 15 hectares. The annual maintenance cost is 1 200 000 F CFA. From the above, we can say that most palms over the age annual yield decline. Mathematically, the yield is higher than the yield P1 P2 and P2 yield is higher than the yield of P3 where P1 is higher than the yield P3. Ultimately we write: RP1> RP2> RP3. The curve of the quantities of the

products to pension age plantations resembles a cone. It marks a peak production is a little over 825 tons per year of pension at the age of 13 years. This production declines significantly as and as age increases palms. We see that the performance of palm over the age of 23 years and older is below 300 tons per year and plans it is almost zero at 26 years.

The study conducted in the locality of Kodiakro on five plantations (P1, P2, P3, P4, and P5) shows at first glance that the plantations in this area are much older plantations compared to other areas above. Average Annual Production (PMA) is equal to 551.33 tons of plans. The correlation between the quantities produced and the age of the plantations is negative: R1 = - 0.06. That obtained between the quantities of products schemes and the surface is positive: R2 = 0, 69. Both coefficients are less than 1; R1 and R2 <1. Maintenance costs of the plantations are respectively: P1 (16) = 1155000 F; P2 (14) = 1260 000F; P3 (24) 000 F = 630; P4 (9 years) = 1,050,000 F, P5 (16) = 1155000 F.

The curve of quantities of products based diets ages of plantations is increasing from 16 to 14 years with a maximum output of 1003 tons two plans per year. At age 24, production is low. Which is related to the amount of pension products in relation to the size decreases and then increases, then decreases and finally increases. It has almost a snaking shape. It is further noted that most plantations are older, more maintenance costs down and they are young plus maintenance costs are high. From the above, we can say that the frequency of weeding and pruning are based on the age of the plantations. Different frequencies listed in Table 3 clearly explain the logic. When plantations are young, weeding and pruning are common and it is the opposite when they are aging. Ultimately, we see that the profitability of palm has an influence on the decision of the villagers to invest in plantation maintenance. Regarding the relationship between the area planted and production factors, the results of the study show that most large sites the means implemented to maintain very high. There is a parallel increase in the management and operation. It was therefore imperative to have superior performance in maintenance of plantations despite the grandeur of the area.

Observed occasionally spatial heterogeneity of organic matter content, which results in a variation of production (Djegui et al. 1992). This is why it is important to choose a land rich in organic matter. But beyond these analyzes above, it is clear repeatedly that the main difficulty of producing village is on the one hand, the degree of farm management by lack of training, and Moreover, the level of the organization of the production system as a whole.

Conclusion

The study in Songon in southern Côte d'Ivoire in order to review and define the perspective of palm was of great importance. It yielded results that give an insight into the situation of smallholder's oil palm. These results showed a fairly large area of the palm causes irregular frequency and therefore cost of weeding, pruning and production. Culture of oil palm is presented from the outset as an activity forming part of the diversification of agricultural products and a source of income. Thus some villagers are engaged in the industry. Between 1960 and 1980, it has performed well.
But from the 1990s, are born enormous economic difficulties and financial. The state has privatized large farms who bought the village production. These private companies have focused on the realization of profits. And to achieve their goal, they lowered the selling price initially in Côte d'Ivoire by the divested businesses. This new policy has had an immediate impact on the corporation. All smallholders suffer every year the adverse effects of lower sales prices per kilogram of their product on the domestic market.

To remedy this situation, the following perspective could be offered as a guide to the various producers Songon. The owners of smallholdings could reorganize the sector to initiate in the future transformation of raw material into a semi-finished product that could be transported to the manufacturing units of various consumables such as butter, soap, cosmetics, etc... And beyond this perspective, they must ensure that their product is of better quality and competitive in order to get a seat at the negotiating table domestic producers of palm oil.

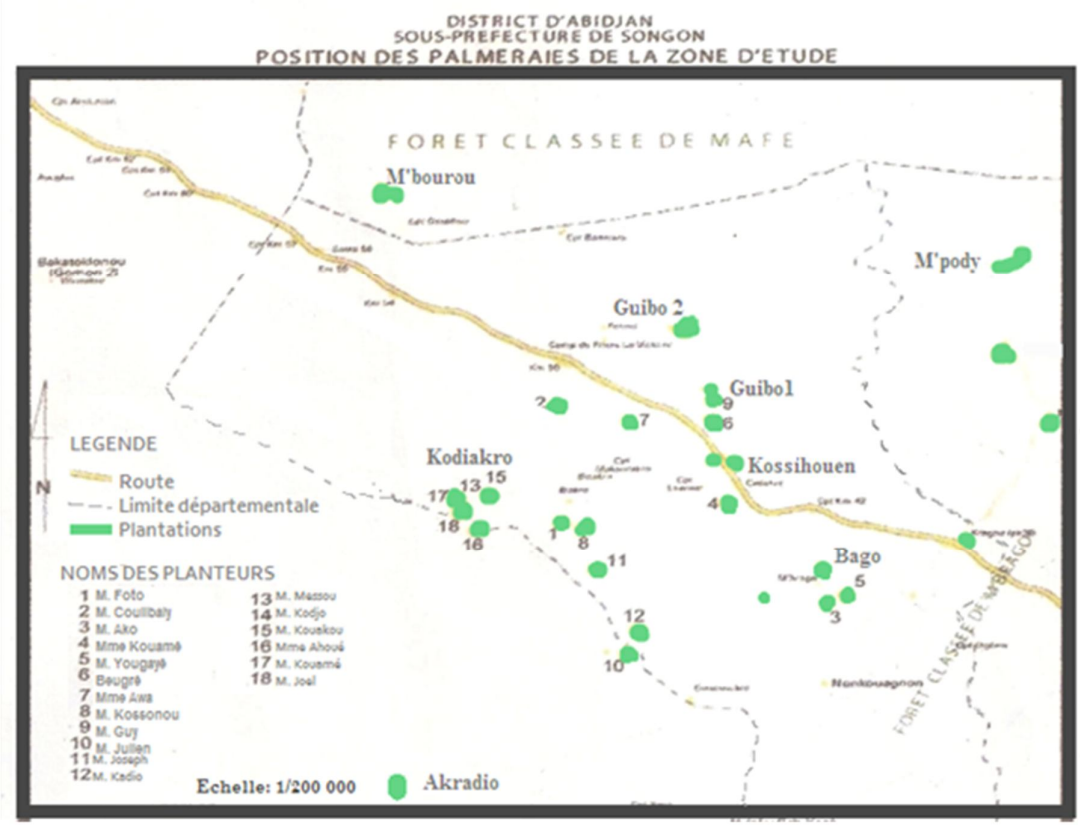

Figure 1: Map of study environment

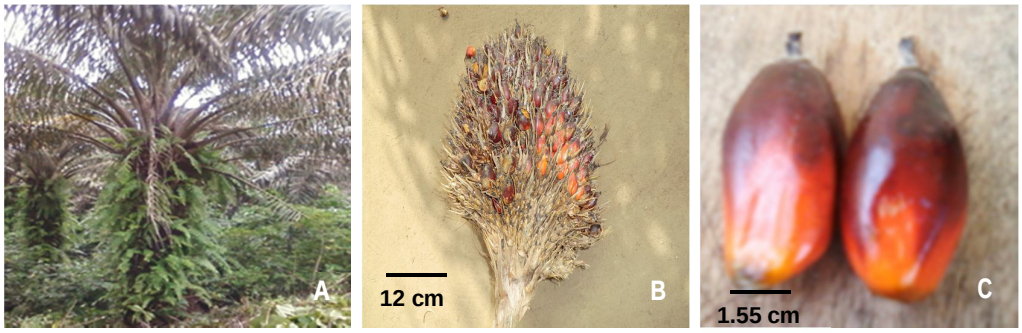

Figure 2: palm oil (A), diet (B), and seeds (C)

Table 1: Different parameters studied in the area of Bago

Oil palm plantations	P1	P2	P3	P4	P5
The age of the plantations (in years)	5	10	15	20	25
Area planted (ha)	6	8	10	13	15
Number of trees on the plot	876	1168	1460	1898	2190
Amount of pension income / year (T)	48	560	850	845	450
Frequency of weeding year	4	4	3	2	2
Cost of weeding: 25.000 FCFA / ha	600.000	800.000	750.000	650.000	750.000
Frequency pruning year	4	4	3	3	2
Cost pruning: 10 000 F CFA / ha	240.000	320.000	300.000	390.000	300 000
Annual yield (tonnes / ha)	8	70	85	65	30

Source: Surveys conducted in 2010 in the plantations in Bago

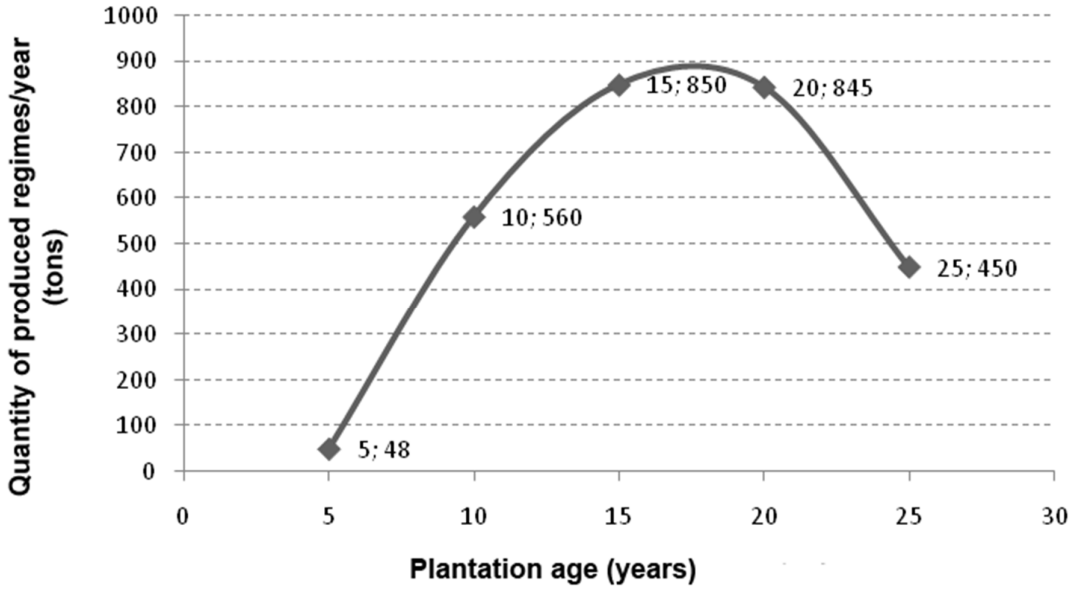

Figure 3: Evolution of the quantities of products regimes depending on the age of the plantations (Tons)

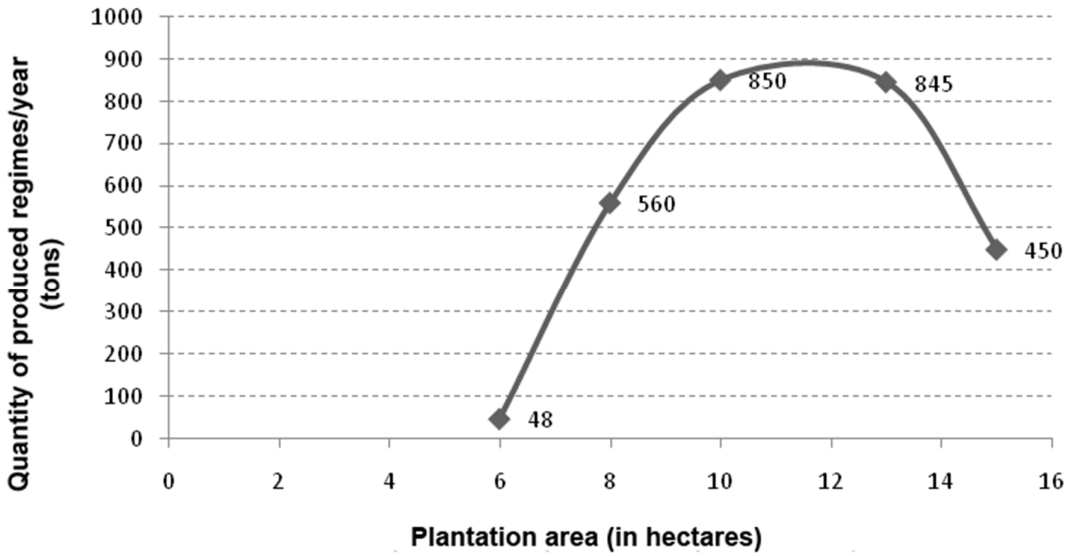

Figure 4: Evolution of the quantities of products based systems areas (tons)

Table 2: Different parameters studied in the area of Kossihouen

Oil palm plantations	P1	P2	P3	P4	P5
The age of the plantations (in years)	13	26	22	11	7
Area planted (ha)	10	7	15	12	8
Number of trees on the plot	1460	1022	2190	1752	1168
Amounts of pension income / year (T)	825	175,7	424,5	809,4	78
Frequency of weeding year	3	2	2	3	4
Cost of weeding: 25,000 F CFA / ha	750 000	350 000	750 000	900 000	800 000
Frequency pruning year	4	2	3	4	4
Cost pruning: 10 000 F CFA / ha	400 000	140 000	450 000	480 000	320 000
Annual yield (ton / ha)	82,5	25,1	28,3	67,45	9,75

Source: Surveys conducted in 2010 plantations Kossihouen010 dans les plantations de Kossihouen

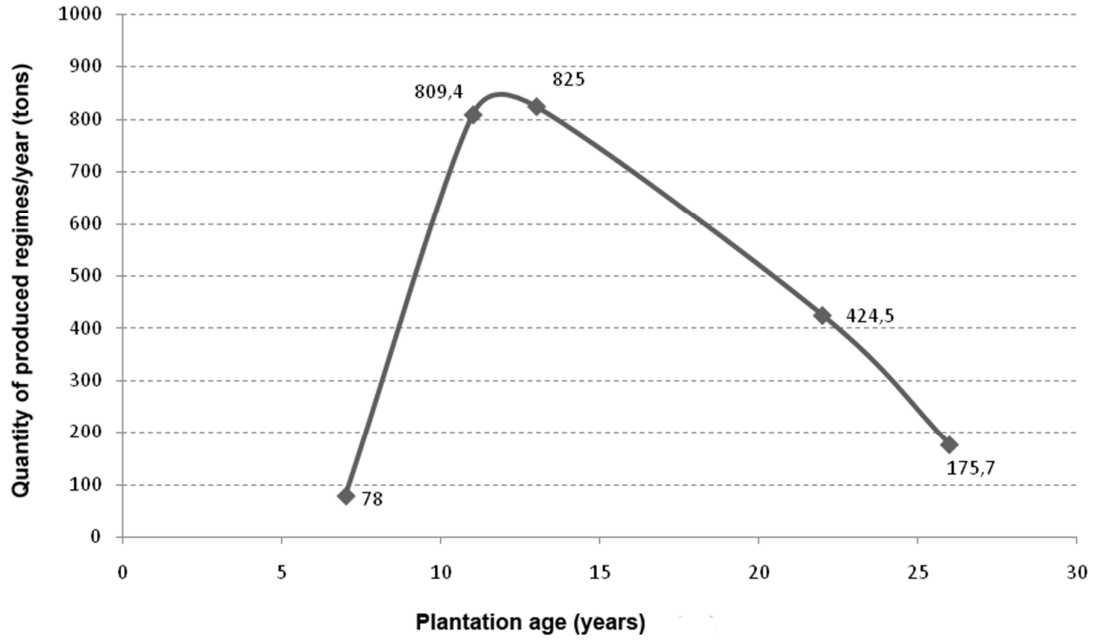

Figure 5: Evolution of the quantities of products regimes depending on the age of the plantations (Tons)

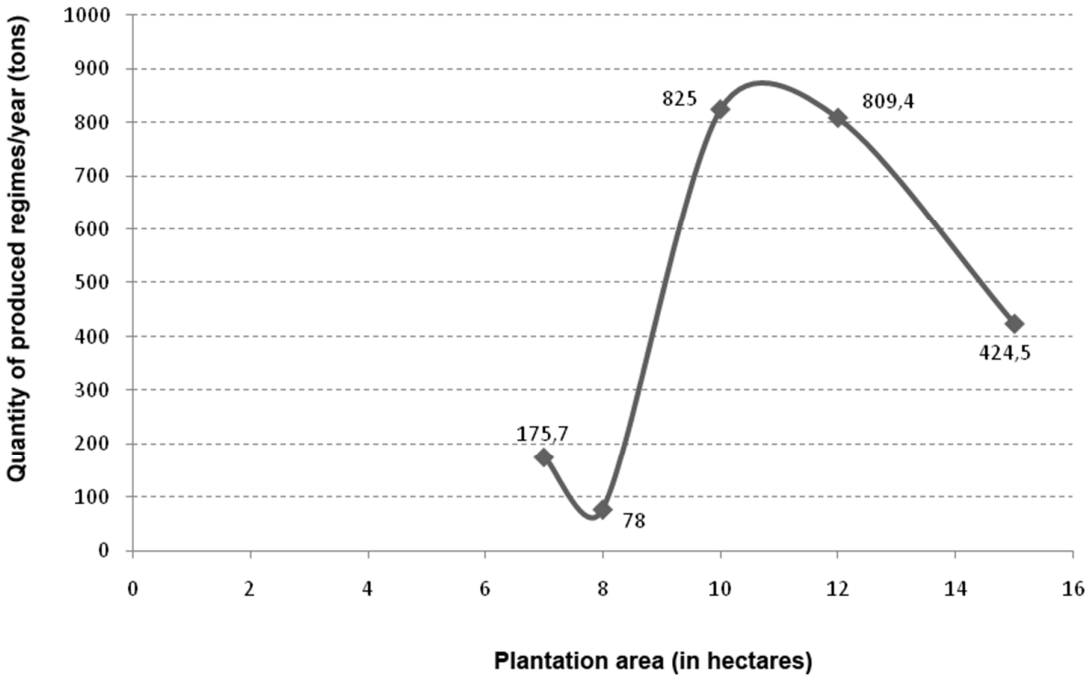

Figure 6: Evolution of the quantities of products based regimes areas plantations (Tons)

Table 3: Different parameters investigated in the region of Kodiakro

Oïl palm plantations	P1	P2	P3	P4	P5
The age of the plantations (in year)	16	14	24	9	20
Area (ha)	11	12	9	10	12
Number of trees on the plot	1606	1752	1314	1460	1752
Amount of pension income / year (T)	935	1003,2	231,75	102,5	484,2
Frequency of weeding year	3	3	2	3	2
Cost of weeding: 25,000 F CFA / ha	825.000	900.000	450.000	750.000	600.000
Frequency pruning year	3	3	2	3	2
Cost pruning: 10 000 F CFA / ha	330.000	360.000	180.000	300.000	240.000
Annual yield (ton / ha	85	83,6	25,75	10,25	40,35

Source: Surveys conducted in 2010 Kodiakro plantations.

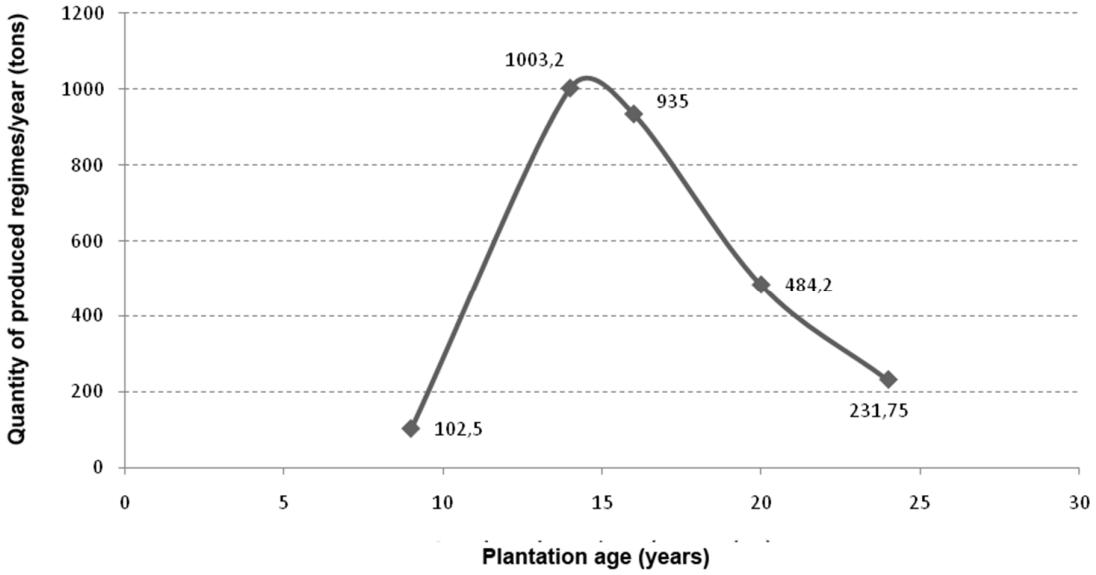

Figure 7: Evolution of the quantities of products based on age (Tons)

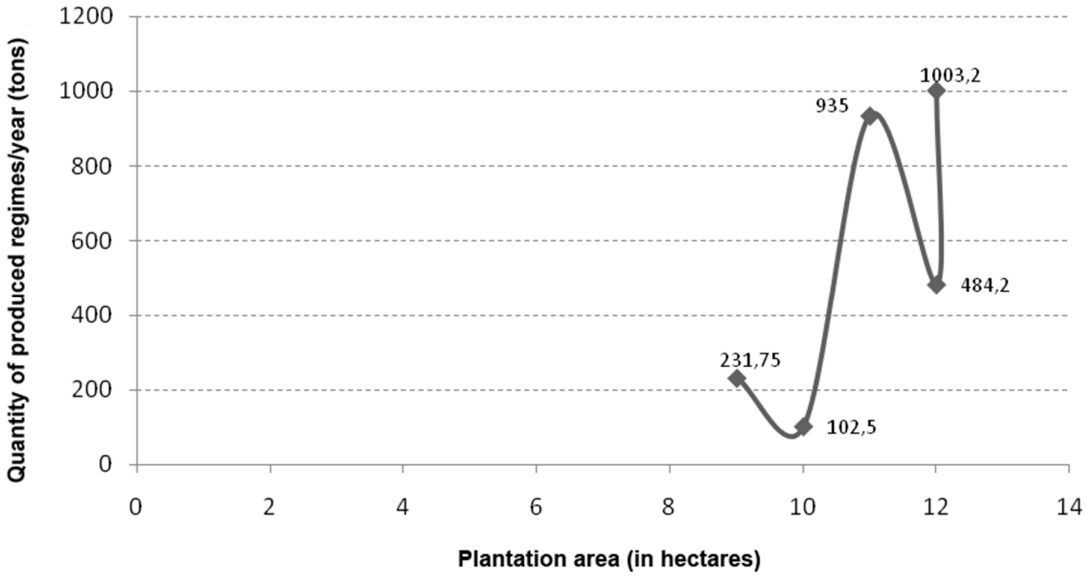

Figure 8: Evolution of the quantities of products based systems areas (Tons)

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