

Oil palm diversification assessment

using farmers typology and value chain analysis
to support product diversification of oil palm
farmers from the Takoradi region, Ghana

Cécile Renier, Elsa Sanial, Léo Godard
and the ALC team, February - March 2021

- Non-confidential report -





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Introduction

Diversification is theoretically considered as being a kind of insurance against climate change impact on agricultural productions, a key to slow down deforestation and a lever to rise households' incomes (Bymolt, Laven, and Tyszler 2018). Diversification is also important to absorb the demand for food of a growing population. In the perennial crops sector such as palm oil, it holds very relevant stakes. Indeed, farmers usually start with a very specialised farm with one main perennial crop. As conditions are very favourable for the adoption of this crop, many farmers will plant it. This process creates a boom in the region or the country. After several decades, this boom is followed by a bust as productive conditions are degrading and prices are decreasing. Facing this crisis, farmers or their children might start diversifying activities on the farm. Such diversification is therefore driven by ecological (soil and forest depletion, difficulties for replantation, climate change) and economic factors (competition with new pioneer fronts having better productive conditions, prices fall, difficulties of replantation) (Ruf and Schroth 2013). According to these booms and busts, farmers have contrasted interests for diversification. From one territory to another, and within these territories, from one farmer to another, diversification stakes differ a lot: launching diversification on new activities, strengthening existing activities, facilitating market access, setting partnerships along the value chain.... For this reason, understanding the diversity of farmers' profiles at territorial and individual scales is crucial to propose relevant diversification programs.

It is also important to consider that diversification holds risks. Benefits are still under-researched and we lack knowledge on some informal value chains (eg: non tree forest products). Markets for alternative crops may not be well established, especially for small volumes, farmers can face difficulties to connect with buyers, especially in remote areas, and the alternative crop can in the end generate lower profits than expected. Thus, it is important to assess on the one hand the opportunities and risks for the adoption of a new crop at regional, local and individual scale and the markets and off-takers readiness on the other hand.

This report shares (i) the analyses of palm oil dynamics in a palm oil mill sourcing area, (ii) a typology of farmers' profiles regarding diversification, including their work and cash calendar, and (iii) the current economic trends of potential diversification value chains. The combination of these three levels of information allow to target relevant diversification options for oil palm farmers.

1 Context and objectives of the assignment

The assignment for which was produced this report has been requested and funded by a Ghanaian palm oil company in order to assist them in the design of a support program dedicated to the diversification of productions and incomes of their supplying oil palm farmers.

The objectives of the assignment were to improve the understanding of the situation of their farmers through a detailed profiling and value chain analysis, and provide relevant information and recommendations to build a support program to foster farmers' resilience, farm diversification, and improve their production base.

The data collection and interviews with farmers and value chain stakeholders took place in February 2021 during a field mission in the Western Region of Ghana, around Takoradi.



2 Approach used for the diversification assessment

2.1. Methodology

The methodology used to undertake this diversification assessment is based on the crossing of 2 sources of information: downstream (farmers' situations) and upstream (state of the value chains).

Firstly, the farmers' situations were analyzed through the lens of a farmers' typology, based on key segmentation criteria. The information used for this typology has been collected during a fieldwork mission conducted through two different strategies:

- Farmers' interviews set at households' level to understand the main characteristics of households regarding land, income and manpower that are key elements to build a farmers' typology for diversification.
- In some communities of interest, Focus Groups were organised with a group of around 10 farmers different from the ones that were individually interviewed. The objectives of these Focus groups are to gather data at territorial scale (description of the area, manpower cost, access to market), integrate information that is more delicate and complex, and finally to discuss farmers' interest for a list of diversification options.

This combination allows to collect data at appropriate scale, to interview a wider number of farmers with a shorter and specific form, and to have more qualitative insights on the territorial situations and farmers' strategies, interests and needs. The findings of the farmers' typology analysis are given in the parts 3 (description of territorial characteristics), 4 (farmers typology) and 5 (work and cash calendars).

Secondly, value chains analysis were conducted in order to identify which kind of product benefitted from an already existing and "strong" chain of actors: reliable buyers, stable prices, steady demand on local / regional / international markets... This analysis also provided information on the challenges that should be overcome to link the targeted farmers with the relevant value chains. The findings of the value chain analysis are given in part 6.

Finally, a comparison matrix has been included to this report in the part 7, and a summary of the recommendation delivered to the palm oil company in part 8.

2.2. Presentation of the sample and geographical repartition

The zone of the study has been delineated in order to incorporate as many suppliers of the palm oil factory as possible. The division in 7 zones is an insight provided by the company, based on the geographical repartition, administrative boundaries, specific characteristics, and number of their suppliers:

- Zone 1 (441 km²) following approximately Ahanta West district boundaries;
- Zone 2 (257 km²) comprising the city of Mpohor and its surroundings;
- Zone 3 (684 km²) with Sekoradi, Sekondi, and a large central part of the Mpohor district;
- Zone 4 (2'322 km²) including the districts of Cape Coast, Komenda and the Northern part of the Mpohor district;
- Zone 5 (3'583 km²) including the Jomoro and Nzema East districts;



- Zone 6 (2'724 km²) following approximately the Wassa West district boundaries, with Tarkwa city in the center; and
- Zone 7 (area not yet delineated), with the city of Twifo Praso and its surroundings.

The sample of farmers is exclusively constituted with supplying farmers of the palm oil company. Hence, the sample does not intend to represent the full diversity of farmers from this zone of study. It is biased since all of the farmers interviewed are involved in palm farming, however at different levels, as will be depicted in the typology.

The map below is a representation of the zones of the study, with the number of farmers individually interviewed and the number of farmers constituting the Focus Groups that were organized:



Figure 1: Map of villages where the interviews (white) and focus groups (blue) were conducted, with the number of participants in brackets and the total number of participants per Zone (zones 1, 2, 3 are merged)

238 farmers (171 men and 67 women) were interviewed and the characteristics of their farms' plots were collected. It represents 520 plots among which 268 are palm fields. On top of these individual interviews, 5 focus groups were realized in 5 different zones. They gathered between 23 and 53 farmers, with an effort made to have a good representation of genders. Each Focus Group was split in two smaller groups one with men and one with women. The geographical repartition of the sample is also presented in the table below:

Table 1: Presentation of the repartition of the sample in the investigated villages

	Village	Individual interviews	Focus Group
Zone 1 34 farmers	Yabiw		51 (25 men / 26 women)
	Aketenchie	25 farmers	
	Ankyernyin	9 farmers	
Zone 2 28 farmers	Nyameyekrom		40 (25 men / 15 women)
	Afrapkrom	15 farmers	
	Mpohor	13 farmers	
Zone 3 50 farmers	Kejebil		32 (21 men / 11 women)
	Kwakutsiakrom	21 farmers	
	Pretsia	7 farmers	
	Whendo	22 farmers	

Zone 4 92 farmers	Abayee	28 farmers	23 (18 men / 5 women)
	Besease	25 farmers	
	Kwokwado	4 farmers	
	Breman	24 farmers	
	Oponkrom	11 farmers	
Zone 6 34 farmers	Huniso	6 farmers	
	Pepesa	21 farmers	
	Tebe	7 farmers	
Zone 7	Twifo Nyimase & Edugyaa		53 (29 man / 24 women)

2.3. General characteristics of the sample

2.3.1. Household characteristics

According to individual interviews, palm farmers of the sample have between 21 to 95 years old with an average of 51 (+/- 13) years old. 72% of farmers investigated are males.

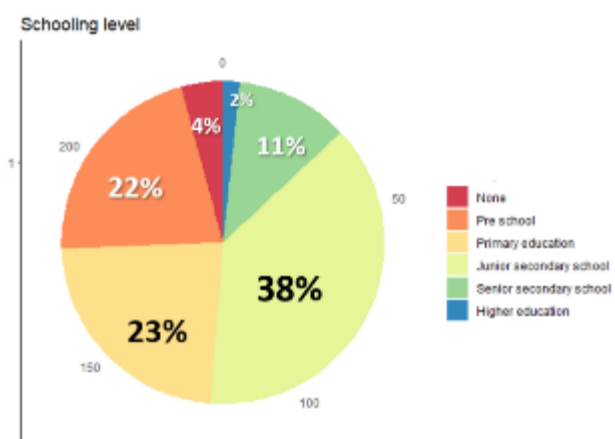


Figure 2: Repartition of schooling level among the investigated sample

Their schooling level varies a lot from farmers who have not been to school at all to farmers who have followed higher education (Figure 2).

Most farmers (96%) have been to pre-school at least. However, only half of the sample have kept attending school further than primary school (51%).

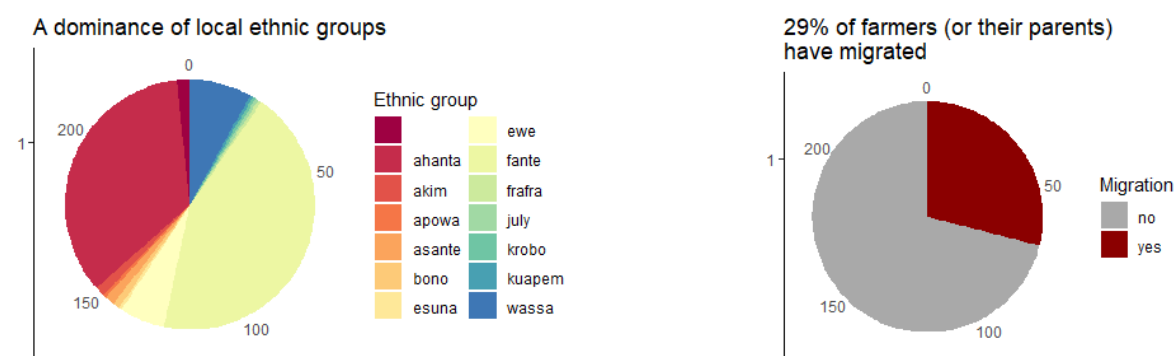


Figure 3: Ethnic groups and migration

The sample is composed of 14 different ethnic groups (Figure 3). Two of them are dominant: **Ahanta** (35 %) and **Fante** (44%), which are both part of the Akan group. These groups are local of the investigated area.

Indeed, all the farmers investigated were born in Ghana. 29% of them (or their parents) have migrated in the past, but these migrations are all national migrations and most migrants are in fact

coming from places neighboring Western and Central regions. Hence it seems that **international migration did not influence agrarian dynamics in general in the surveyed zone.**

There is a minor but significant part of Ewe people with Togolese origin and born in Ghana in Zone 6, who were probably attracted by the dynamic mining sector close to Tarkwa (see part 2).

2.3.2. Income strategies and dependence to agriculture and palm

Farmers' households gather in average 7 people. There is some variability in households' incomes. The annual average income is 6'600 Ghana Cedis (980 €). When divided by the number of people in the household, this annual average income is 1'400 Ghana Cedis/pers/year (200 €). However, **we strongly suspect that total revenues, and in particular palm incomes were under-declared by the farmers.** The charts below (Figure 4) illustrate the repartition of incomes in the sample:

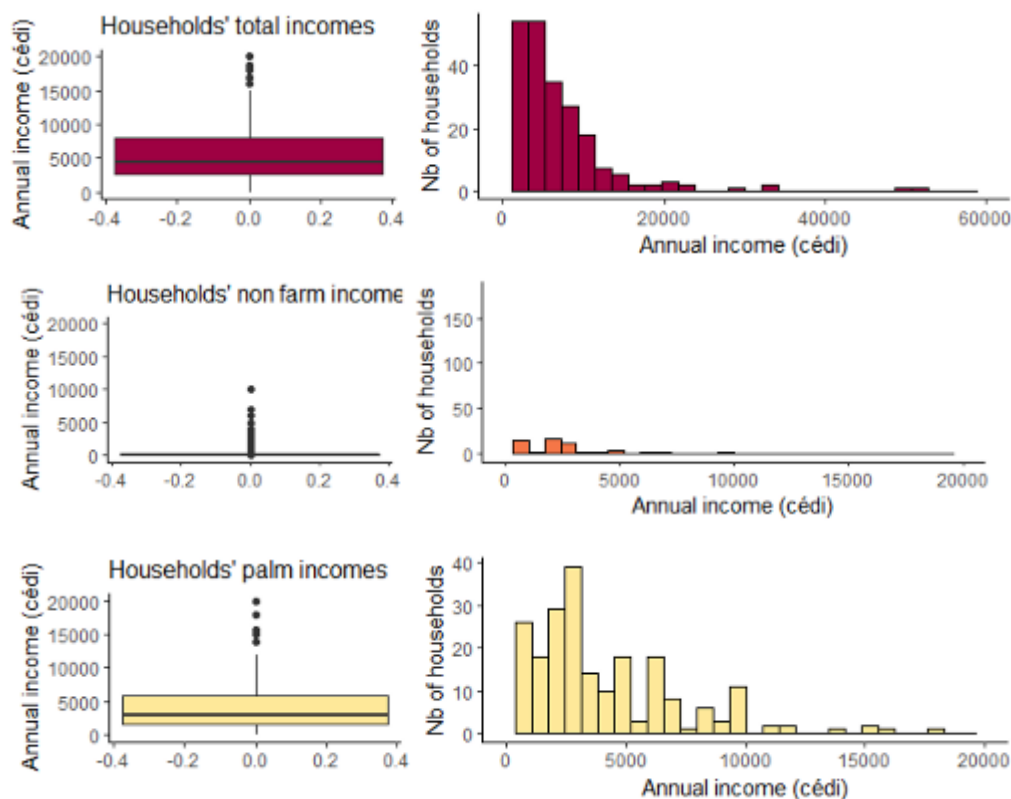


Figure 4: Repartition of incomes in the sample

Over the 238 farmers interviewed, 187 households show high dependence on agriculture, of which 115 rely quasi-exclusively on palm. This means that **48% of households are fully dependent on palm incomes.** The rest of agriculture-dependent households have diversified their incomes from palm and earn money with cocoa (42 households), cassava (38), oranges (13), vegetables (11), breeding (3 - this figure is under-estimated) and coconut (3). The number of coconut farming households is also under-estimated since this study was not undertaken in Zone 5, where these households are mostly concentrated.

Some households have also diversified their sources of income towards non-agricultural activities such as construction work (masonry, carpentry, electrician), driving (taxi, trucks), shops (alcohol, food), sewing, hair dresser... These households are closer to urban areas. This repartition is summarized in the Table 2 below:

Table 2: Dependence to palm and agriculture among the sample

	Farmers 100% dependent on revenues from agricultural activities		Farmers diversified with non-farm activities
	Very high dependance on palm	Diversified agri activities	
Number of households	115 (48%)	72 (30%)	51 (22%)
Average annual income	5'540 GHS/year	6'681 GHS/year	7'277 GHS/year

However, these different strategies are not necessarily related to the area of palm cultivated. Indeed, when comparing total income, palm income and areas cultivated with palm, it is interesting to note that many different economic situations exist among farmers. There is no simple relation between palm area, farm income and total income. The Figure 5 below shows that both poorest and richest households, or smallest and biggest palm farmers, can be totally dependent on palm incomes. On the contrary, some very small palm farmers (less than 2 Acres cultivated) can have significant annual incomes as they have non-farm incomes. There is also a lack of correlation between the palm area and the total palm revenues.

This lack of correlation between the palm area and the total palm revenues is because of several factors, the most important being the variety of palm planted. Indeed, Tenera variety allows higher revenues per acre since its price is higher by 8% and its yield is probably at the same level as the local variety Dura, if not higher (no scientific paper could be found on this topic).

In this context it is then difficult to link a farming strategy with the capitalization of the household.

If that link existed, the graph below would show a clearer separation between farmers: farmers with large farms (green-blue colors) would be located in the upper right corner (high palm income) and farmers with small farms (red-orange color) on the bottom left corner (low farm income), with farmers having non-farm income located above the diagonal with larger dots (higher non-farm income).

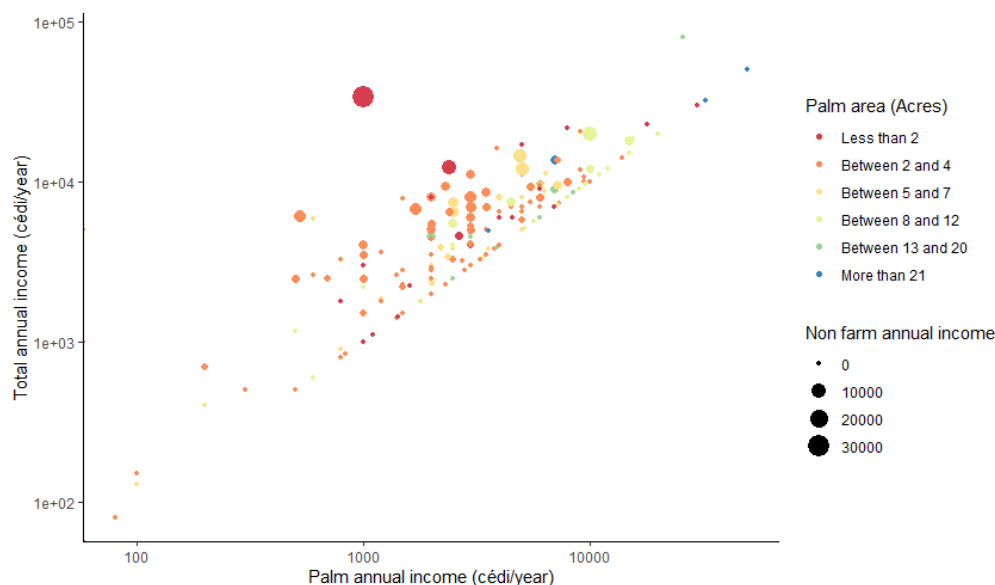


Figure 5: Economic stratification of the surveyed households



These characteristics will be more analyzed in the part 4 which is dedicated to farmers typology

2.3.3. Land tenure: a customary system deeply linked to palm cultivation

It seems that most of the land occupied by the interviewed farmers belong to them or their extended family. This hypothesis is correlated by both the results of our survey and Solidaridad's. However, since it is very common in this kind of survey that the farmers answer for their "crops" and not "the land" (as the crops belong to them, they might therefore answer that they own the land), we must look upon this statement as a hypothesis.

Land tenure customary practices may have a strong impact on farm diversification. Indeed, when a farmer negotiates a tenure arrangement with a land lord (being his extended family or an outsider), it is narrowly linked to the crop that will be grown on the land, and in the context of this study, **all the farmers secure land quasi-only for palm farming purposes**. For this reason, when a land has not been totally planted with palm trees, it is difficult for the farmers, considering the arrangement with the land lord, to plant something else than palm.

Crops with shorter or longer cycles than palm may weaken the clarity of customary arrangements regarding land. Therefore, there is a whole social organization linked to palm activities and ruling access to land. Such organization must be taken into account before considering any diversification options relying on land availability. It is also to be noted that it complicates the adoption of this kind of option.

2.3.4. Palm dynamics': an attractive and specialized activity

The table and the charts below summarize the characteristics of palm fields in the sample.

Table 3: Main characteristics of palm fields in the sample

	Min.	Max.	Median	Mean	Sd
Area of palm fields (acres)	1	60	4	5.7	6.8
Number of palm fields per households	1	5	1	1.2	0.5
Total area of palm farmed per household (acres)	1	100	4	6.1	8.9

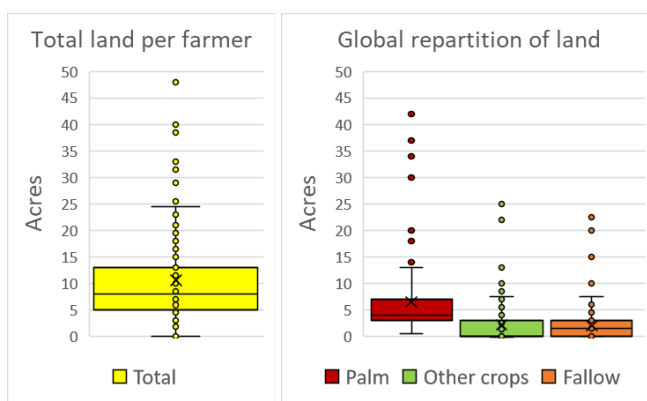


Figure 6: Land repartition in the sample

Interviewed farmers have rather small palm fields as more than 60% of farmers have less than 5 acres of palm (2 hectares). Households who have more than one palm field are rare (less than 16%).

The average land repartition is largely dominated by palm, with more than 60% of the land dedicated to it, then 20% to other crops, and 20% to fallows.

It is interesting to note that, according to an extension officer of a palm oil company, a palm farmer would need at least 8 acres to break even and make profit. If not, the profitability would be too low mainly because of the transportation costs (you need around 10 acres to fill in a Kya truck). Only



farmers in clusters, with a lot of neighbors practicing palm, can profit from smaller acreage like 5 acres. Therefore, we can notice that a lot of farmers from the sample are on a precarious situation and may not be able to really profit from palm because of their small area planted.

Most farmers are personally involved in palm fields' work. Indeed, 70% of palm fields are farmed directly by the farmer interviewed only.

As shown by the figure 7 below, most fields (67%) have been created in the last 15 years. According to the investigation data, and farmers' declaration, 2010 was the peak period of palm field creation in the studied area¹. Since 2005, 800 acres of palm have been planted or replanted over the 2'460 acres of farms investigated. **This is an indication of farmers' durable interest for palm activities.**

However, on the same graph it must be noted that the most recently planted palm fields are smaller than the ancient ones. Before the 2000s', the minimum size of a plot was 2 acres and almost all the plots (89%) were over 2 acres. The plots created in the two last years are almost all under 5 acres (80%). Moreover, there is a significant relationship between the age of the plot and its area. **This is a witness of land pressure that palm farmers are facing more and more along the years.**

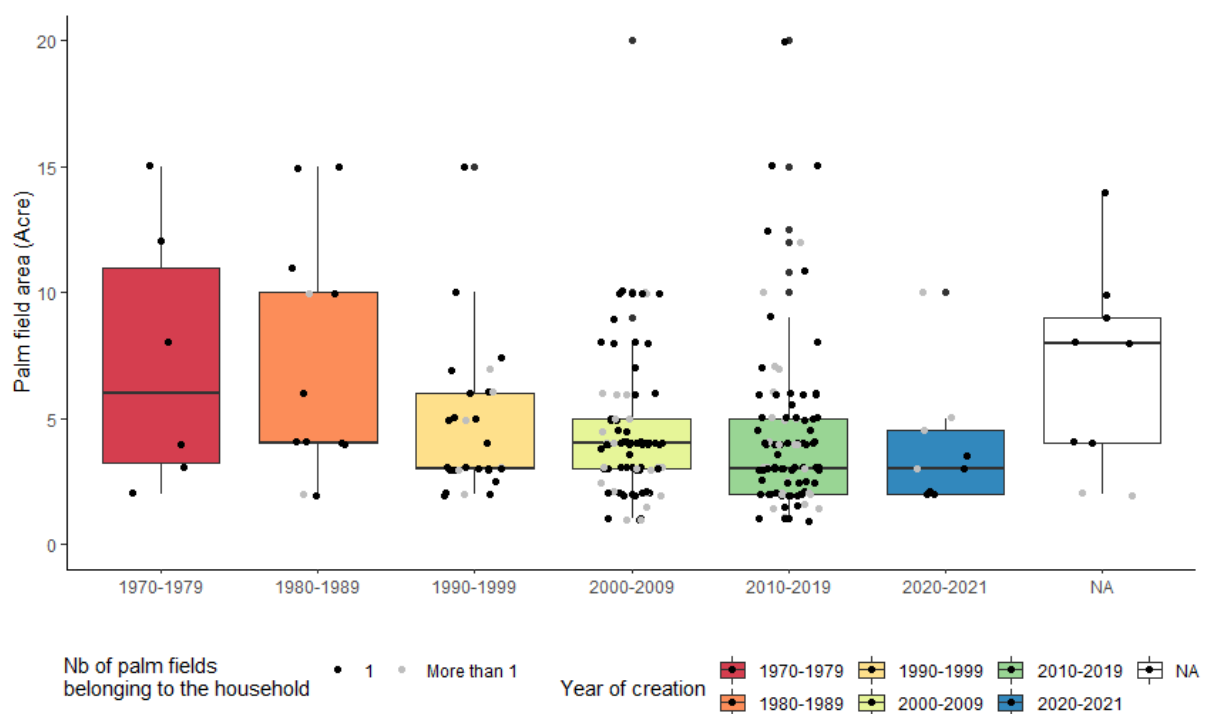


Figure 7: Year of plantation of the palm fields

This land pressure was described by many farmers during the focus group in Nyame Ye Krom, with conflictual debates related to the chief of the community's approval towards land attribution. In this particular area, the land pressure was exacerbated by the presence of large agro-industrial palm estates such as Norpalm and BOPP.

Another witness of land pressure is the very low number of fallows, secondary forest and old forest that households own. 59% of households declared that they have some available land (either ancient forest, secondary forest, old fallow, recent fallow or foodcrops fallow). These available lands

¹ It is interesting to note that the palm oil sector has been supported from 2001 to 2007 with a government program called the Presidential Special Initiative (PSI – Oil Palm). This program failed to achieve its initial objective, but it surely created interest towards palm oil from the part of the farmers.



represent in average 1,5 acres per household. The table 4 below summarizes the area occupied by each kind of fallows for the households concerned, however we suspect that the numbers are underestimated. Indeed, farmers declared fallow lands and forest but then did not mention them during the land-specific survey.

Table 4: Main characteristics of uncultivated lands in the sample

	Ancient forest	Secondary Forest	Old fallow	Recent fallow	Foodcrops fallow
Number of households	1	29	39	9	4
Area data (in acres)	5	Min: 1 Max: 50 Average: 6.3	Min: 0.5 Max: 20 Average: 3.3	Min: 1 Max: 5 Average: 3.1	Min: 0.5 Max: 6 Average: 3.4

Farmers are willing to extend or pursue palm activities on the long term

Many farmers are willing to keep palm activities in their farms on the long term. The figure 8 below highlights the fact that most farmers are intending to renew their palms fields once they will reach the end of their lifecycle (20-25 years) rather than converting them into another cash crop or agricultural activity. In addition, the main project for fallows, secondary forests and forests is converting them into palm fields.

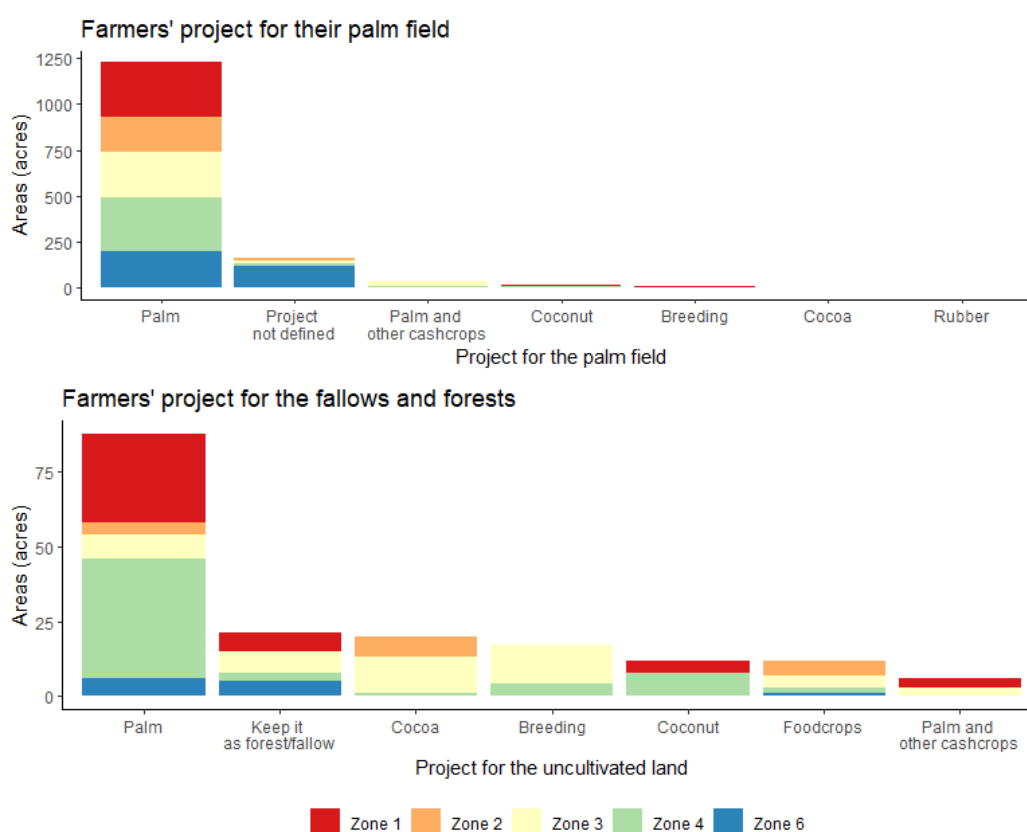


Figure 8: Farmers' declared projects for their palm fields and uncultivated land

According to the data collected, farmers intend to replant 1'250 acres of palm (85% of current palm area) when they reach the end of their lifecycle. Farmers who have unoccupied land also intend to convert more than 50% of it into palm fields. Those declared projects must not necessarily be taken



for granted as palm economic context may change in the coming decades. However, they can be considered as a good indication of farmers' current interest for palm.

Furthermore, when farmers are asked about which activity they would like to extend on their farm, palm is largely the most quoted option (Figure 9), with breeding in 2nd position falling far behind, and cocoa in 3rd.

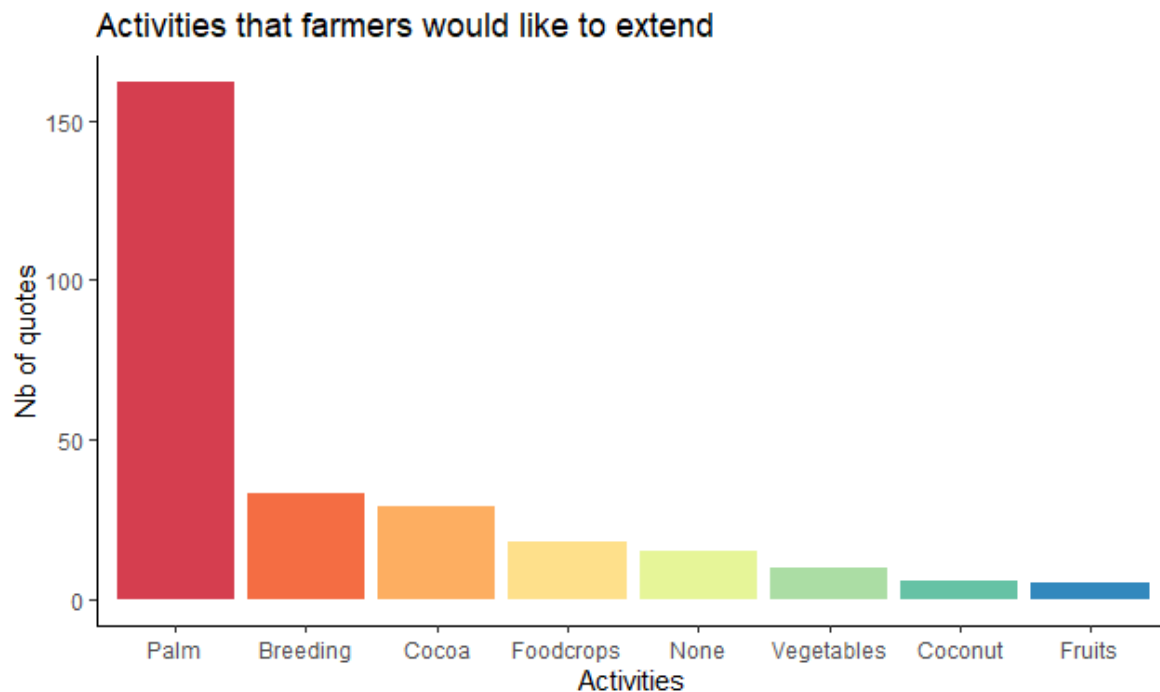


Figure 9: Farmers' declared project in case they can extend their farm activities

On the one hand, the combination between the rather young age of palm fields, the strong will to pursue or extend palm activity, and the limited availability of land, are hindering farmers' interest for diversification and adoption of new activities.

On the other hand, their strong economic dependency to palm activities makes diversification an important stake to help farmers reach more resilience. Taking into account these two aspects and the existence of contrasting farmers' profiles are crucial to properly identify relevant diversification options. Contrasting farmers' profiles are linked, in the first place to contrasting territories.

3_ Contrasting situations at territorial level

The study area has been organized in 7 different zones corresponding more or less to the gathering of different administrative districts. All zones (apart from zone 5) have been investigated. Since no consistent document has been obtained regarding farmers' repartition, Solidaridad referencing was used to assess it.

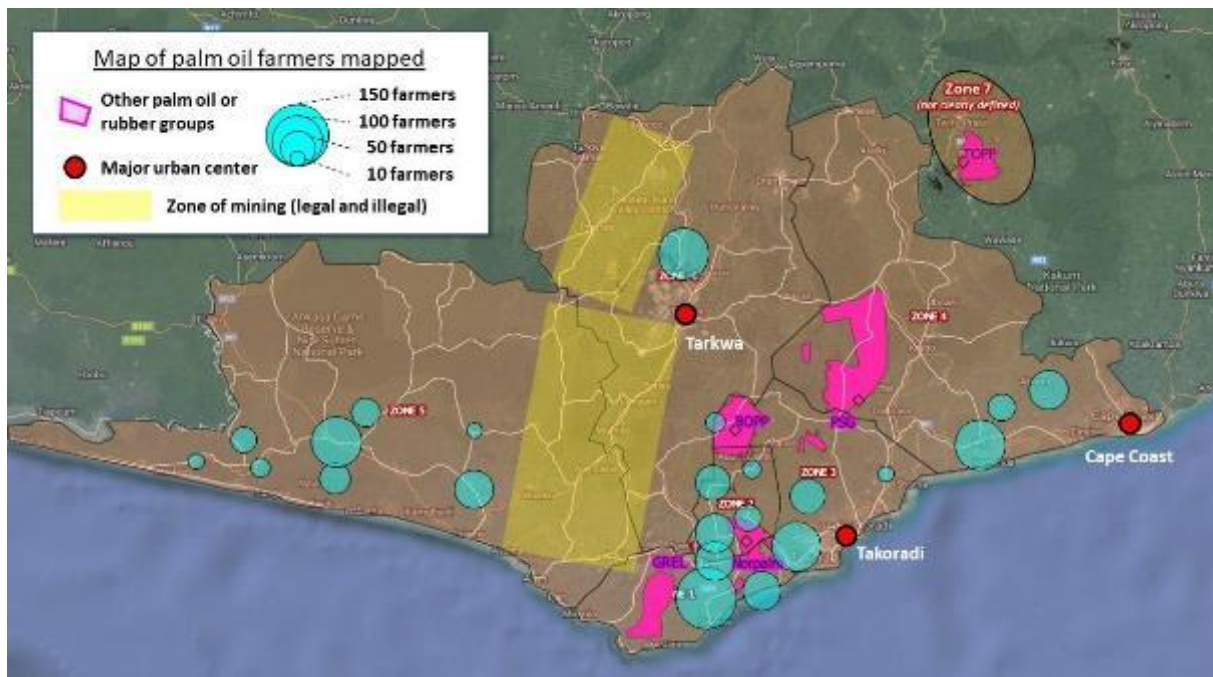


Figure 10: Map of the studied zones: contrasted proximity to palm mill, urban centers and alternative activities (sources of farmers' referencing: Solidaridad)

As shown by Figure 10, palm farmers are not spread all over the zones but gathered in specific areas (close to Tarkwa in Zone 6, along the road going to Ivory Coast in Zone 5, in the South of zone 4).

At a first glance, the zones are located in contrasting territories with key influential factors such as proximity to major urban centers (Sekondi-Takoradi², Cape Coast and Tarkwa) or presence of gold mining areas (legal in Zone 6 with Tarkwa Gold Mine, illegal "galamsey" in zone 2 and 3). These gold mining activities can attract young people and hence deplete a territory, or another sector, of its vigorous manpower.

Zone 6, 4 and 5 are far away from most of the palm oil purchasing companies. On the opposite, Zone 2 in particular is surrounded by palm factories.

The West half of Zone 1 is also completely occupied by rubber farmers, supervised by GREL (Ghana Rubber Estates Limited). It is important to note that palm and rubber are not complementary strategies for farmers by lack of available land, and they are seen by the processors of each sector as rivals cashcrops for the occupation of the land. That is why no palm farmers seem to be located in west part of Zone 1, and also why rubber as a diversification option will not be much investigated.

² Sekondi-Takoradi: 550'000 inhabitants (2010), Cape Coast = 170'000 (2010) and Tarkwa = 35'000 (2013)

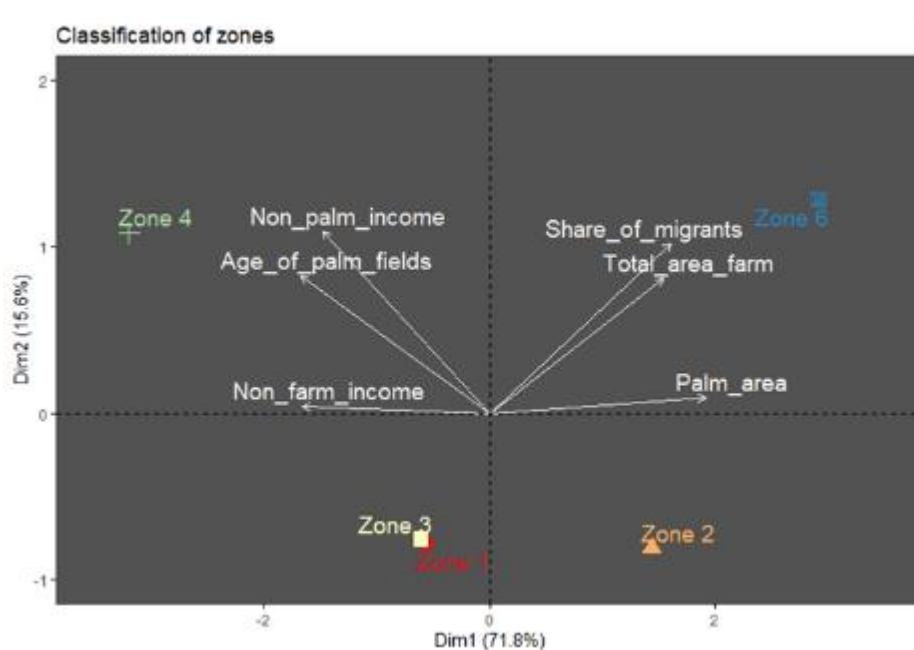


Figure 11: Multi-criteria classification of the studied zones

Figure 11 is a PCA graph³ that depicts the results of a classification of zones based on palm area per household, total area of farm, share of migrants in the zone, age of palm fields, share of farmers having non-palm agricultural incomes and share of farmers having non-agricultural incomes. Below, table 5 shows the summary of the data of these key classification variables:

Table 5: Contrasted territories regarding key farmer segmentation criteria

	Palm area (average in acres)	% of farmers with non-farm incomes	% of farmers with non-palm incomes	Share of migrants
Zone 1	6.4	30 %	44 %	15 %
Zone 3	5.9	24 %	45 %	18 %
Zone 2	7.2	16 %	46 %	43 %
Zone 4	3.5	30 %	86 %	22 %
Zone 6	9.4	18 %	45 %	68 %

This classification proves that there are in fact 4 groups statistically different when analyzed with our variables of interest: Zone 4, Zone 6, Zone 2 and Zone 1/3. That is why these groups will be analyzed separately in the following paragraphs.

3.1. Zone 2: Historical stronghold of palm farming

Zone 2 is mainly characterized by the fact that it is framed by several major palm stakeholders (BOPP, NORPALM, PSG, B-BOVID...). Also, it seems that it was the first place, with zone 6, where farmers adopted palm farming. Indeed, we can see in the figure 12 that zone 2 is the zone having the oldest

³ The Principal Component Analysis (PCA) correlation graph seeks to explain the variance in the dataset and represents it in a 2-dimensional space. The dimension with the most explained variance is plotted on the horizontal axes, the second-most explanatory dimension is placed on the vertical axis. The original variables are projected onto this 2-dimensional graph and represented by the arrows. If 2 arrows are pointing in the same direction (small angle) then the variables are highly correlated, if they are orthogonal (at a 90-degree angle) they are unrelated (independent) and if they are pointing in opposite directions, they are negatively correlated. Arrows that are closer to the axes contribute more to those axes.



palm fields, most of them were created before the 1990s' and were already palm replantation, which is an indication of an ancient presence of palm growing in the area.

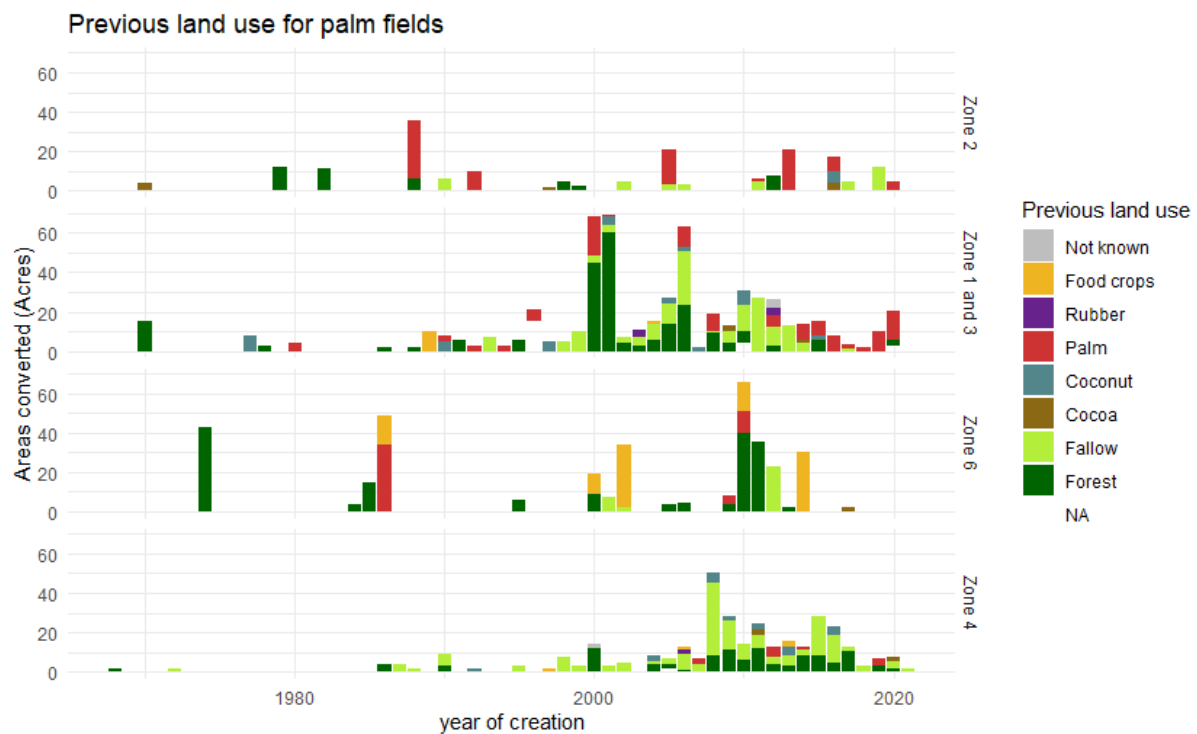


Figure 12: History of palm fields' creation based on interviewed farmers declarations

This is corroborated by the fact that households have slightly bigger palm fields, and that the share of households relying solely on agricultural activities is high (table 5). Also, zone 2 has a high share of regional migrants compared to the other zones, possibly attracted by the palm in the 1980s'.

Zone 2 probably became this palm historical stronghold by benefitting from its good localization between the two main urban centers Tarkwa and Takoradi, without suffering from the land pressure of these cities or gold mining.

The fields created recently are planted on fallows or coconut fields, which indicates an increasing land pressure. Land is getting saturated by palm, making farm extension difficult.

It is interesting to note that zone 2 is where farmers have more manpower available at household level (figure 13). It is also the case in zone 4. On the other hand, hired manpower seems to be difficult to find due to illegal mining activities draining young people (see figure 23).

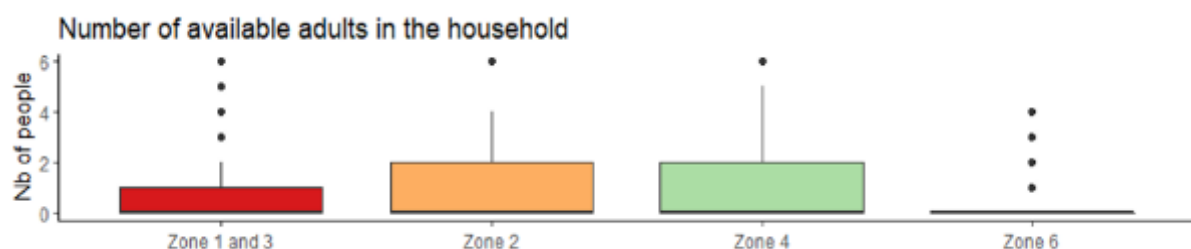


Figure 13: Available adults in the household per zone



3.2. Zone 1/3: Increasing land pressure with rubber in the West and Takoradi-Sekondi in the East

In zone 1 and 3, it seems like palm areas are medium size (6,4 acres in average in zone 1 and 5,9 acres in zone 3). In terms of planting cycles (figure 12), oldest fields were planted in 1970, directly on forest land.

However, the peak of palm planting happened in the 2000s', probably as farmers gained interest by witnessing their neighbors in zone 2. The forest land was quickly planted and it can be seen that between 2000s and 2010s, fallows increased as main land planted with palm.

For farmers, planting in fallow is an indication of land pressure since these lands are normally used to plant food crops or to participate in the rotation of food crops.

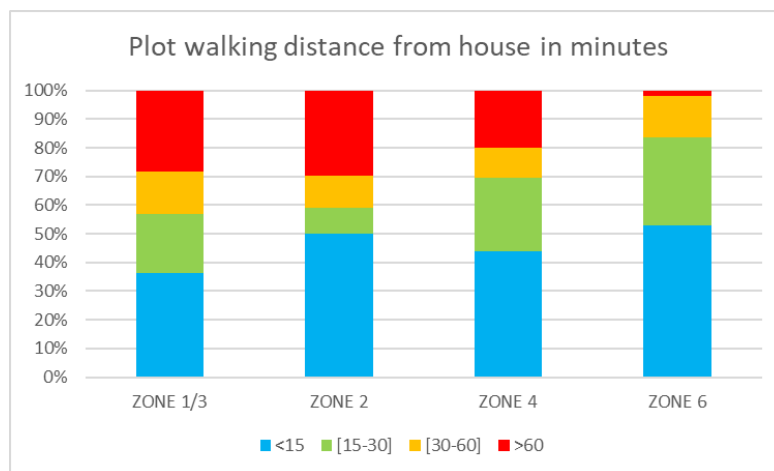


Figure 14: Repartition of plots per walking distance from farmer house

Looking at the plots distance from the house, it is to be noted that it is in zone 1/3 that plots are the farthest (figure 14). This also indicates a higher land pressure as the farmers have to go farther away to find available land.

This land pressure can be explained by the proximity of Takoradi in zone 3, but also by the heavy presence of rubber in the West of zone 1.

Cocoa planting cycles also confirms this hypothesis of land pressure (figure 15). In the 2010s' farmers have replanted cocoa fields. It happened when the creation of palm fields on forest stopped (maybe due to forest depletion in the area). This could be linked to a specific farmers' strategy: rehabilitate old cocoa fields when they feel that palm extension will be limited or when manpower is made available by the limitation of palm extension.

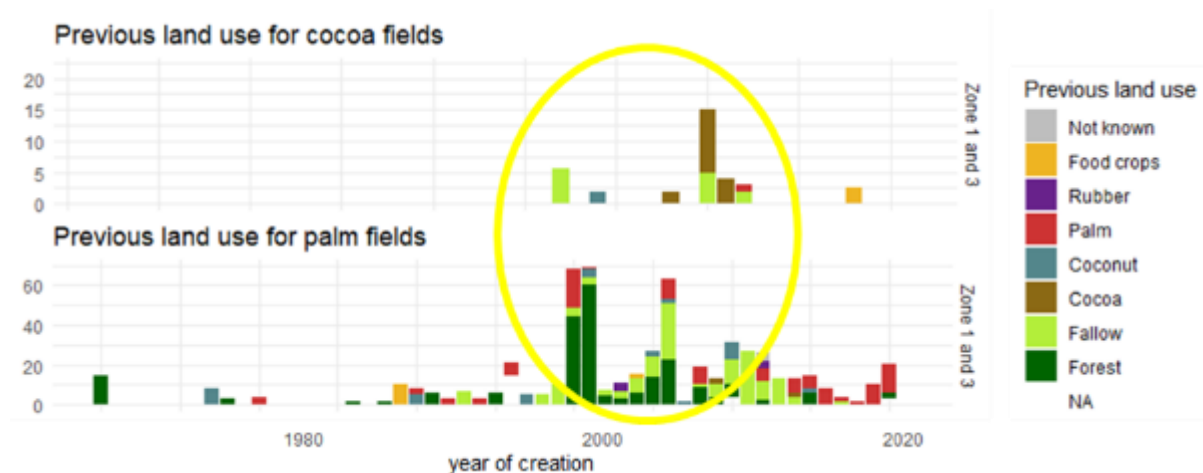


Figure 15: Possible rehabilitation of old cocoa fields in zone 1/3 (on the upper graph: in brown cocoa being replanted on cocoa fields, and on the lower graph, in dark green forest land being planted with palm)



The influence of the proximity of the Takoradi-Sekondi major urban center can also be noticed by the high share of farmers with non-farm incomes (table 5) which are mainly coming from urban jobs such as driver, carpenter, working for shops...

Also, in Zone 1 and 3, households have a great share of their farm incomes other than palm coming from the production and the sale of vegetables (figure 16) such as pepper, okro, cucumber, cabbages and tomatoes. This could be linked to the proximity of Takoradi city. Indeed, farmers of Zone 1 and Zone 3 are located close enough to Takoradi to constitute an horticulture belt.

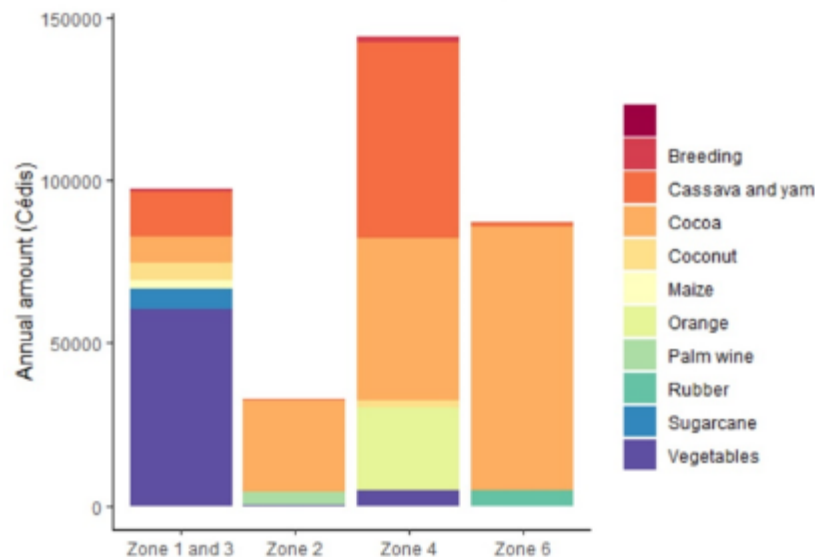


Figure 16: Farm incomes other than palm per zone

3.3. Zone 4: Far away from palm factories, specialized on other crops

It is in zone 4 that we find the most important share of farmers with non-palm incomes, and also the lowest acreage of palm planted per farmer (table 5). Hence, farmers from zone 4 depend less on palm incomes than in the other zones (figure 17).

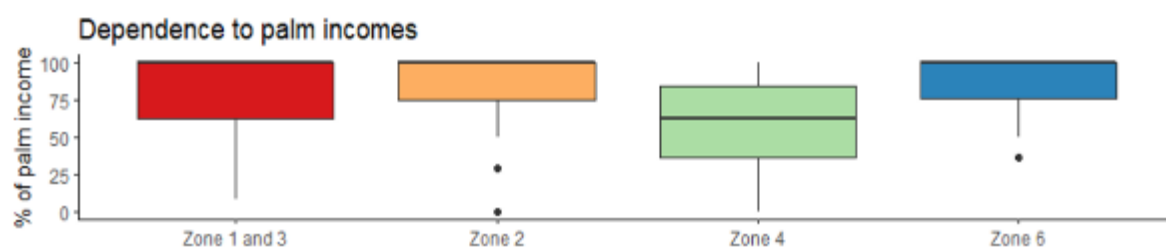


Figure 17: Share of palm income in total incomes of farmers per zone

This lower interest towards palm is mainly linked to the remoteness of the area to the palm oil processing hub in zone 2 (from 46 to 85km). As for a consequence, transport availability decreases and transportation costs increase, as can be seen in figure 18. Also, the remoteness of zone 4 made it difficult for farmers to get access to planting material and support programs to enhance their palm plots from Dura variety to Tenera, hence obtaining a lower price than the other zones (figure 19, from Solidaridad data).

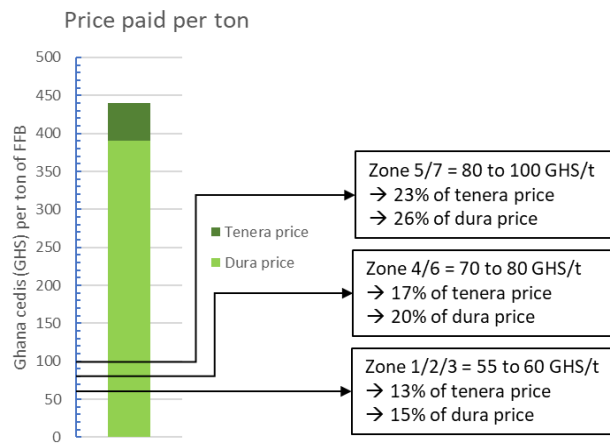


Figure 18: Transport cost per zone (Data: Industry)

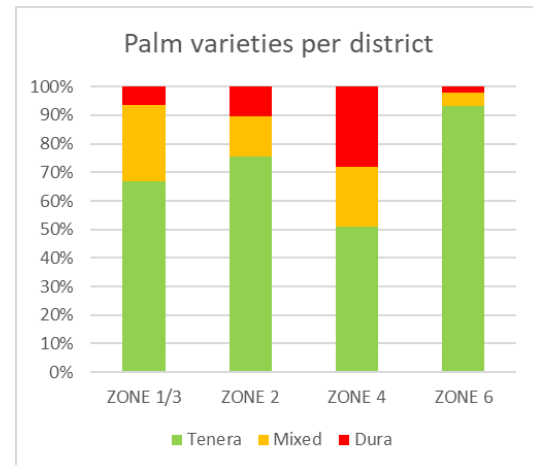


Figure 19: Variety repartition per zone (Data: Solidaridad)

The last factor that makes palm less profitable and interesting for farmers of zone 4 is the sale canal. Indeed, farmers from the farthest zones seem to rely more on buying agents for the sale of their FFBs, as can be seen in the figure 20 below:

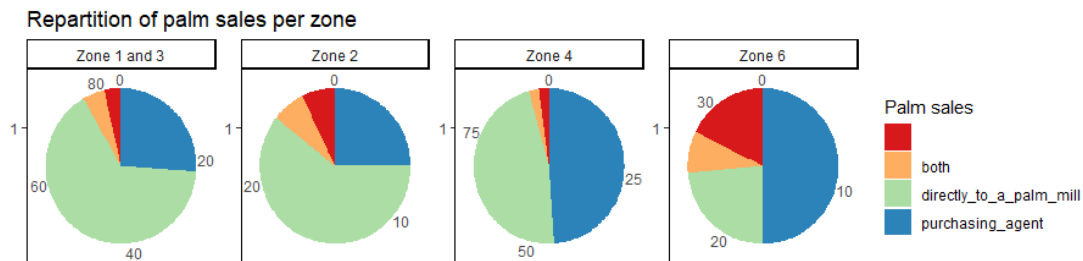


Figure 20: Selling habits per zone (in red question not answered)

This low palm profitability for zone 4 explains also why palm farming arrived later than in the other zones (figure 12). Hence farmers rely on other kind of cashcrops such as cassava (41% of the farmers), oranges (26%), cocoa (25%) or coconuts (7%), as can be seen in the figure 21 below:

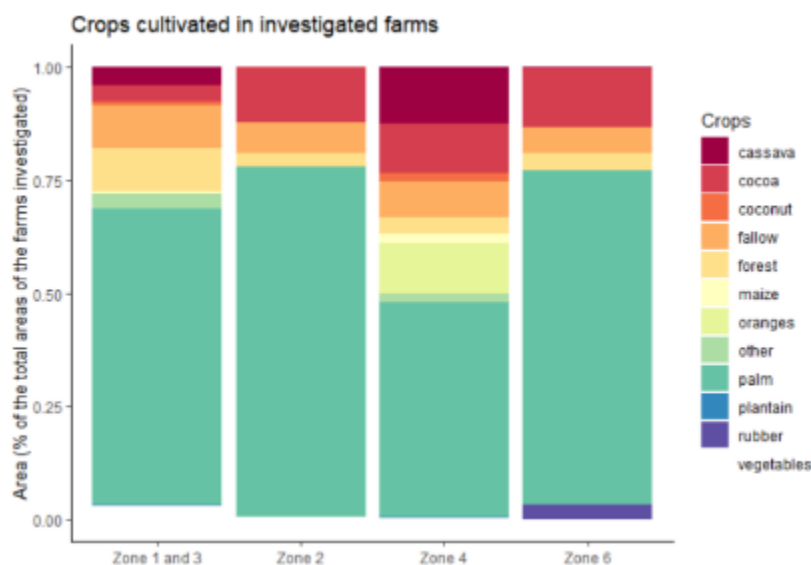


Figure 21: Area planted with the different crops per zone

3.4. Zone 6: Old palm area dominated by mining activities where land availability allows a recent renewal of interest for palm

The most important territorial feature of zone 6 is its proximity to the mining zones in Tarkwa, which made it a dynamic zone, attractive to migrants. Indeed, as can be seen in figure 22, migration to zone 6 began in the 1960s', earlier than the other zones. This resulted in a higher share of migrants (table 5).

However, this proximity to mining activities set a heavy pressure on manpower availability since palm relating tasks such as slashing are put in competition with working in the mining sector, which pays more, as can be seen in figure 23. This issue of manpower availability seems also intense in zone 2, where illegal mining has also been reported in the focus groups, as well as labor demand by the NORPALM plantation. It is still possible to find manpower but it is much more expensive.

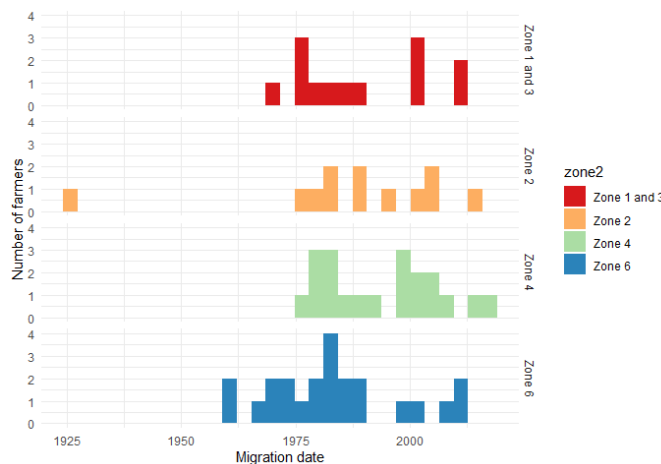


Figure 22: Farmers' migration dates per zone

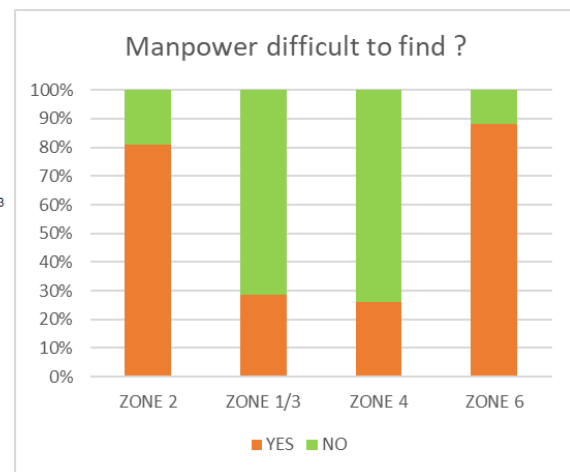


Figure 23: Farmers' opinion on manpower availability

In Zone 6, most fields were created on forest land. There was a first peak of plantation in the mid-1970s', another in the 2000s' and finally in the 2010s'. Some farmers renewed their old palm fields and others kept converting forests into new palm fields. Regarding cocoa, the fields were planted in the start of the 2000s' on forest land. Here again, farmers have rather young and potentially productive cocoa fields.

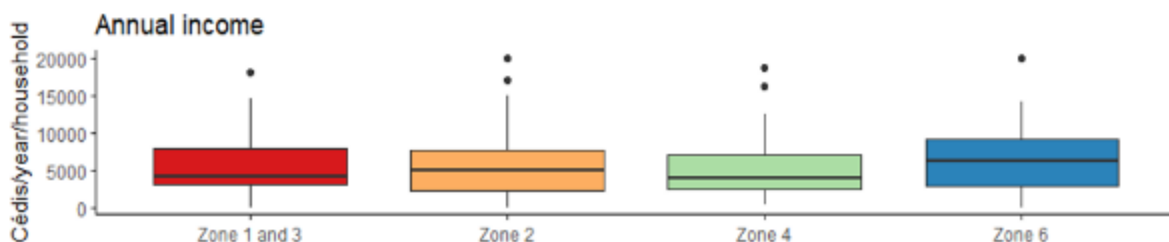


Figure 24: Annual total income (farm and non-farm) per household per zones

Zone 6 is also where farmers have the highest total revenues (figure 24) due to cocoa growing, bigger farms and bigger palm fields. Mining is a widespread activity but no mining incomes have been declared by the household. We have two hypotheses to explain this bias:

- Regarding legal mining: this activity attracts more young adults. Once they have their own income, they become independent and leave the household.



- Regarding illegal mining: the illegal aspect of this widespread activity may have discouraged farmers to declare any incomes linked to that.

Hence, cocoa is quasi the only other crop that brings cash to farmers in zone 6 (figure 16). This specialization towards cocoa seems to be explained by the higher land availability in this zone. Indeed, zone 6 seems to have more farmers with a lot of land than in the other zones (figure 25). Moreover, plots seem to be closer to their houses (figure 14).

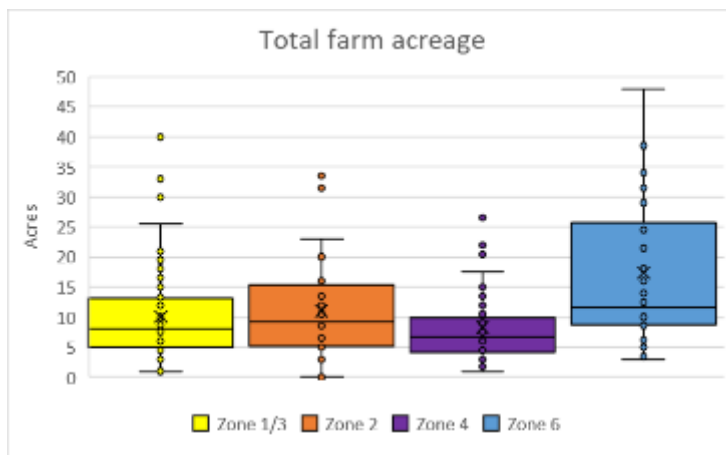


Figure 25: Total farm acreage per zone

3.5. Zone 5 (not surveyed): Coconut production basin

Zone 5 is a very large zone spreading from West of zone 1 to the border with Ivory Coast. However, according to Solidaridad referencing (figure 10), it seems like farmers are gathered along the main road going to Ivory Coast, which is logical.

No surveys nor focus groups were made there, because it is a zone of lesser interest for the palm oil companies, being too far away, and with a high prevalence of farmers selling to Buying Agents. This would then make the undertaking of diversification support activities by the palm oil company complicated, with the intermediacy of these agents.

In any case, thanks to the Solidaridad database (see graphs in Deliverable 1), and discussions with palm oil companies' technicians, some insights can be given.

All in all, farmers from zone 5 seem to have a very close profile to farmers from zone 4:

- Low palm acreage around 3-5 acres per farmer
- A majority of farmers depending on cashcrops incomes other than palm
 - Predominance of coconut as the main cashcrop
- Low palm profitability per acre (high transport costs...)
- Hypothesis: possible high land availability. Indeed, recent deforestation maps of Ghana shows agricultural expansion in this area.

3.6. Zone 7 (not surveyed): Close to zone 4 profile

Zone 7 is a farther zone, difficult to reach. Hence, no survey was conducted there, however a focus group was organized, giving some insights on farmer profiles. It is the farthest zone from the palm



oil factories cluster in zone 2, with the highest transportation costs (figure 18). However, on the contrary of zone 4, there is a palm mill in this zone, called TOPP (see the map, figure 10).

The presence of this palm factory probably incentivized farmers in planting oil palm, we can then assume that a large part of the farmers of zone 7 have profiles closer to the ones in zone 2 (planted palm early, large palm area, high dependance on palm revenues, Tenera variety, etc.). However, it is important to note that these “intensive” farmers are working with TOPP, and were not part of the sample for this study.

Much on the contrary, interviewed farmers of zone 7 seem to have adopted palm more recently, and could not join the TOPP network. In other words, they are less advanced in terms of intensity of palm farming than the others. It is unsure to give a hypothesis only based on one focus group, but it seems like these farmers are closer to zone 4 profile.

3.7. Summary of territorial characteristics

According to the previous analysis, the profiles of each zone can be summarized as below:

Table 6: Summarized differentiation criteria at zone level

	Zone 1/3	Zone 2	Zone 4	Zone 5/7	Zone 6
Proximity to urban center	***	**	*		**
Proximity to Takoradi	***	****	*		**
Mining activities influence	*	**	*		***
Area planted with palm	**	***	*		****
Dependence to farm income	*	**	*	**	***
Dependence to palm income	***	***	*		***
Presence of migrants	*	***	**		****
Palm plantation peak	2000-2010	1990	2010		2012
Replantation dynamic	***	***	*		*
Presence of cocoa	*	**	***	Coconut	***
Available manpower	**	***	***		*
Distance of fields from home	***	***	**		*
Palm sales	Direct	Direct	Buying agent		Buying agent

3.8. Contrasted diversification stakes per zone

Each farmer was asked which activity he/she would like to extend and which activity he/she would like to adopt (figure 26). The results differ from one zone to another and they provide a first guideline to identify the relevant option(s) for each zone.

Without surprise, palm extension is really important for each zone, and even present in the “new activities” graph, which shows at the same time confusion on the question, but also reinforce the fact that farmers really want to plant more palm. Cocoa appears evenly in each zone, as complementary cash crop to palm.

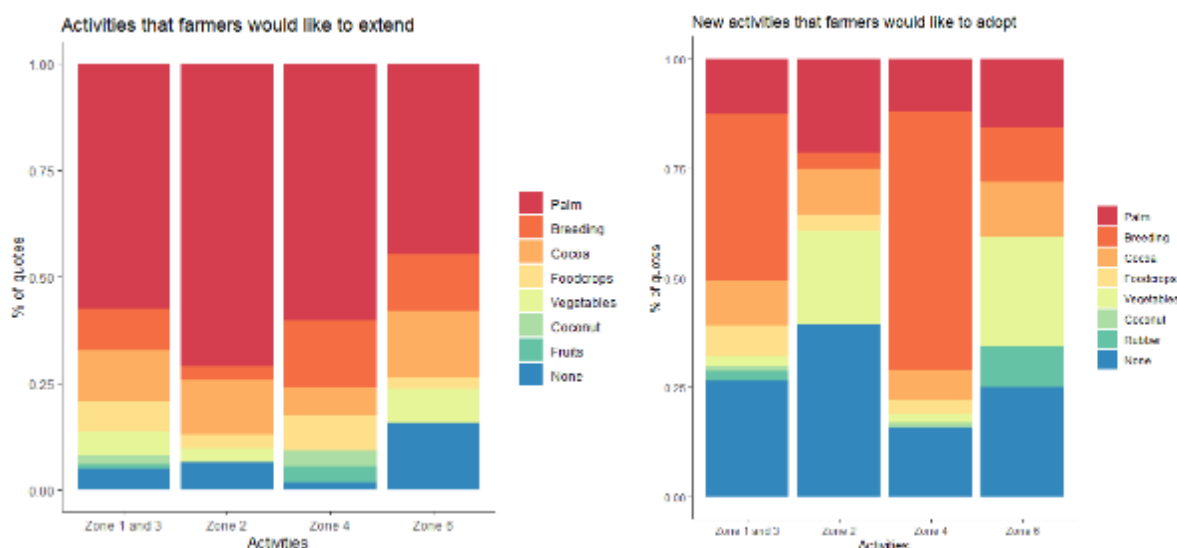


Figure 26: Activities that farmers would like to extend (on the left) and to create (on the right) in function of zones

Zone 2: keep up with palm specialization

In zone 2, farmers seem to intensify their specialization towards palm, and in secondary towards cocoa. They are the less interested in creating new activities, and those who do seem to lean towards vegetables rather than breeding.

Zone 1/3 and 4: strong interest for breeding

In zone 1/3 and 4, breeding is the first new activity that farmers would like to adopt. It seems like some farmers already practice it since it appears also in the activities they would like to extend.

Zone 6: lack of manpower limit extension and diversification

In zone 6, 20% of farmers do not want to extend any activity, and 25% who do not want to create new ones, probably due to the already lacking manpower.

However, as in zone 2, vegetables would seem to be the preferred new activity for the farmers. This could be linked to the proximity of the mining hub, where there is a lot of consumption. Breeding do not seem to interest farmers, except those who already practice it.

Zone 5 (not surveyed): focus on coconut

The main cashcrop in this zone seems to be coconut. The major challenge that farmers are facing for coconut farming is the yellowing disease. It is then highly probable that farmers would be interested in extending this activity, and in receiving support with resistant seedlings. Unfortunately, no survey results can back this hypothesis, or give more details on which other option could be interesting.

Zone 7 (not surveyed): idem as zones 1/3 and 4, but with more land available

As the studied farmers from zone 7 seem to have same stakes as farmers from zone 4, it is highly probable that they have the same interest for breeding activities. From the focus group discussions in zone 7, it would seem like the preferred diversification options for the farmers would be maize, cassava, cocoa and breeding.

Cocoa is being highlighted probably because farmers of zone 7 seem to have more land availability.



4_Farmer typology based on production strategy

After having described at territorial / zone level the pool of farmers studied, it is now important to dive into the different farmers' profiles that can be found within each zone. It is a complementary approach that will bring a more detailed overview of the distinct farming strategies of the producers. The success of a diversification support program mainly relies on the accurate perception of its targeted zone and beneficiaries.

In this regard, a farmer typology will be presented in this section, with the objective of eventually helping in the design of diversification support activities and the selection of the beneficiaries for each activity. This typology is a modelization of reality, meaning that every farmer will not exactly match with a presented type, more likely they will be at the frontier between several. Nonetheless, each farmer will in the end tend to be closer to one type, and hence to react accordingly to diversification support activities.

4.1. Methodology of the building of the typology

The farmers surveyed in this study being all suppliers of a palm oil company, they are very homogeneous in terms of type, since palm farming will heavily influence their production strategy. Hence, in this situation, building a farmer typology is complex and needs to be done through key segmentation criteria, related to diversification. The set of segmentation criteria selected are the following:

Dependance on palm incomes: Even if all the respondents are oil palm farmers, some of them rely quasi-only on palm for their living when others have more diversified sources of income. Farmers having more than 80% of their farm income coming from palm can be classified as "focus palm". This criterion shows which farmers have really palm-oriented strategies, hence probably less interest for diversification, but at the same time they are in a precarious situation because of their heavy reliance on a unique source of revenues.

Dependance on farm incomes: Some farmers have non-farm activities that complete their farm incomes, making them part-time farmers, or just land owners, depending on the situation. These farmers that have more than 40% of their total revenues coming from non-agricultural activities can be classified as "multi-activity".

Main other agricultural revenues: Farmers having diversified farm revenues, but who are not "multi-activity" have different diversification strategies. We can identify two main non-palm farming activities: cocoa and cassava, and secondarily: oranges, coconuts, vegetables and breeding that are gathered under the name others.

Finally, since palm farming has huge influence on each type (except the extreme cases of diversified types), another key segmentation criterion should be **palm farming practices** (acreage, variety planted, use of inputs, practice of replanting...). However, due to the limited time available for the survey, specific questions on this topic could not be investigated for each farmer. Nonetheless, thanks to the previous Solidaridad profiling, discussions with technicians and the focus groups discussions, some sub-types can be identified. But since it is not possible to link these sub-types to the sample, the representation of each sub-type in the sample cannot be calculated. On the next page is displayed a figure showing the process of building this proposed farmer typology.

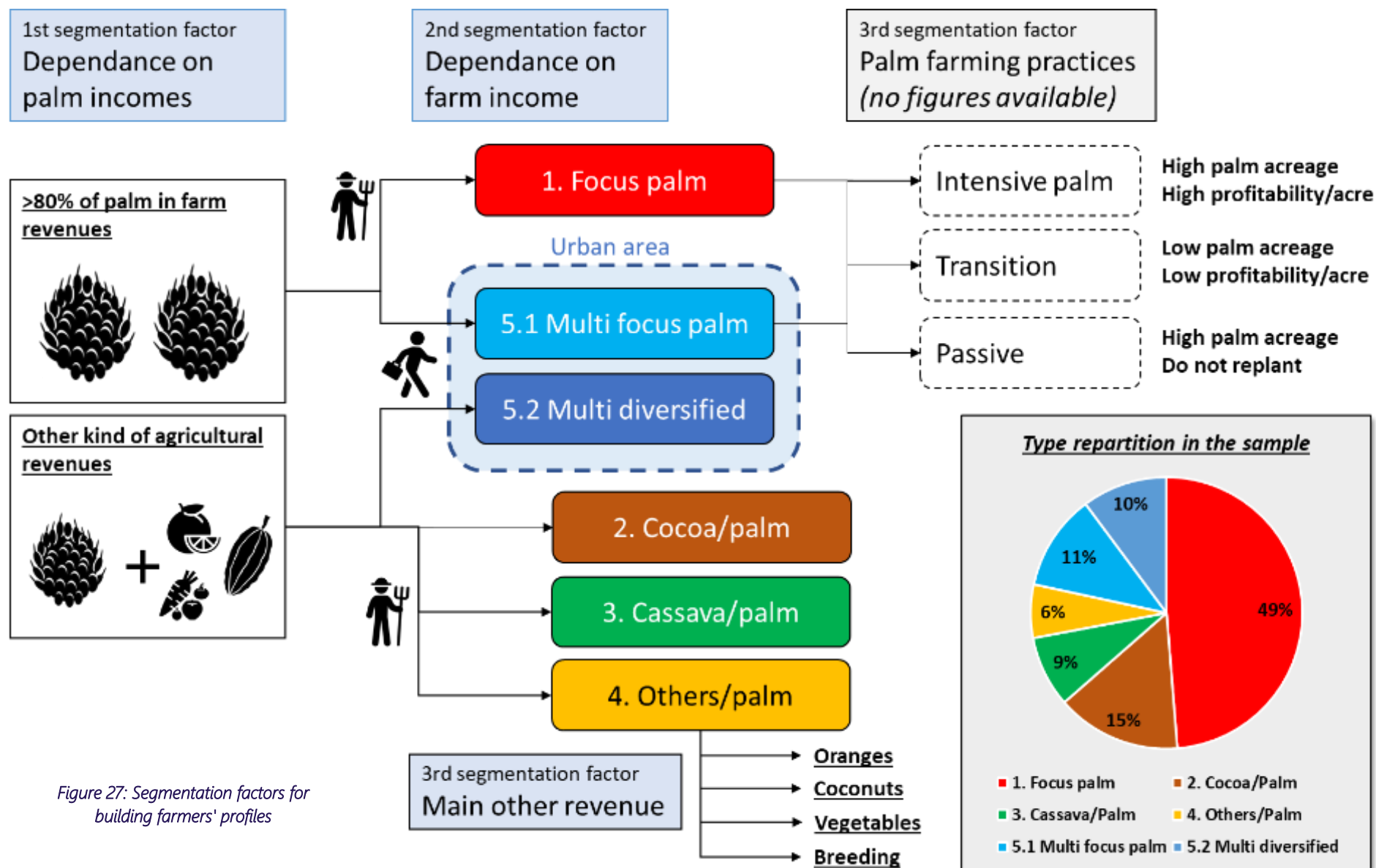


Figure 27: Segmentation factors for building farmers' profiles

4.2. Representation of the types in the zones

Here below are the share of each profile in the general sample, and also in the zones of the study:

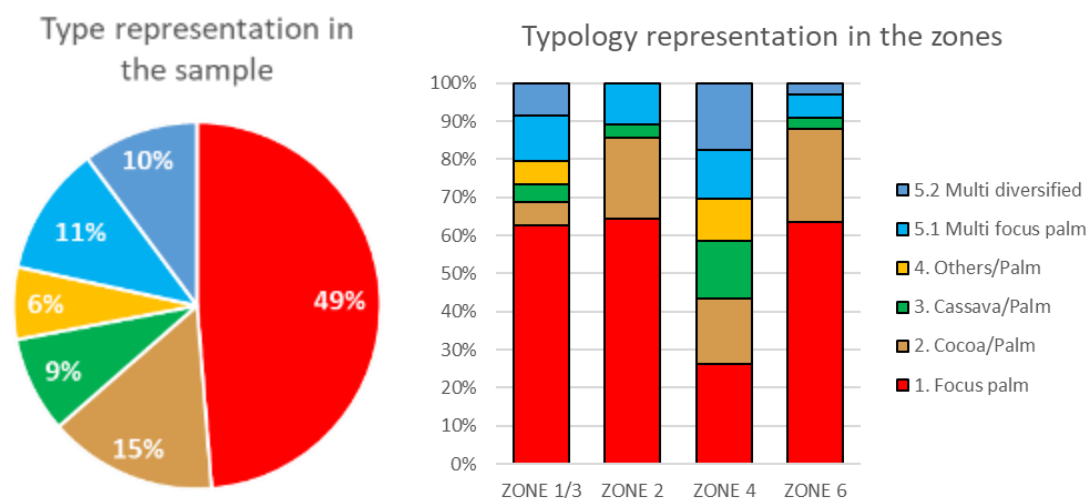


Figure 28: Representation of the farmer types in the general sample (on the left), and in the zones (on the right)

4.3. Description of the farmer types

1. Focus palm

They are farmers who strongly depend on palm for their living as it constitutes more than 80% of their revenues. It is the type the most represented among the studied farmers (49%), however it gathers farmers with a lot of different situations, specifically regarding palm acreage, as can be seen on figure 30.

That is why it would have been optimal to subdivide this type in sub-types according to their palm farming practices such as: palm acreage, palm variety, use of herbicide / fertilizer, practice of replantation.

On this basis several "classic" types could be imagined:

Intensive: Mature palm trees, high acreage, Tenera variety, close to factory, use of inputs...

Transition: Immature or mature palm trees, low-medium acreage, Dura variety, far away from factory, using slashing only twice a year...

Passive: Old and large palm fields, no replantation practices...

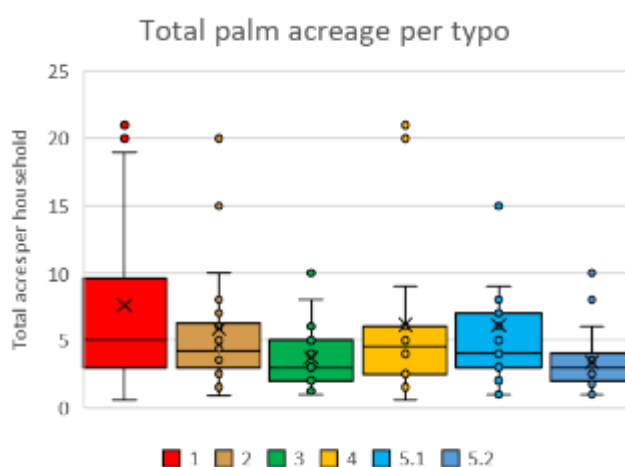


Figure 29: Total palm acreage per farmer type

2. Cocoa/palm

Farmers that complete their palm revenues with cocoa revenues. They have at least 25% of their farm revenues coming from cocoa. They represent 15% of the sample and are mainly located in zone 4, 6 and 2, and some in zone 3. These farmers have generally more land availability (figure 31) and that is why they have chosen to diversify their revenues with a land-intensive strategy. These cashcrops allow them to have slightly more revenues (figure 32). They share these characteristics with farmers from the type 4.

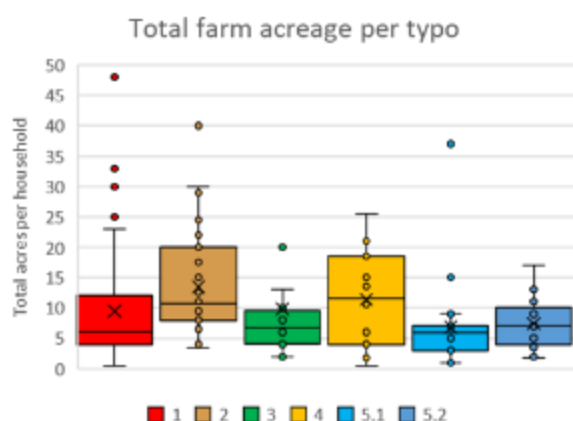


Figure 30: Total farm acreage per farmer type

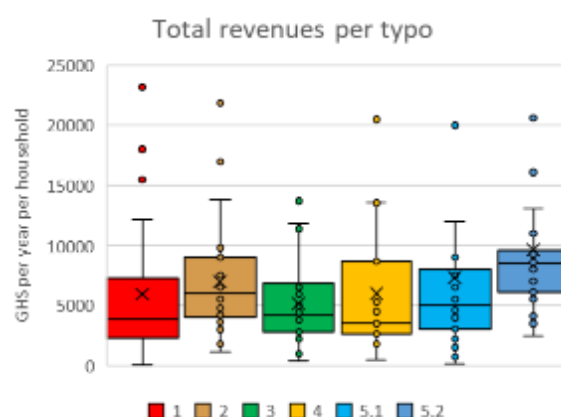


Figure 31: Total revenues per farmer type

3. Cassava/palm

Farmers that complete their palm revenues with cassava revenues. They have at least 25% of their farm revenues coming from cassava. They represent 9% of the sample and are mainly located in zone 4. These farmers seem to have less land availability than the other types since their total acreage is lower (figure 31) and their plots are farther away from their house (figure 33).

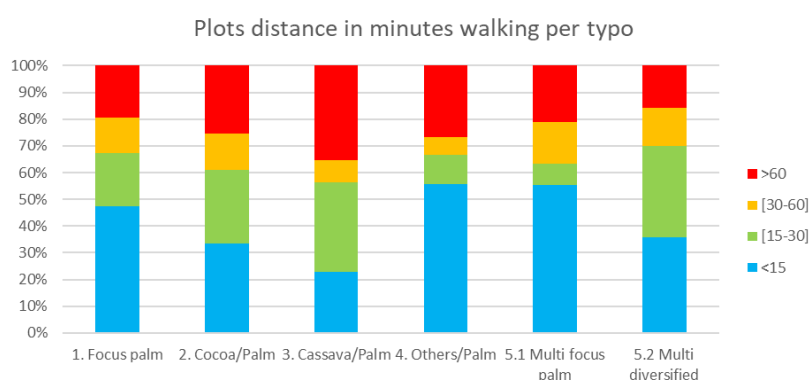


Figure 32: Farmers' plots distance per type

4. Others/palm (oranges, coconuts, vegetables, breeding)

Farmers that complete their palm revenues with other crops. They have at least 25% of their farm revenues that come from another crop than cocoa or cassava. They represent 6% of the sample and are mainly located in zone 4, then in zone 1/3.

These farmers were gathered in a large type but they actually have quite different strategies, and should be sub-divided in several sub-types:

- 4.1 **Orange/palm:** the ones located in zone 4 where citrus are common and there is market access to Accra through Cape Coast. Cashcrop/ land-intensive strategy like type 2.
- 4.2 **Coconut/palm:** under-represented in our sample since they are mainly located in zone 5 where the survey was not conducted. Cashcrop/ land-intensive strategy like type 2.
- 4.3 **Vegetable/palm:** the ones located in zone 3, the horticulture belt of Takoradi. It is a seasonally labor-intensive strategy necessitating little land but requiring a lot of time to it.
- 4.4 **Breeding/palm:** Also under-represented in our sample since farmers did not declare the breeding revenues when they still declare to have animals. This is due to the fact that breeding is not generally practiced as an activity among the studied farmers, but seems to be more related to “financial saving”. Indeed, animals such as goats or pigs are bought when farmer has capital, and then sold when the farmer has a cash necessity. It also has cultural importance since it is a consumed good during various celebrations. It is not a land-intensive strategy, but relatively labor-intensive all over the year. In any case, on figure 26 it can be seen that the farmers declaring a will to extend breeding activities are equally represented in every zone, except zone 2.

5. Multi-activity

These farmers have diversified their revenues with non-farm activities, mostly linked to urban areas but not exclusively (driver, building work, grocery...), as can be seen in figure 34. They are present in zone 4, 2 and 1/3.

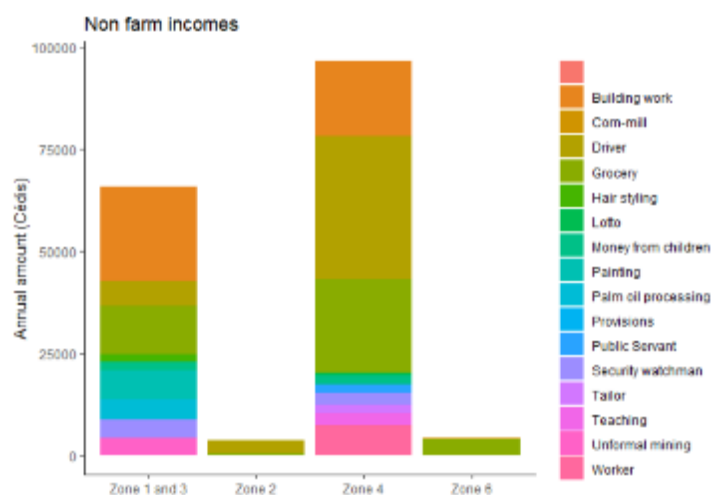


Figure 33: Non-farm incomes activities per zone

Some of these farmers rely more on palm than others, differentiating 2 sub-types:

- 5.1 **Multi-activity focus palm:** More than 80% of their farm revenues come from palm
- 5.2 **Multi-activity diversified:** They have other farm revenues (mainly cocoa)

It is interesting to note that farmers from type 5.1 seem to have the most available people in their household (unoccupied adults under 60 years old), as can be seen in figure 35. That means that they will be more interested in diversifying with labor-intensive activities such as breeding.

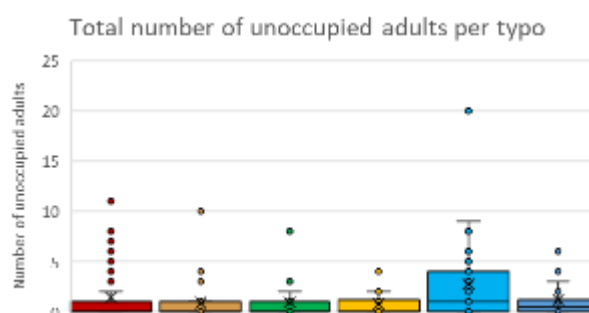


Figure 34: Unoccupied family labor per type

4.4. Summary of the farmers' types characteristics and diversification projects

Here below are the main characteristics of the different farmers' profiles:

Table 7: Summary of the characteristics of the farmers' profiles

	Total incomes	Non-farm incomes	Palm revenues	Cocoa incomes	Other farm incomes	Total farm acreage	Palm acreage	Cocoa acreage	Other crops acreage
1. Focus palm	5 940	58	5 600	69	57	9	8	0	1
2. Cocoa/Palm	6 963	100	3 057	3 205	203	14	6	6	1
3. Cassava/Palm	5 163	25	3 293	-	1 845	10	4	0	2
4. Others/Palm	5 421	223	3 147	295	1 756	11	6	0	4
4.1 Orange/Palm	8 355	-	5 050	739	2 567	10	4	1	4
4.2 Coconut/Palm	9 050	1 250	5 050	-	2 750	23	21	-	2
4.3 Breeding/Palm	4 150	400	2 500	-	1 250	3	2	-	1
4.4 Vegetable/Palm	2 668	-	1 600	-	1 068	12	5	-	6
5.1 Multi focus palm	7 319	4 322	2 997	-	-	7	6	-	0
5.2 Multi diversified	9 848	4 142	2 893	610	2 204	8	3	1	2

	Migrated	Sell directly B-BOVID	Adults per household	Available adults	Acres of available land
1. Focus palm	29%	53%	5	1,44	2,18
2. Cocoa/Palm	29%	61%	5	0,88	2,16
3. Cassava/Palm	30%	58%	6	0,95	1,30
4. Others/Palm	13%	57%	6	0,79	1,30
4.1 Orange/Palm	0%	50%	6	0,80	1,67
4.2 Coconut/Palm	50%	100%	5	0,50	1,25
4.3 Breeding/Palm	0%	100%	7	0,50	0,00
4.4 Vegetable/Palm	20%	25%	5	1,00	1,40
5.1 Multi focus palm	22%	42%	6	2,74	1,31
5.2 Multi diversified	25%	63%	6	1,26	2,33

5 Analysis of work & cash calendars of studied farmers' types to match with diversification options

5.1. Importance of the analysis of farmers' types' calendars

In this part, a modelization in calendars of the fluxes of farmers' workload and cash has been realized to understand and visualize better the situation of the studied farmers. These calendars have been created based on the farmers' types identified and described in the part 5. The data were collected during Nitidae's field mission and taken from the literature⁴.

The farmers studied are not in a situation that encourages diversification. For these reasons, the analysis cannot be based only on a financial aspect with business models, margins and net benefits. The motivations of the farmers are more complex, and based on land occupation strategies (which are already described in part 4), but also on monthly workload repartition, and treasury fluxes.

Indeed, in order to promote relevant diversification options, the approach cannot solely rely on an annual income / financial rentability comparison of production models. The monthly analysis of the repartition of workload and cash fluxes over months will allow to understand which option could provide answers to important farmers issues such as best valuation of available labour time, or bridging gaps of incomes during lean periods.

Each farmer type is summarized below through an "identity card" showing their key characteristics. These identity cards are supplemented with the related workload and cash calendars.

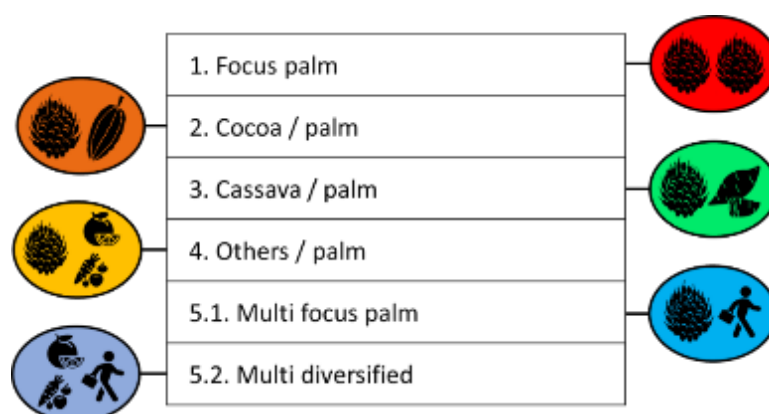


Figure 35: Summary of the farmers' profiles

In the second part, the calendars will be analysed and crossed with the potential diversification options identified in the previous deliverables.

⁴ Agrarian diagnosis of farmers of the Eastern Region of Ghana, Laure Steer, 2003

Devenir des exploitations agricoles face au jaunissement mortel du cocotier, R. Geiger, JC Lhommet, 2005

Agrarian diagnosis of the villages of the Mé Region in Ivory Coast, PRM Project, Nitidae, 2017

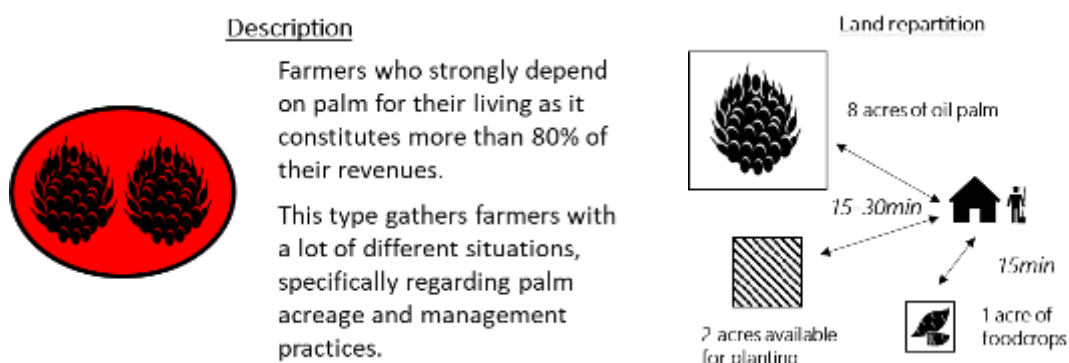
Agrarian diagnosis of the Agboville District of Ivory Coast, Laure Christiansen, 2017

Analyzing the Cost and Returns of Smallholder Farmers: A Case of Asante Akim South in Ghana, E. Neizer and al., 2020

Closing yield gaps in oil palm production systems in Ghana, T. Rhebergen and al., 2020

5.2. Identity cards of farmers' types

5.2.1. Farmer type 1. Focus palm



In this type 1 is gathered many farmers, with varying oil palm farming practices. The main profile is depicted on this identity card, but a more "intensive" profile can be found in annex 2.

Table 8: Detailed farm activities in days of work per month of type 1. Focus palm

Mandays PALM/acre	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL	TOTAL/ha
Weeding		2,0	2,0			1,0	1,5		1,0	1,5			9	23
Pruning											1,0	1,0	2	5
Harvest	0,4	0,5	0,8	0,8	0,8	0,4	0,4	0,3	0,3	0,3	0,3	0,2	5	13
Total work PALM/acre	0,4	2,5	2,8	0,8	0,8	1,4	1,9	0,3	1,3	1,8	1,3	1,2	16	40
Total work PALM (8 ac.)	2,8	19,6	22,0	6,0	6,0	11,2	14,8	2,0	10,0	14,0	10,0	9,6	128	

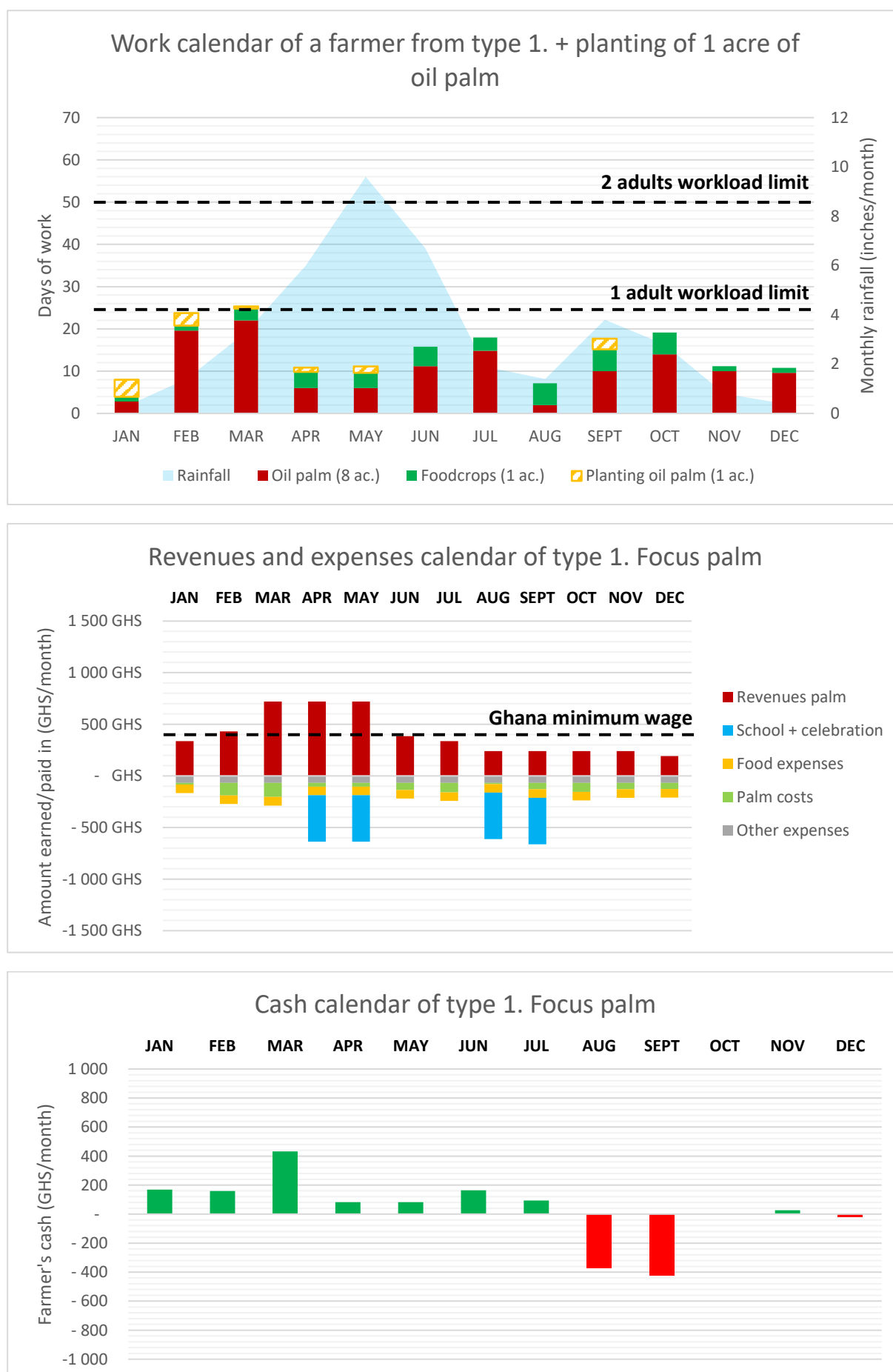
Mandays FOODCROPS/acre	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL	TOTAL/ha
Planting (tubers)					1,6	1,6								
Weeding (tubers)			0,5	0,5										
Harvesting (tubers)	1,2	1,2	2,3	2,3			1,2	1,2	1,2	1,2	1,2	1,2		
Nursery (vegetables)				1,0	2,0								3	8
Transplanting (vegetables)						3,0	2,0						5	13
Harvest (vegetables)								4,0	4,0	4,0			12	30
Total work FOOD/acre	1,2	1,2	2,8	3,8	3,6	4,6	3,2	5,2	5,2	5,2	1,2	1,2	38	96
Total work FOOD (1 ac.)	1,2	1,2	2,8	3,8	3,6	4,6	3,2	5,2	5,2	5,2	1,2	1,2	38	

Mandays PLANTING/acre	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL	TOTAL/ha
Land clearing	4,0	3,0											7	18
Picketing			0,5											
Planting				1,0	1,5								3	6
Weeding									2,5				3	6
Total work NEW PALM/acre	4,0	3,0	0,5	1,0	1,5	0,0	0,0	0,0	2,5	0,0	0,0	0,0	13	31
Total work PALM (1 ac.)	4,0	3,0	0,5	1,0	1,5	0,0	0,0	0,0	2,5	0,0	0,0	0,0	13	

Table 9: Detailed revenues and expenses in GHS per month of type 1. Focus palm

Cash calendar	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Revenues palm	336	432	720	720	720	384	336	240	240	240	240	192	4800
School + celebration				-450	-450			-450	-450				-1800
Food expenses	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-1000
Palm costs	-18	-123	-138	-38	-38	-70	-93	-13	-63	-88	-63	-60	-800
Other expenses	-67	-67	-67	-67	-67	-67	-67	-67	-67	-67	-67	-67	-800
Total cash	169	160	433	83	83	164	94	-373	-423	3	28	-18	400
Total cash accumulated	169	328	761	843	926	1090	1183	811	388	391	418	400	

Figure 36: Work & cash calendars of a farmer from type 1. Focus palm



5.2.2. Farmer type 2. Cocoa / palm

Description



Farmers that complete their palm revenues with cocoa revenues. They have at least 25% of their farm revenues coming from cocoa.

These farmers have generally more land availability and that is why they have chosen to diversify their revenues with a land-intensive strategy.

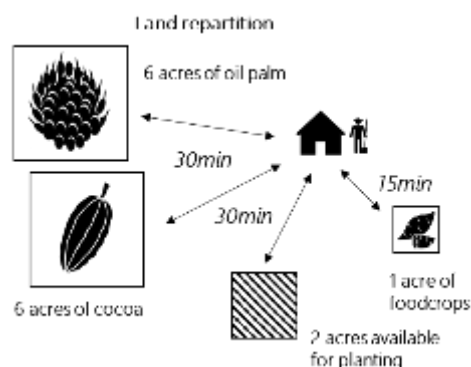


Table 10: Detailed farm activities in days of work per month of type 2. Cocoa / palm

Mandays PALM/acre	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL	TOTAL/ha
Weeding		3,0						3,0					6	15
Pruning											1,0	1,0	2	5
Harvest	0,4	0,5	0,8	0,8	0,8	0,4	0,4	0,3	0,3	0,3	0,3	0,2	5	13
Total work PALM/acre	0,4	3,5	0,8	0,8	0,8	0,4	0,4	3,3	0,3	0,3	1,3	1,2	13	33
Total work PALM (6 ac.)	2,1	20,7	4,5	4,5	4,5	2,4	2,1	19,5	1,5	1,5	7,5	7,2	78	

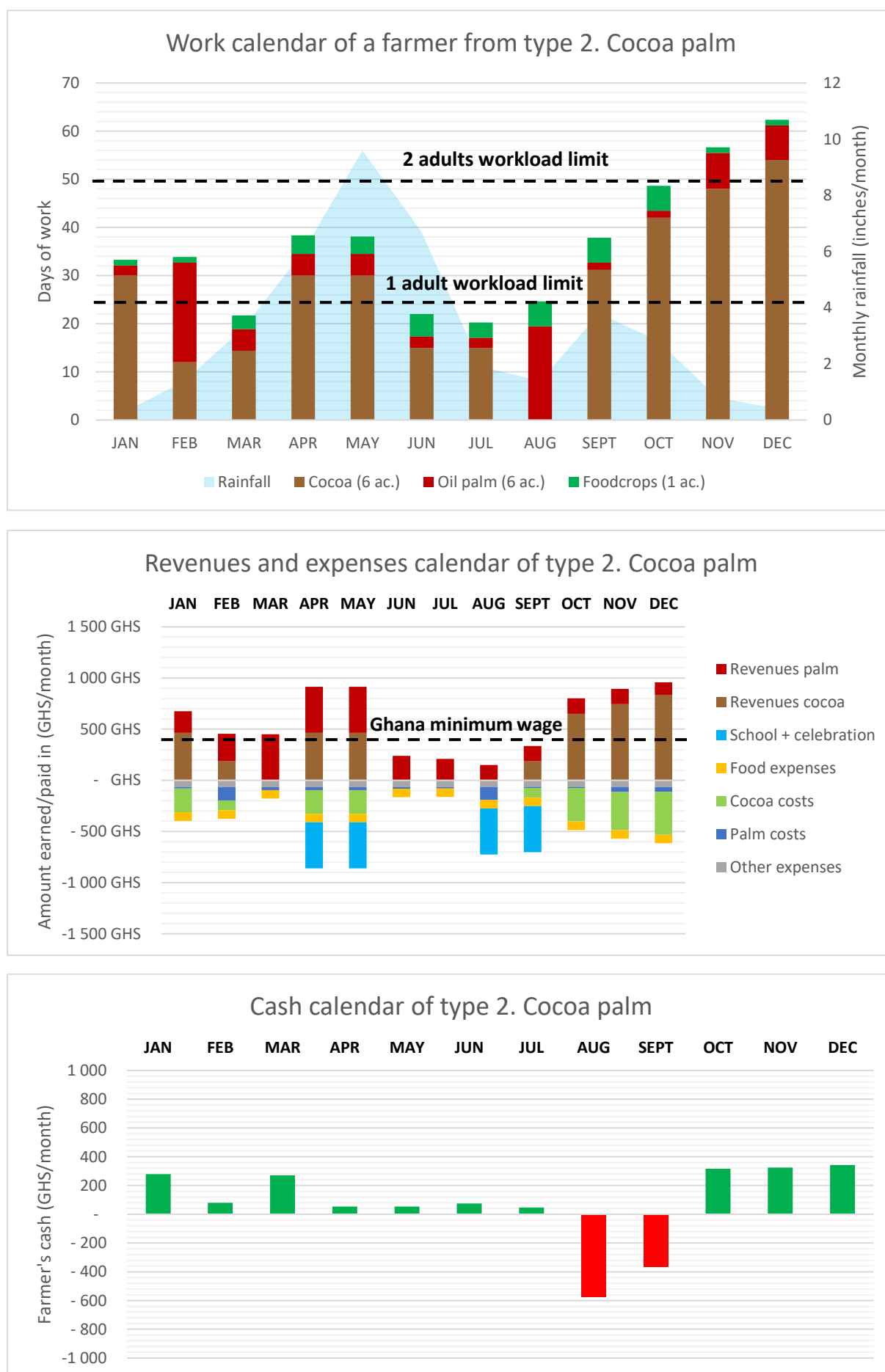
Mandays COCOA/acre	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL	TOTAL/ha
Weeding			2			2	2		3				10	24
Insecticide spraying						0,5	0,5						1	3
Harvest & pod split & dry	5	2		5	5				2	7	8	9	43	108
Total work COCOA/acre	5	2	2	5	5	3	3	0	5	7	8	9	54	134
Total work COCOA (6 ac.)	30	12	14	30	30	15	15	0	31	42	48	54	322	

Mandays FOODCROPS/acre	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL	TOTAL/ha
Planting (tubers)					1,6	1,6								
Weeding (tubers)			0,5	0,5										
Harvesting (tubers)	1,2	1,2	2,3	2,3			1,2	1,2	1,2	1,2	1,2	1,2		
Nursery (vegetables)				1,0	2,0								3	8
Transplanting (vegetables)						3,0	2,0						5	13
Harvest (vegetables)								4,0	4,0	4,0			12	30
Total work FOOD/acre	1	1	3	4	4	5	3	5	5	5	1	1	38	96
Total work FOOD (1 ac.)	1	1	3	4	4	5	3	5	5	5	1	1	38	

Table 11: Detailed revenues and expenses in GHS per month of type 2. Cocoa / palm

Cash calendar	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Revenues palm	210	270	450	450	450	240	210	150	150	150	150	120	3000
Revenues cocoa	465	186	0	465	465	0	0	0	186	651	744	837	4000
School + celebration				-450	-450				-450	-450			-1800
Food expenses	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-1000
Cocoa costs	-233	-93	0	-233	-233	0	0	0	-93	-326	-372	-419	-2000
Palm costs	-13	-133	-29	-29	-29	-15	-13	-125	-10	-10	-48	-46	-500
Other expenses	-67	-67	-67	-67	-67	-67	-67	-67	-67	-67	-67	-67	-800
Total cash	279	80	271	54	54	75	47	-575	-367	316	324	342	900
Total cash accumulated	279	359	631	684	738	813	859	284	-82	234	558	900	

Figure 37: Work & cash calendars of a farmer from type 2. Cocoa palm



5.2.3. Farmer type 3. Cassava / palm

Description

Farmers that complete their palm revenues with cassava revenues. They have at least 25% of their farm revenues coming from cassava.

These farmers seem to have less land availability than the other types since their plots are smaller and are farther away from their house.

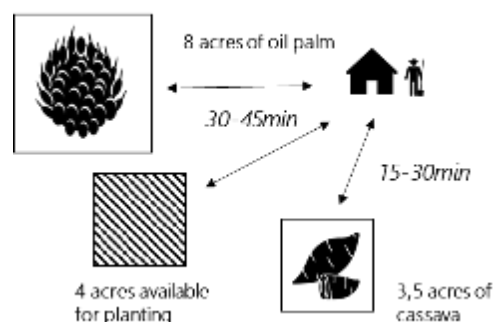
Land repartition

Table 12: Detailed farm activities in days of work per month of type 3. Cassava / palm

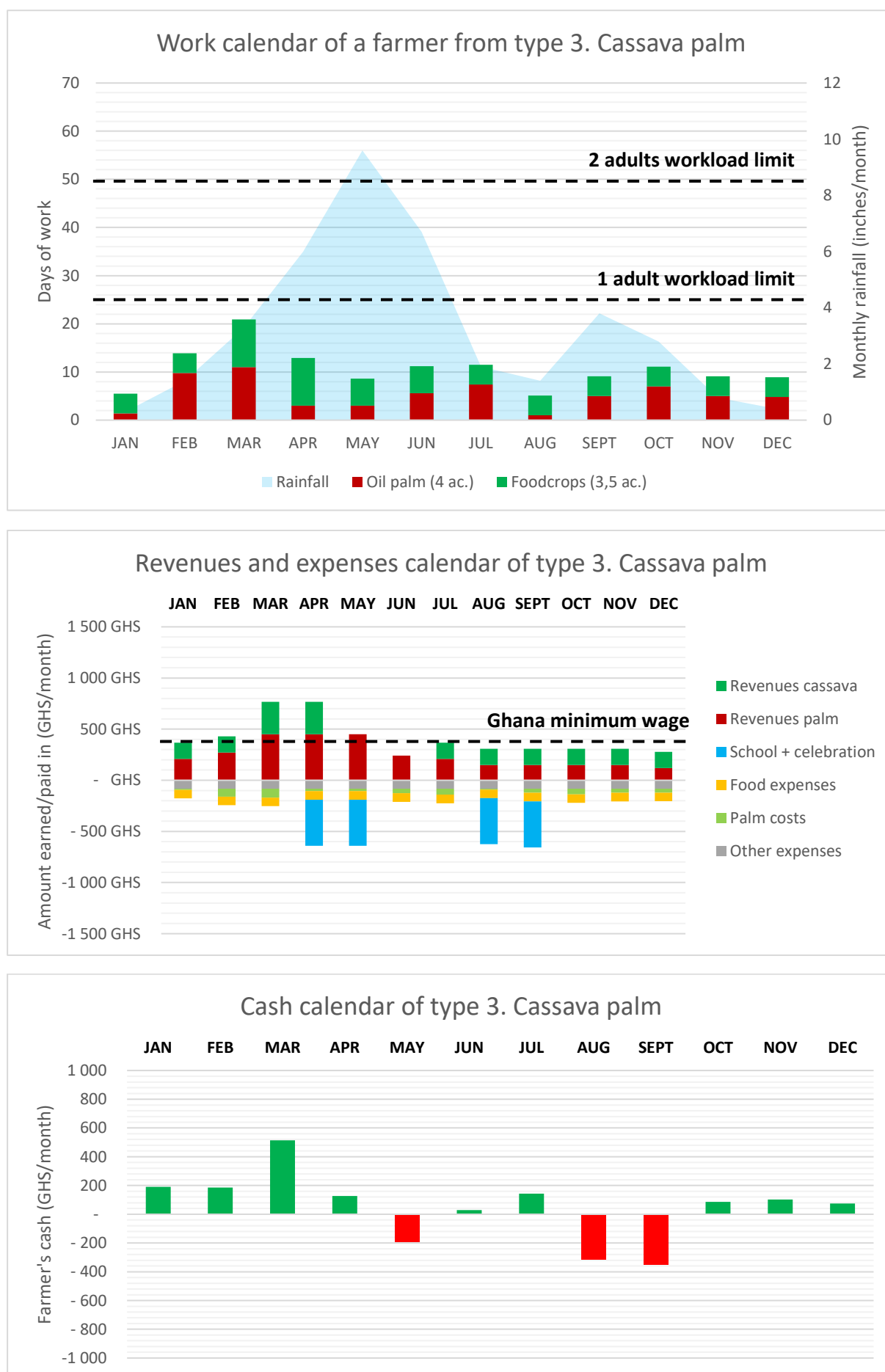
Mandays PALM/acre	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL	TOTAL/ha
Weeding		2,0	2,0			1,0	1,5		1,0	1,5			9	23
Pruning											1,0	1,0	2	5
Harvest	0,4	0,5	0,8	0,8	0,8	0,4	0,4	0,3	0,3	0,3	0,3	0,2	5	13
Total work PALM/acre	0,4	2,5	2,8	0,8	0,8	1,4	1,9	0,3	1,3	1,8	1,3	1,2	16	40
Total work PALM (4 ac.)	1,4	9,8	11,0	3,0	3,0	5,6	7,4	1,0	5,0	7,0	5,0	4,8	64	

Mandays CASSAVA/acre	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL	TOTAL/ha
Planting					1,6	1,6							3	8
Weeding			0,5	0,5									1	3
Harvesting	1,2	1,2	2,3	2,3			1,2	1,2	1,2	1,2	1,2	1,2	14	35
Total work CASSAVA/acre	1	1	3	3	2	2	1	1	1	1	1	1	18	46
Total work CASSAVA (3,5 ac.)	4	4	10	10	6	6	4	4	4	4	4	4	64	

Table 13: Detailed revenues and expenses in GHS per month of type 3. Cassava / palm

Cash calendar	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Revenues palm	210	270	450	450	450	240	210	150	150	150	150	120	3000
Revenues cassava	158	158	317	317	0	0	158	158	158	158	158	158	1900
School + celebration				-450	-450			-450	-450				-1800
Food expenses	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-1000
Palm costs	-11	-77	-86	-23	-23	-44	-58	-8	-39	-55	-39	-38	-500
Other expenses	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-1000
Total cash	191	185	514	127	-190	30	144	-316	-347	87	103	74	600
Total cash accumulated	191	376	890	1016	826	856	1000	684	336	423	526	600	

Figure 38: Work & cash calendars of a farmer from type 3. Cassava palm



5.2.4. Farmer type 4. Others / palm

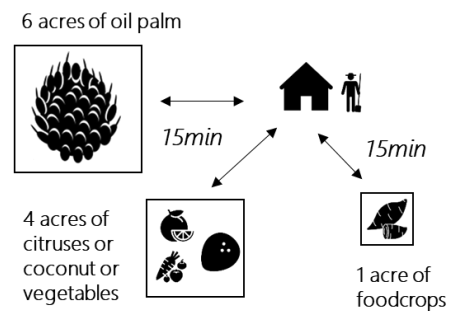
Description



Farmers that complete their palm revenues with other crops. They have at least 25% of their farm revenues that come from another crop than cocoa or cassava.

These farmers were gathered in a large type but they actually have quite different strategies, and should be sub-divided in several sub-types:

Land repartition



- **4.1 Orange/palm:** the ones located in zone 4 where citrus are common and there is market access to Accra through Cape Coast. Cashcrop/ land-intensive strategy like type 2.
- **4.2 Coconut/palm:** they are mainly located in zone 5. Cashcrop/ land-intensive strategy like type 2.
- **4.3 Vegetable/palm:** the ones located in zone 3, the horticulture belt of Takoradi. It is a seasonally labor-intensive strategy necessitating little land but requiring a lot of time to it.
- **4.4 Breeding/palm:** Farmers who own animals. Farmers declaring a will to extend breeding activities are equally represented in every zone, except zone 2.

Work and cash calendars are specially complicated to produce for this type since it gathers a large variability of strategies and practices.

5.2.5. Farmer type 5.1. Multi focus palm

Description

These farmers have diversified their revenues with non-farm activities, mostly linked to urban areas but not exclusively (driver, building work, grocery...). They are present in zone 4, 2 and 1/3.

More than 80% of their farm revenues come from palm

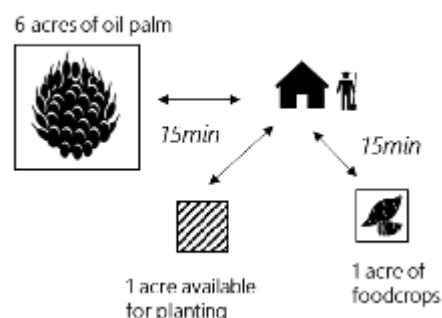
Land repartition

Table 14: Detailed farm activities in days of work per month of type 5.1. Multi focus palm

Mandays PALM/acre	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL	TOTAL/ha
Weeding		2,0	2,0			1,0	1,5		1,0	1,5			9	23
Pruning											1,0	1,0	2	5
Harvest	0,4	0,5	0,8	0,8	0,8	0,4	0,4	0,3	0,3	0,3	0,3	0,2	5	13
Total work PALM/acre	0,4	2,5	2,8	0,8	0,8	1,4	1,9	0,3	1,3	1,8	1,3	1,2	16	40
Total work PALM (6 ac.)	2,1	14,7	16,5	4,5	4,5	8,4	11,1	1,5	7,5	10,5	7,5	7,2	96	

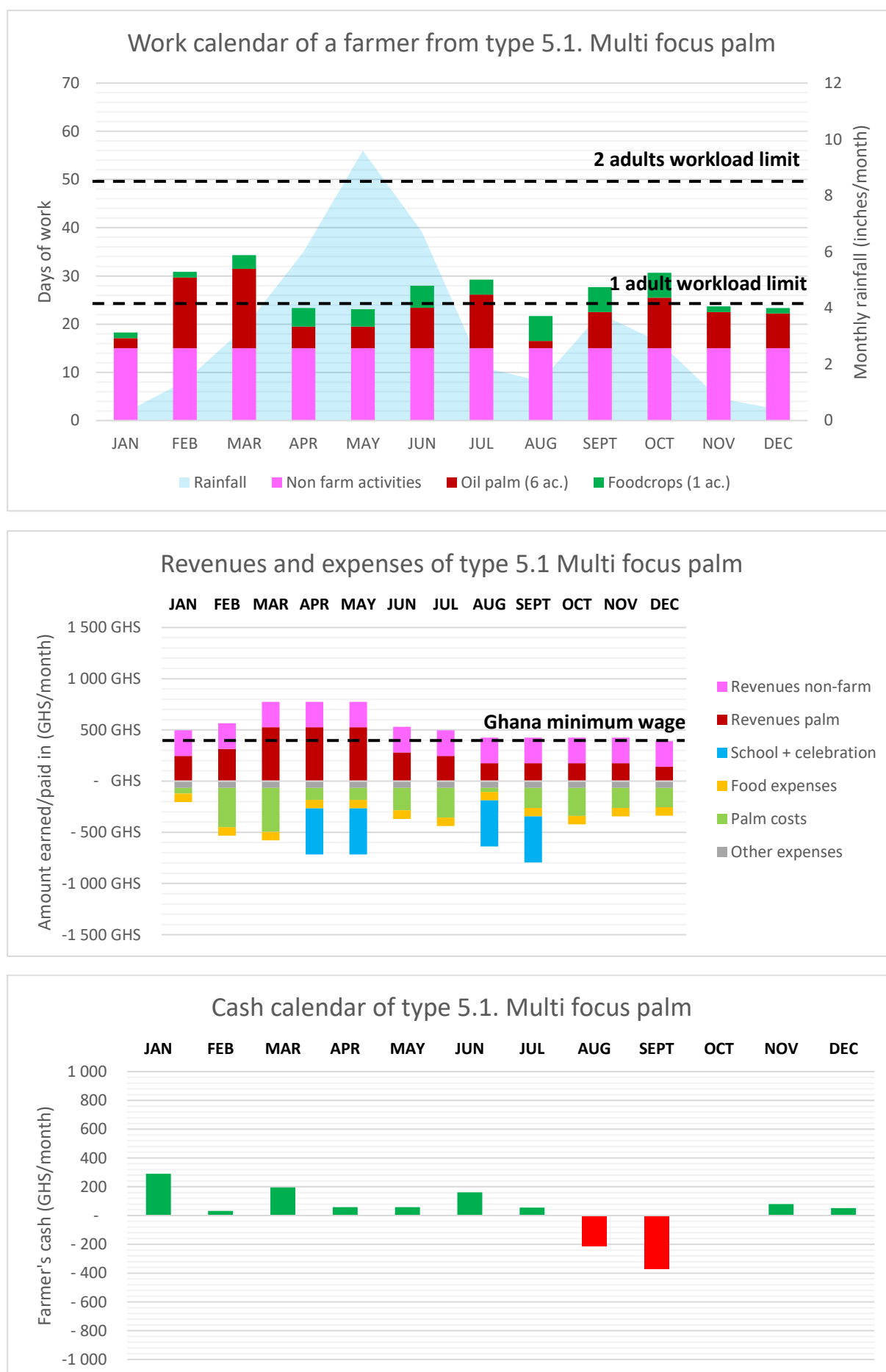
Mandays FOODCROPS/acre	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL	TOTAL/ha
Planting (tubers)					1,6	1,6								
Weeding (tubers)			0,5	0,5										
Harvesting (tubers)	1,2	1,2	2,3	2,3			1,2	1,2	1,2	1,2	1,2	1,2		
Nursery (vegetables)				1,0	2,0								3	8
Transplanting (vegetables)						3,0	2,0						5	13
Harvest (vegetables)								4,0	4,0	4,0			12	30
Total work FOOD/acre	1	1	3	4	4	5	3	5	5	5	1	1	38	96
Total work FOOD (1 ac.)	1	1	3	4	4	5	3	5	5	5	1	1	38	

NON FARM ACTIVITIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Part-time job	15	15	15	15	15	15	15	15	15	15	15	15	180

Table 15: Detailed revenues and expenses in GHS per month of type 5.1. Multi focus palm

Cash calendar	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Revenues palm	245	315	525	525	525	280	245	175	175	175	175	140	3500
Revenues non-farm	250	250	250	250	250	250	250	250	250	250	250	250	3000
School + celebration				-450	-450			-450	-450				-1800
Food expenses	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-1000
Palm costs	-55	-383	-430	-117	-117	-219	-289	-39	-195	-273	-195	-188	-2500
Other expenses	-67	-67	-67	-67	-67	-67	-67	-67	-67	-67	-67	-67	-800
Total cash	290	32	195	58	58	161	56	-214	-370	2	80	53	400
Total cash accumulated	290	323	518	576	633	795	851	637	266	268	348	400	

Figure 39: Work & cash calendars of a farmer from type 5.1. Multi focus palm



5.2.6. Farmer type 5.2. Multi diversified

Description



These farmers have diversified their revenues with non-farm activities, mostly linked to urban areas but not exclusively (driver, building work, grocery...). They are present in zone 4, 2 and 1/3.

They have other farm revenues (mainly cocoa).

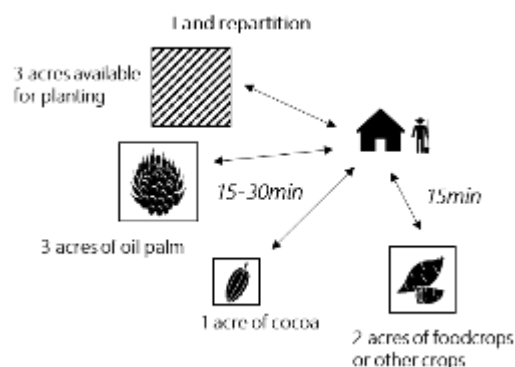


Table 16: Detailed farm activities in days of work per month of type 5.2. Multi diversified

Mandays PALM/acre	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL	TOTAL/ha
Weeding		2,0											2	5
Spraying herbicides				1,0				1,0						
Pruning											1,0	1,0	2	5
Harvest	0,6	0,8	1,3	1,3	1,3	0,7	0,6	0,4	0,4	0,4	0,4	0,3	8	21
Total work PALM/acre	1	3	1	2	1	1	1	1	0	0	1	1	14	36
Total work PALM (3 ac.)	2	8	4	7	4	2	2	4	1	1	4	4	43	

Mandays COCOA/acre	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL	TOTAL/ha
Weeding			2			2	2		3				10	24
Insecticide spraying						0,5	0,5						1	3
Harvest & pod split & dry	5	2		5	5				2	7	8	9	43	108
Total work COCOA/acre	5	2	2	5	5	3	3	0	5	7	8	9	54	134
Total work COCOA (1 ac.)	5	2	2	5	5	3	3	0	5	7	8	9	54	

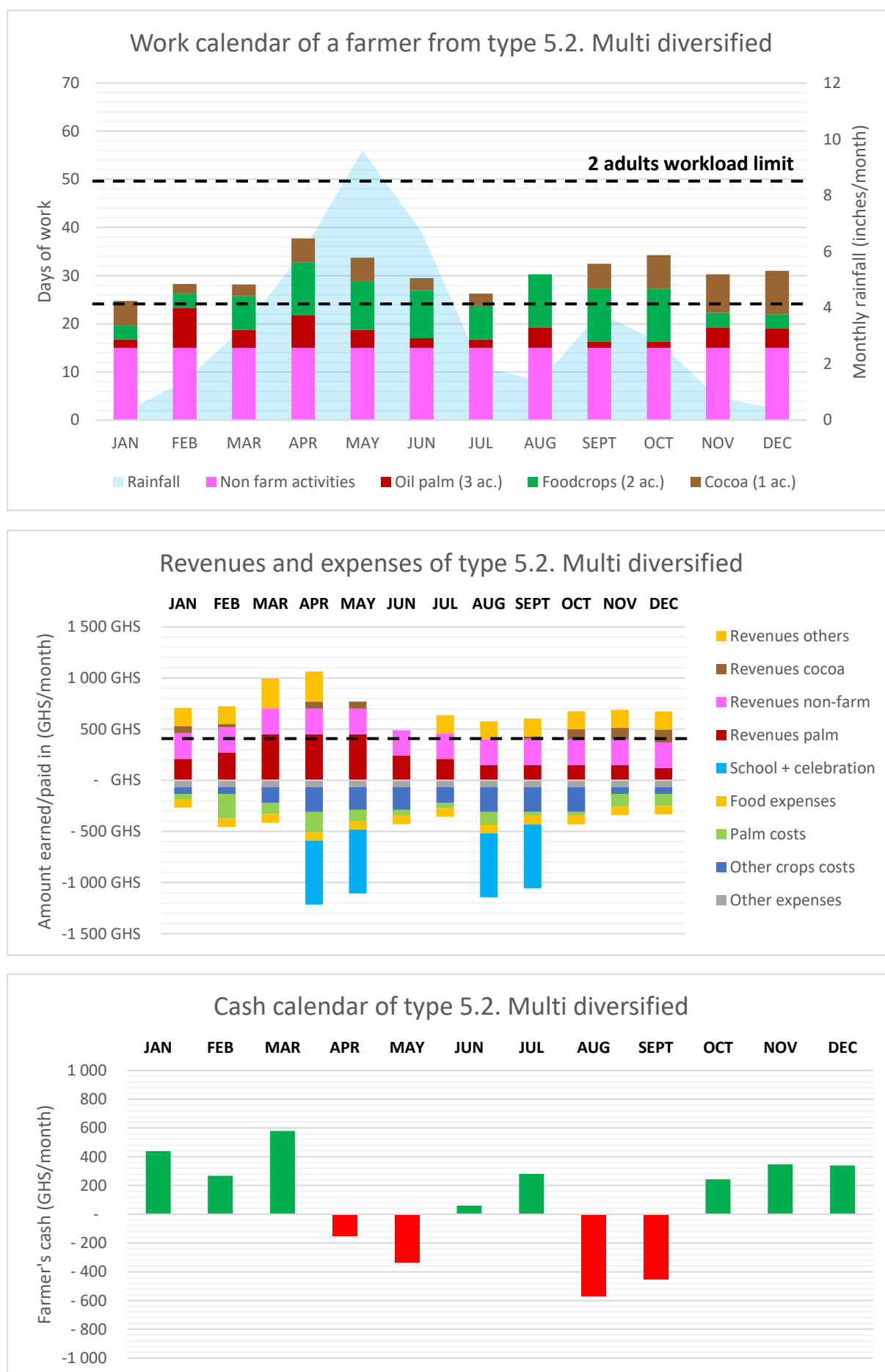
Mandays FOODCROPS/acre	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL	TOTAL/ha
Planting (tubers)					2,0	2,0							4	
Weeding (tubers)			1,0	1,0									2	
Harvesting (tubers)	1,5	1,5	2,5	2,5			1,5	1,5	1,5	1,5	1,5	1,5	17	
Nursery (vegetables)				2,0	3,0								5	13
Transplanting (vegetables)						3,0	2,0						5	13
Harvest (vegetables)								4,0	4,0	4,0			12	30
Total work FOOD/acre	2	2	4	6	5	5	4	6	6	6	2	2	45	113
Total work FOOD (2 ac.)	3	3	7	11	10	10	7	11	11	11	3	3	90	

NON FARM ACTIVITIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Part-time job	15	15	15	15	15	15	15	15	15	15	15	15	180

Table 17: Detailed revenues and expenses in GHS per month of type 5.2. Multi diversified

Cash calendar	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Revenues palm	210	270	450	450	450	240	210	150	150	150	150	120	3000
Revenues cocoa	70	28	0	70	70	0	0	0	28	98	112	126	600
Revenues others	176	176	294	294	0	0	176	176	176	176	176	176	2000
Revenues non-farm	250	250	250	250	250	250	250	250	250	250	250	250	3000
School + celebration				-625	-625			-625	-625				-2500
Food expenses	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-83	-1000
Palm costs	-51	-240	-109	-196	-109	-58	-51	-124	-36	-36	-124	-116	-1250
Other crops costs	-67	-67	-156	-244	-222	-222	-156	-244	-244	-244	-67	-67	-2000
Other expenses	-67	-67	-67	-67	-67	-67	-67	-67	-67	-67	-67	-67	-800
Total cash	439	268	580	-152	-336	60	280	-567	-451	243	348	339	1050
Total cash accumulated	439	707	1286	1134	798	858	1138	571	120	363	711	1050	

Figure 40: Work & cash calendars of a farmer from type 5.2. Multi diversified



5.3. Analysis of the work and cash calendars

In order to assess if a given diversification option has a high probability of being adopted, it needs to answer two main preoccupations of the farmers:

- Fit with the work peaks and valleys of the farmers
- Provide revenues during lean/hunger season

In terms of work seasonality, the calendars show that the farmers don't have intense seasonal peaks, especially types 1, 3, and 4. Indeed, oil palm farming do not require a lot of days of work from the part of the farmer (only 16 days in total per acre per year), and this work is spread all year long, even if harvest is more intense during peak season (March, April, May). Only the weeding activities create a surplus of workload, that fulfil the work capacity of one adult for 8 acres of oil palm. This explains why most of the studied farmers seem to keep only 8 acres of oil palm and would not expend.

The work calendar of the farmers from type 2 is however very influenced by cocoa, which is very seasonal in terms of peaks of works, especially during the big harvest (October to January). Farmers from types 5.1 and 5.2 are also already well occupied with their non-farm activities, leaving not much time for new activities.

- For these reasons, activities that entail balanced workloads over the year such as rubber, cassava, animal husbandry and artisanal processing would fit better. Especially for women or young people that would not be prone to engage in weeding of oil palm fields.

On the other hand, cash calendars show that there are 2 periods of important expenses which are April/May (probably related to celebrations) and August/September (school fees and celebrations). The first period is mitigated by the revenues from the peak season of palm; however, the end of the year is a hunger period for oil palm farmers.

That is why some farmers with land reserve chose cocoa (these are the ones from type 2) since this crop allows to earn the most revenues at the end of the year, completing well the palm revenues. However, as explained in the previous deliverables, farmers from the other types lack of land reserve, and would in any case rather use it to plant palm.

- Hence, activities that do not require land and would generate revenues during these periods of expenses would be relevant for the studied farmers. This is particularly the case with animal husbandry since demand for meat is very high during celebrations (mainly Christian's ones in this part of Ghana: Easter, Christmas, New Year's Eve...)

A compared analysis of the labour peak per crop is put in annex 1. According to these work calendars, maize appears to fit well with oil palm calendar. Indeed, the peak activities occur at sowing (February – May) and harvesting (July – September), and can be adapted to the oil palm activities.

- Therefore, the production of feed by the farmers themselves seems to be compatible with their current farm system.

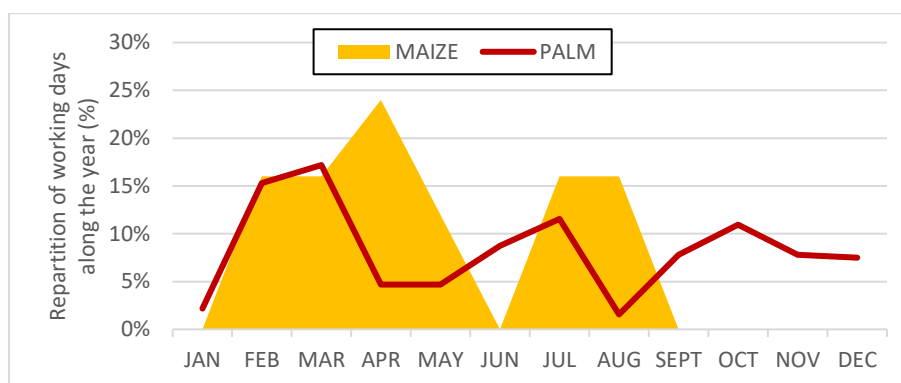


Figure 41: Compared workload calendar Maize vs Palm

Another reflexion from the analysis of the cash calendar would be that the farmers from type 1 and 3 seem to have few accumulated cash at the end of the year. This means that there is quasi no possibility of saving or investment in extension of an activity or a new activity. This may also explain the threshold of 8 acres of oil palm planted per farmer.

Indeed, with a cost of 6 (subsidized by the oil company) to 15 GHS per seedling of oil palm, this would mean an upfront investment of 360 to 900 GHS per acre (60 oil palm trees planted), to be made in January, when there is no money left.

Apart from diversification options, any solution provided by an oil company that could help the farmers in his cash-scarce period would be very well-received and, therefore could improve loyalty of the suppliers. For example, a mechanism of “quality bonus” delivered in August. This is used in several other value chains such as cocoa or cashew.

6_ Value chain analysis of the main diversification options

6.1. Purpose of the value chain analysis for a diversification assessment

This part focusses on the analysis of the value chains and more specifically on the market outlets of the various products which could be considered for a Diversification Program adapted to the studied farmers.

The methodology consisted in 1) a first global analysis of international and regional markets through the analysis of trade data to assess the prospects of the main export value chains; 2) a qualitative study based on interviews with key stakeholders such as public institutions, NGOs and private companies; and 3) Focus Group discussions with farmers in order to identify key bottlenecks.

6.2. Perennial cash crops

6.2.1. Coconut

There are two market opportunities associated with coconuts: dry coconuts for copra or virgin oil, fresh coconuts for direct consumption or coconut water and/or fresh cuts. For both of these products, demand in national market is high but varies in function of the season.

The price varies also along the season (with higher prices during the dry season) but remains good all over the year. The price shot up to 85-110 GHS for 100 mature coconuts in 2020 because of a

strong competition (Nigerians and Americans are buying the copra for processing). In a highly competitive market, farmer's loyalty to the buyer is a challenge. Farmers must be provided with a constant ready market, prompt payment, fair prices, and support (technical trainings and inputs such as seedlings, manure) to secure supply.

The Cape Saint Paul Wilt Disease has drastically reduced the once-common coconut crops around Takoradi (Ahanta West, Shama Districts). In this area, coconut farms have been converted to other crops. Some coconut trees remain in mix cropping, and some big coconut farms can be found, but the farmers are dedicated to coconut farming (not oil palm). Coconut farms are now concentrated in Zone 5 (Jomoro and Ellembelle Districts), which is far from the palm mills hub in Takoradi.

The new variety Sri Lankan Green Dwarf crossed Vanuatu Tall (SGD X VTT) is resistant to the Yellowing Disease (85% survival rate after planting) and quicker to produce (3 to 4 years). However, it requires a more intensive management: good soil, fertilizer application, a regular manual weeding or herbicide. Unlike the local African tall variety, this variety is sensitive to fire, hence slash and burn cannot be practiced. Therefore, in order to benefit from coconut farming, farmers need to invest more time, and they need capacity building to implement good practices.

Coconut sector benefits from a good support from the government and a good institute. The Ministry of Food and Agriculture (MoFA) of Western Region has a nursery with a target of 27'000 seedlings with CSIR (Council for Scientific and Industrial Research) at a subsidised price of 12 GHS/seedling. They produce the seedlings from the parent material unlike the private sellers who produce material from second generation which is less reliable.

GKV investment (Ava coconut oil brand), met during the field mission, has confirmed its interest in a co-designed support program for palm oil companies outgrowers:

GKV investments ([website](#))

Contact: Kojo Nunoo, Director (nunoo.kojo@avacoconutoil.com)

Product: Coconut oil, Ava brand. They want to produce organic oil (short term target of 40%, long term 80%). For now, they sell only locally, but they want to export.

Location: 20 minutes east of Takoradi

Production capacity: They are currently producing 4-5MT of oil per month but their full capacity has increased to 30MT/month.

GKV gets its supply from 600 farmers, but they will need more farmers to supply their forecasted increase in production. Most of their farmers are focused on coconuts, only some have a bit of oil palm. GKV sources within a 2-hour drive radius of their processing facility (Mankessim, Tarkwa, Axim), but also as far as Half Assini (3h) in the Jomoro District, which means that the studied farmers are located in the sourcing area of GKV.

GKV has partnered with the Hortifresh project (Dutch funding implemented by SNV and Wageningen university) to pilot a support package with 50 farmers: creation of a farmer group with signed MoU, trainings, 100 free improved variety seedlings per farmer and subsidised seedlings at 10 GHS.

Conclusion: Coconut seems a solid market with good outcasts. Also, the presence of a possible partner such as GKV could increase the success rate of a diversification strategy oriented towards

coconuts. Indeed, they could off-take production and also provide seedlings and trainings. However, coconut farming requires a lot of land and the new resistant variety needs an intensive maintenance. Hence, as all of the cashcrops, it should be farmed by specialized producers which strategy is mainly focused on coconut. It may be complicated for the palm oil farmers to enter this activity since most of them are experiencing contexts of lack of land available, unavailability of manpower or high costs of labour.

Taking in account these limitations, only farmers that are already farming coconuts could be supported, such as farmers from type 4.2 Coconut/palm. For these farmers, support measures could be easy to design, and undertaken by partners such as GKV: resistant seedling distribution, off-taking agreement with buyer GKV.

6.2.2. Cocoa

Cocoa market is experiencing a steady growth at mid and long term fueled mainly by two phenomena: i) increase of the consumption of chocolate and chocolate products in emerging countries where demand was limited until the 2010s; ii) increase of consumption of cocoa per capita in developed countries due to the quality upgrading of the chocolate products: consumers are more inclined to buy dark chocolates with higher cocoa contents.

At the same time cocoa supply is also growing in response to this consumption increase. So far, no country seems to challenge the overwhelming leadership of Ivory Coast which benefits from low production costs, an efficient policy of price stabilization and several layers of economy of scale due to its high "specialization" in this sector. Even if cocoa prices fell in 2017 due to the strong increase of Ivorian cocoa production, they still remain higher than the lowest prices experienced in the 90s or the beginning of the 2000s.

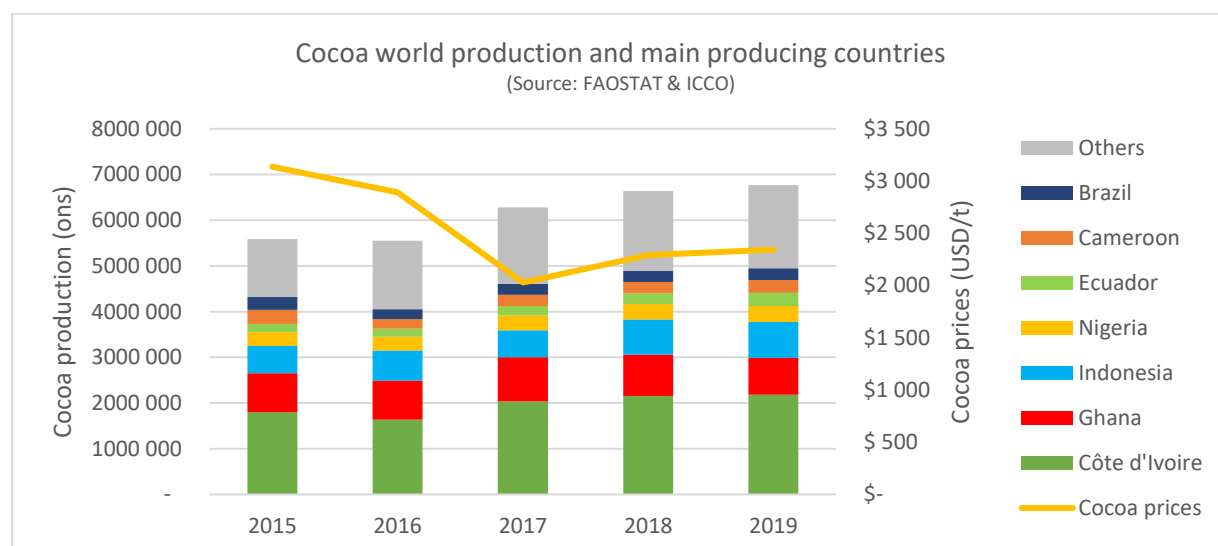


Figure 42: Cocoa world production and main producing countries

Ghana benefits also from the same advantages as Ivory Coast; however, its immigration policy limited the development of the cocoa sector in the past, leaving Ivory Coast with an overwhelming advance which led to its undisputed leadership. Overall, cocoa remains a strong sector in Ghana agriculture, well structured around the government agency COCOBOD and a solid option for farmers. However, cocoa already benefits from an extensive set of support programs. Indeed, every

chocolate company, or trading company have specific programs to support their supplying farmers, which are completed by a strong attention from NGOs and institutions such as the EU.

Conclusion: Even though cocoa is a solid diversification strategy for oil palm farmers in terms of market and value chain, and even though a significant part of the studied farmers show interest in being supported with cocoa (especially farmers from type 2. Cocoa/palm), this option does not seem fitted for a diversification program. Indeed, based on the concept of non-additionality, such a program should be dedicated to support diversification options that would benefit from it with leverage. Implementing support activities focused on cocoa may not only overlap with already existing support programs, but require also specialized expertise, and should be left to cocoa-dedicated structures.

Nonetheless, if this option is to be chosen, an interesting axis to work on would be organic certification. Very little cocoa supply from Ghana is organic, and value addition can be high, especially for smallholders with little lands planted.

6.2.3. Rubber

Rubber covers large portions of the Western Region, especially in the west of Zone 1 and in Zone 5. GREL is the main and quasi exclusive rubber company in Ghana and the main outlet for rubber farmers. It can be said that the rubber sector was implemented and is currently mainly represented by GREL in Ghana.

Another company, Rubber Plantation Ghana Limited (RPGL), owns 1'600 ha and works with more than 1'000 farmers cultivating rubber on 2'000 hectares. Another big company, Ghana Oil Palm Development Company (GOPDC) is investing in an industrial rubber plantation but few information is available on it.

Ghana Rubber Estates Limited - GREL ([website](#))

Contact: Simon Tetteh, Head of the Rubber Outgrower Unit (simon@grelgh.com) and Elliott Ledru, production manager (Eledru@grelgh.com)

Product: Rubber

Location: Aguna, 45-minute drive west of Takoradi

Production capacity: 150'000 MT/year (includes the new factory). The rubber comes at 70-80% from the outgrowers and 20-30% from GREL plantations (approx. 12'000 ha in various locations). The processing capacity is higher than the production for now.

GREL participated in a long-term outgrower support program⁵ (1995 – 2020) with funding from kfW and AFD which enabled to plant 50'000 ha of rubber on small-holders' farms. The program has stopped, but GREL is still interested to increase the number of outgrowers.

⁵ The program supported farmers to access a loan of approx. 6500 euros (including interest rate at 20%) covering the cost of land acquisition, land preparation, maintenance, inputs, etc. for 4 ha during the 6-7 years before the start of production (rubber produces for 30 years). The farmer reimburses the loan through his/her sales to GREL (25% of the proceeds are deducted during approx. 6 years). It worked well in the first phases with 90% of the loans reimbursed. However, since 2016, some foreign companies started purchasing raw rubber and farmers tend to sell to them rather than to GREL to avoid the 25% deduction.

They are currently working with 10'000 farmers, with 35 extension officers that are visiting the farms 4 times a year at no cost.

GREL provides loans to loyal farmers. New farmers can also get a loan, but they have to pay 50% of the initial costs of planting (i.e. 4'340 GHS). The farmers should be located within a 50km radius from the closest aggregation point.

Apart from the production coming from the GREL own plantations, GREL introduced rubber cultivation to surrounding smallholders in a progressive and controlled manner, beginning in 1995. This resulted in an adequate ramp-up between national processing capacity and raw rubber production. It is not the same case in Ivory Coast where rubber cultivation experienced an impressive and uncontrolled growth since the 2000s due to a particular context of low cocoa and coffee prices combined with high rubber prices and a favourable policy from the government. Unlike in Ghana, rubber processing capacities are now exceeded and Ivorian rubber farmers are left with unsold production and no possible outlet.

Rubber is experiencing a fall of the world prices that negatively impacts farmers prices. This trend might last several more years as rubber demand knows a very slow growth (slowing down of car market, rivalry of synthetic rubber due to the fall of oil prices...) while world production experiments a peak period (with a lot of recent new plantation starting to produce).

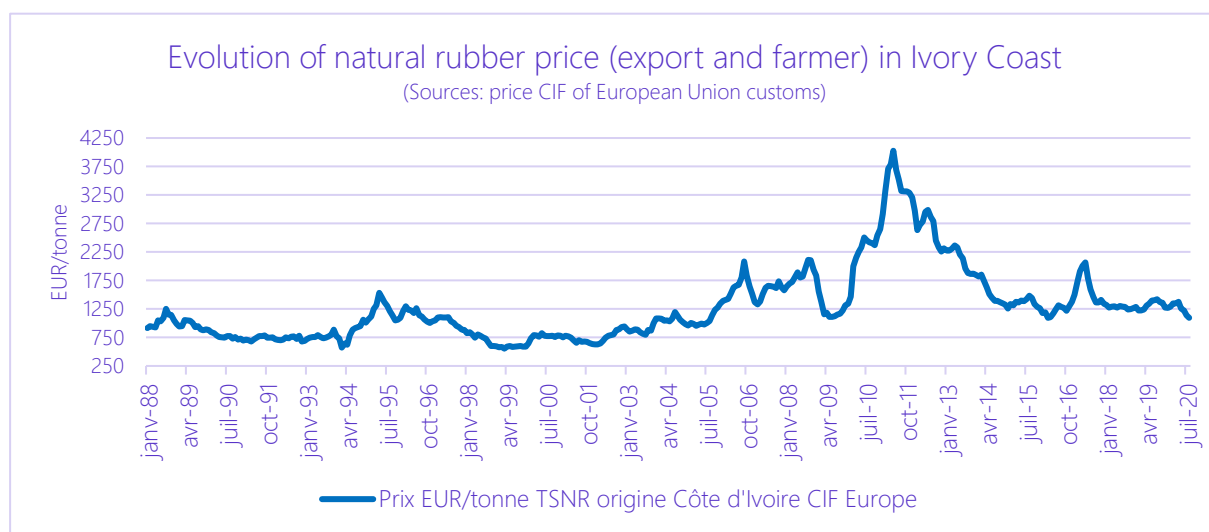


Figure 43: Evolution of natural rubber price in Ivory Coast

According to GREL outgrower unit manager, the minimum size for rubber cultivation is 4 ha, to be able to fully engage a tapper (it is considered as a full-time job, no tapper would be willing to work on several small-scale farms). The initial capital needed in total is 8'680 GHS to plant 4 ha (3,91 GHS or 0,55€/seedling, subsidised by GREL – otherwise it would be 5,20 GHS – with 555 trees/ha and 15% mortality rate).

The income generated by rubber is high. A farm of 4 ha produces 15 tons/year of wet rubber, at 3,2 GHS/kg, giving a gross income of 50'000 GHS/year, minus 25% to reimburse the loan if the farmer got one (12'500 GHS including interests) and minus the operating expenses of 7'000 GHS/year, it gives a net annual income of 30'000 GHS.

Conclusion: GREL would be interested to get more outgrowers, but farmers would have to pay 50% of the planting costs to get a loan from GREL. Rubber requires a lot of land (minimum 4 ha) and is competing with palm. It does not seem to be a good diversification option for the studied farmers, putting in jeopardy the area dedicated to palm. Moreover, rubber prices are linked to oil prices (through substitution effects), like palm oil, so depending on two crops linked with oil prices can decrease the resilience of the farmers.

6.3. Classical Food crops

6.3.1. Horticulture (tomato, eggplant, okra, pepper and others)

Ghana's sustained economic growth has led to the emergence of a middle class of consumers demanding higher quality fresh products. Vegetable production has been increasing annually in Ghana but has not been enough to keep pace with growing demand. Commercial vegetable production in Ghana is concentrated on a line running southeast from Sunyani to Ho, with additional planting running south from Bolgatanga to Tamale. While commercial production is concentrated in the Northern, Upper East, Ashanti and Brong Ahafo regions, household vegetable production is more widespread. Although Ghanaian vegetable production does not currently meet local demand, vegetable production is spread across the country and Ghana benefits from having several climatic zones, giving it the potential to supply vegetables year-round.⁶

In Ghana, domestic consumption represents 70% of the fruit and vegetable market, and the traditional open market comprises approximately 80% of the fresh fruit and vegetable market in Ghana. The main ones are Makola, Techiman, Agbobloshie and Abinkyi markets and are mostly operated by so-called "market queens" who serve as a point of sale for most buyers who run corner shops, hotels and restaurants. There are market queens for vegetables like tomato, onion, hot pepper and okra. The vegetable traders in Ghana are organized by the market queens, who in turn settle disputes between traders, and represent them in negotiations. Each crop has a specific market queen selected by all traders, and is later introduced to the local traditional community leaders and the district assembly. Market queens are never removed but rather retire or get replaced when they pass away.⁷

The studied farmers' households have in a vast majority a few plots of vegetable crops (okra, chili pepper⁸, eggplants, cucumber, tomatoes, etc.), either intercropped with young palm, or as a stand-alone crop (most of the time on land where farmer could not plant palm yet for lack of capital). Depending on how close the community is from an urban area, the access to market seems to vary; farmers either go to the market themselves, individually, with their production (communities close to cities), or an aggregator comes to the village to buy to individual farmers (communities farther away).

⁶ Assibey Yeboah *et al.*, *Horticulture Business Opportunities in Ghana: 2019*, Hortifresh, 2019.

⁷ Idem

⁸ According to the MOAP team of GIZ, Chili pepper does not do well in regions with heavy rainfalls (such as the Western Region). Difficult to export because producers use a lot of pesticides - all exports of capsicum (chili) to the EU were banned in October 2015 for several years due to failure to comply with sanitary and phytosanitary (SPS) measures. For local market, dry pepper could be a good venture, but the interviewed farmers were reluctant to spend time in processing.

Prices do not fluctuate so much along the years, but they experience high variations in function of the seasons, which seems to intensify these past years in the case of tomato:

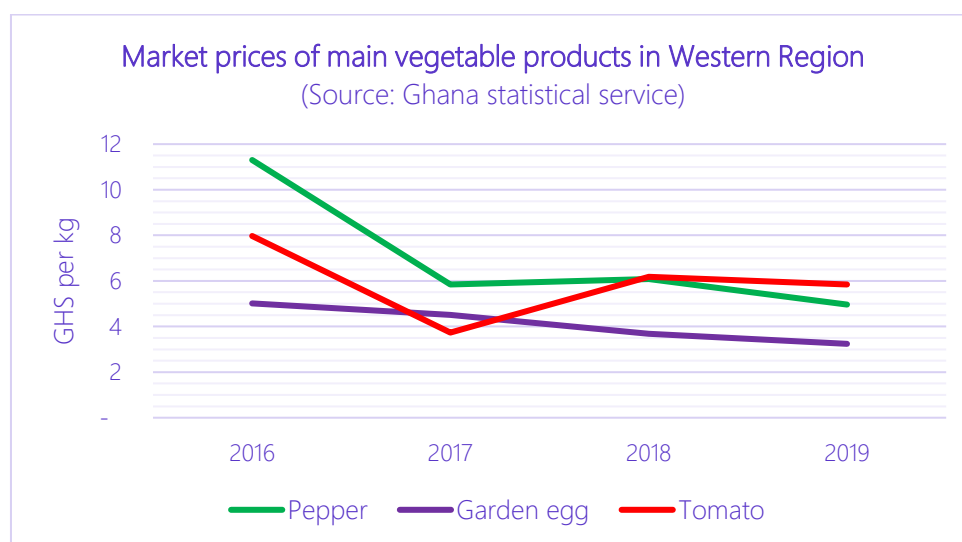


Figure 44: Market prices of main vegetable products in Western Region

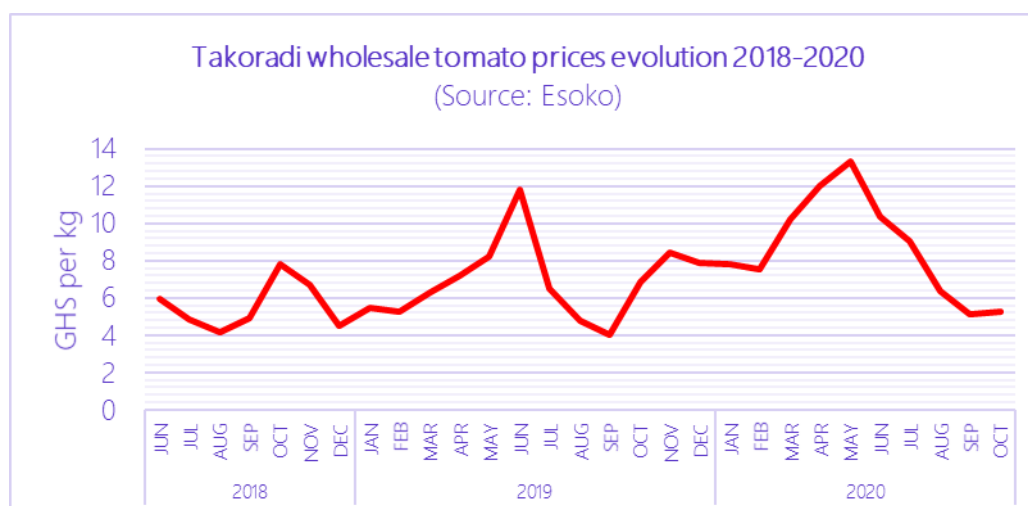


Figure 45: Takoradi wholesale tomato prices evolution 2018-2020

Farmers face numerous challenges regarding their vegetable crops:

- **Low land availability:** most farmers rent their farmland whereas the urbanisation pressure around Takoradi and other cities is high. If a plot can be rented for a year or two, there is no certainty on a longer term, making it difficult for the farmer to invest.
- **Time & labour demanding:** vegetable farming requires a lot of work and is difficult to do in a "business-oriented" way aside a main cash crop. According to Ropryn (cf. below) *"It's a full-time job. If farmers are not supported with equipment or irrigation systems, they become fed up and they stop."*
- **Lack of good practices & inputs** (e.g., quality seeds): Farmers lack technical support and capacity building to be able to produce according to best farming practices in terms of production, inputs, watering, etc. Limited financial capital also prevents them from accessing equipment and good quality inputs such as seeds. The type of seeds and varieties used by

Ghanaian producers is one of the reasons for the low yields obtained. Most seeds are either recycled or obtained from the local market⁹.

- **Low water quality** ("galamsey" activities pollute the rivers) and **no irrigation** system. Vegetable farming requires watering 1-2 times/day and cannot rely only on rainfalls, irrigation also allows to produce during the dry season when prices are high.

The result is low quality and low quantity with high seasonal impact. Producing counter-season could seem like a good option, however it is even more technically complicated. These limitations make vegetable production difficult to sell at a good price.

Organising producers in cooperatives to increase volumes and attract better buyers is tempting. However, this also comes with numerous challenges.

- **Fear of conflicts:** Across all the five focus groups, women expressed reluctance to work together as they are afraid of conflicts, and some have had bad experiences in the past. In some communities, women would be willing to create a cooperative but only for the sale of their products and not for the production.
- **Complex logistics requiring a strong organisation:** Managing the payment of the members according to their production requires a strong internal organisation and trust. Besides, as the cooperative members have separate and spread-out plots, a calendar of production and harvest must be followed to harmonize practices and timing (allowing higher volumes to be collected at the same time), which is not easy to implement. The complex logistics can affect the consistency of the delivery, which is a major drawback for buyers.
- **Low quality:** The challenges that farmers are facing at their level is reflected at the cooperative level, with low quality products. Besides, it takes some time to aggregate the products from the members, which also affects the quality.
- **Difficulty to find a reliable buyer:** Takoradi market is not organised around wholesalers. Market women usually rent a truck twice a week to buy all their products at once in Accra, where they are sure to find everything, at lower prices, and where they have a good relationship with wholesalers built over years. They would not want to go to a cooperative for a single product. Even if they would accept to buy some, they would be reluctant to put their relationship with the wholesalers in Accra at risk. It is unlikely that they would just purchase everything from a new cooperative in Takoradi.

With a strong support package, involving trainings, inputs and a close monitoring, those challenges could be overcome. If producers can be organised and can produce in good quality in high volumes with consistency, they could sell to wholesalers supplying supermarkets: [Eden tree](#) (pack house in Tema, East of Accra) or [Farmer's market](#). The transport time can be up to 4 hours. Mining sites & hotels in Takoradi are also good market outlets. However, these off-takers do not liaise directly with farmers, they require an intermediary linking the cooperative(s) with them such as Ropryn.

⁹ Yeboah *et al.*, Hortifresh, 2019.

Ropryn Company Limited ([facebook page](#))

Contact: Prince Manu Yeboah, CEO (ropryn@gmail.com)

Products: fresh vegetables and fruits, 35% imported & 65% produced locally (packaging, cold storage, link to market – supply high end supermarkets)

Location: 10 minutes west of Takoradi

Ropryn sells 150 MT/year of fruits and vegetables (the demand from hotels and supermarkets is estimated at 12'000 MT/year in Ghana). They are working with 30 farmers in Western Region and 30 in Eastern & Central regions, that have on average 1 to 3 acres of farm. They support them with trainings. Most of the farmers supplying them are located less than 2km away, up to 15-25km for farmers with higher volumes (300-500kg), and 70-80km for greenhouse products (Central region). They seek to set up their own commercial farm and start a 50-acre farm with "ingrowers" (farmers clustered in a farm owned by Ropryn, with irrigation systems installed, and that follow quality standards). Ropryn is not looking for additional small-holder outgrowers, unless they are well organised and are able to aggregate high volumes of good quality (but it entails many challenges).

Conclusion: Horticulture requires time, labour, know-how and investment in irrigation. Especially if you want to benefit from seasonality by producing counter-season vegetables: draining systems and greenhouses are needed. Developing this value chain to make it a profitable and business-oriented activity might be difficult for farmers who are already busy with palm and who tend to fear conflicts. However, almost all the women in the focus group are willing to get support in horticulture through trainings, seeds, and small equipment, even more farmers from type 4.4 Vegetable/palm. Besides, Ropryn would be interested to support farmers close to Angu farm.

6.3.2. Cassava

It is the most important food crop in palm areas. Cassava has a particularity: there is a constant structural overproduction. The low growing costs, its high yields per hectare, its resilience to climate variations, the low impact of weeds pressure and the easiness to store it « standing » make it the best food security crop. The main production cost is harvest work, it is difficult and manpower intensive, especially when the soil is dry. This explains that there are two main forms of sales:

- Most of sweet cassava (principally used to make *fufu*) and a small proportion of sour cassava (principally used to make *gari*) are sold « standing ». The producer sells planted cassava and the buyer will hire workforce to harvest, immediately load a truck and send the product to a wholesale market situated in a deficit consumption area (cities in the north of the country).
- Most of sour cassava sales begins with weekly transformation of small quantities in *gari* or cassava flour/dough at the village by producers. This transformed cassava is sold through grouped sales on the weekly market to specialized buyers.

The fact that this good is easy to produce and that it can be harvested when people have financial needs, commercial opportunities or workforce available is leading to a structural abundance. Two factors can seasonally weaken this abundance:

- During dry season the soil is hard and harvests are more difficult between January and April. This can lead to price increase when there is no rain during several weeks of the dry season in coastal areas as it happened in 2016 and 2018.
- If the rains start late, sowing is concentrated in July and there can be a low availability of raw and transformed cassava at the start of rainy season. Indeed, manpower will be focused on planting cassava and not available to harvest and transform former production.

However, as can be seen on the graph below, prices in Takoradi did not fluctuate seasonally these past 3 years:

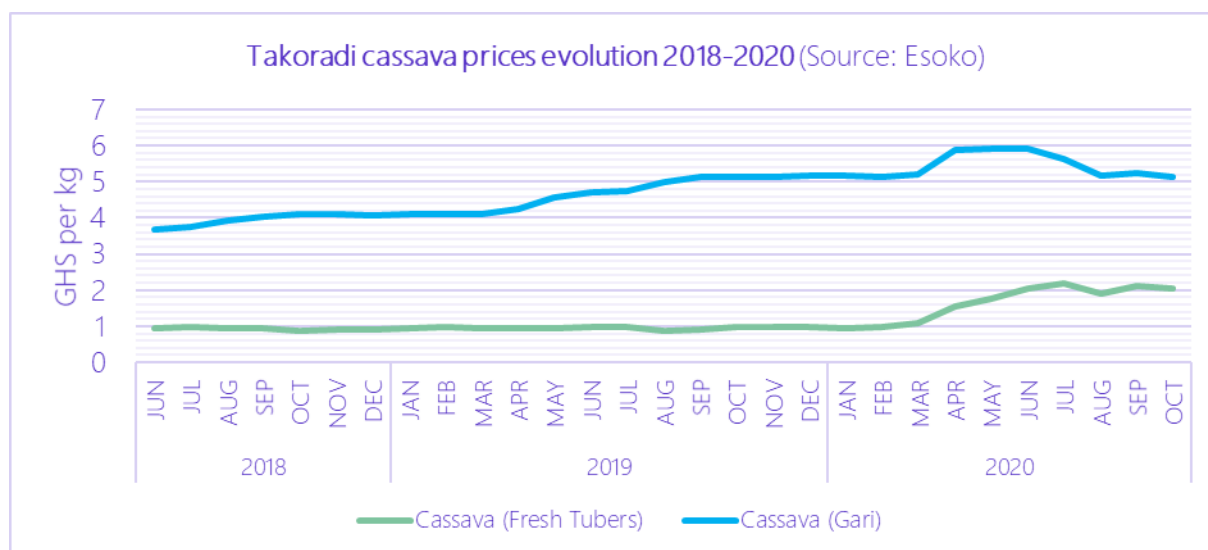


Figure 46: Takoradi cassava prices evolution 2018-2020

Competition in cassava value chain is high, and especially Central and Western Regions are not the leading producing regions in Ghana.

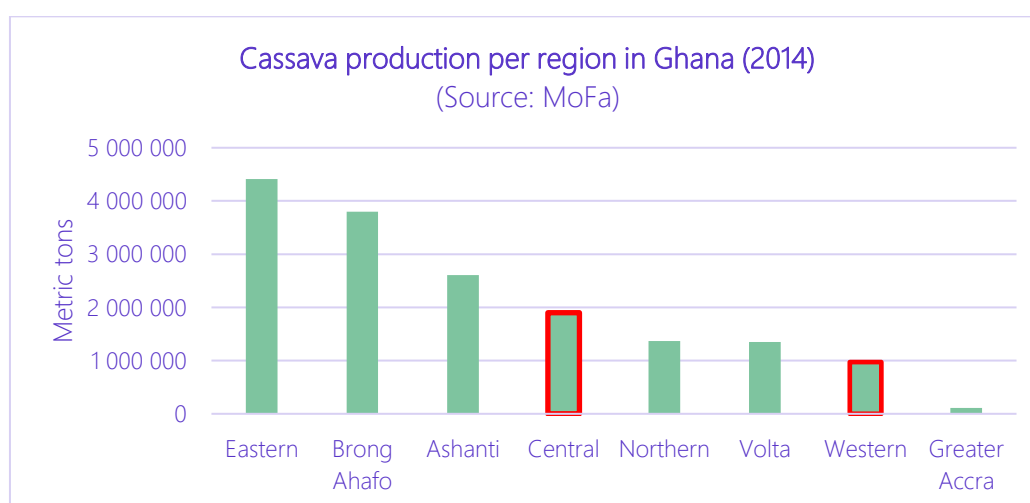


Figure 47: Cassava production per region in Ghana (2014)

Another challenge for cassava value chain is the strong impact of market access. As it is a low added-value product, transportation costs penalize remote areas. For this reason, the value chain is particularly dynamic along asphalted axes close to big cities of the country. Generally, this value chain offers few commercial opportunities because of abundant production. During the last 10 years,

many projects focusing on productivity or commercialization improvement have encountered the market saturation problem and have sometimes make producers lose money.

Principle paths to improve producers' incomes are at transformation level (improved fireplaces to decrease firewood consumption, mechanization of some tasks) and at harvesting level (better tools to dig the soil than a *Daba*, watering material to soften the soil during dry season). Another path would be to identify a niche market (industrial transformation) not far from an accompanied cooperative.

Women who were part of the focus group discussions, except in Zone 4, were reluctant to process cassava into gari, as it is considered as highly time-consuming with little return. However, there is an increasing interest in cassava flour, starch, and ethanol for export. If a reliable private company would be interested in partnering with a cassava-processing cooperative to offtake the product(s) (which could be organic) but also to provide them with technical support, it might be a success. For instance, Savannah Fruits Company could be interested in purchasing organic cassava flour, but it should be confirmed.

Savannah Fruits Company ([website](#))

Contact: Raphael Gonzalez, CEO (raphael@savannahfruits.com)

Products: handcrafted natural products (mainly shea butter and coconut oil), could be interested by cassava flour (to be confirmed).

Location: Based in Accra, work with cooperatives across the country owning their processing unit, provides technical support (also for organic certification), and purchases the products.

Producers who are ready to work as a cooperative and aggregate their fresh tubbers (or individual farmers having a substantial production capacity) could be linked to large-scale ethanol or starch processing factories. However, most of them are located in Eastern or Volta Regions, meaning higher transport costs (which does not make much economic sense for a low-value product). Besides, it should be noted that the variety grown by farmers might need to be changed to match the factory needs (according to MoFA, the cassava grown in the WR is not the starch variety).

Conclusion: Cassava is an important crop for self-consumption and food security. Farmers from type 3. Cassava/palm seem to be interested in reinforcing their cassava activities. However, the market is flooded, and it is difficult to generate good incomes with this activity. Cassava flour processing could be an option but only if a strong partnership with an export company can be secured, and women groups show true interest in artisanal processing.

There are also strong options in mechanization of the harvest (which is time consuming and costly), but this would need some innovations (or import/copy innovation from other countries like Thailand, Vietnam or Brazil).

6.3.3. Maize

Corn is a cereal benefiting from a particularly dynamic national and regional market. The production is steadily increasing and easily answers to the growth of human and animal consumption's demand.

The strength of this market is its liquidity. It is easy to sell corn both on local market (sales to the neighbors), regional market (sales to breeders and wholesalers), national market (sales to big

breeders and producers of cattle's feed) and West-African market (sale to traders who export it to Sahelian countries during lean season).

It is one of the rare markets integrated at West-African scale. In function of harvests and stocks, Ghana can be both exporter and importer of corn from and toward Sahelian countries, often within a single year. Generally, first cycle harvests of forest zones (harvest in June-July) are exported because they arrive when Sahelian countries are facing the lean season. Surplus imports from Sahelian countries often complete big cattle feed industries' supply (production peak in November to February).

Big corn buyers are market regulators, they buy surplus during harvest time and import for West-African or international markets (Argentina/Brazil) in case of national or West-African prices inflation. For this reason, corn prices are rather stable on the national market as shown by the chart below.

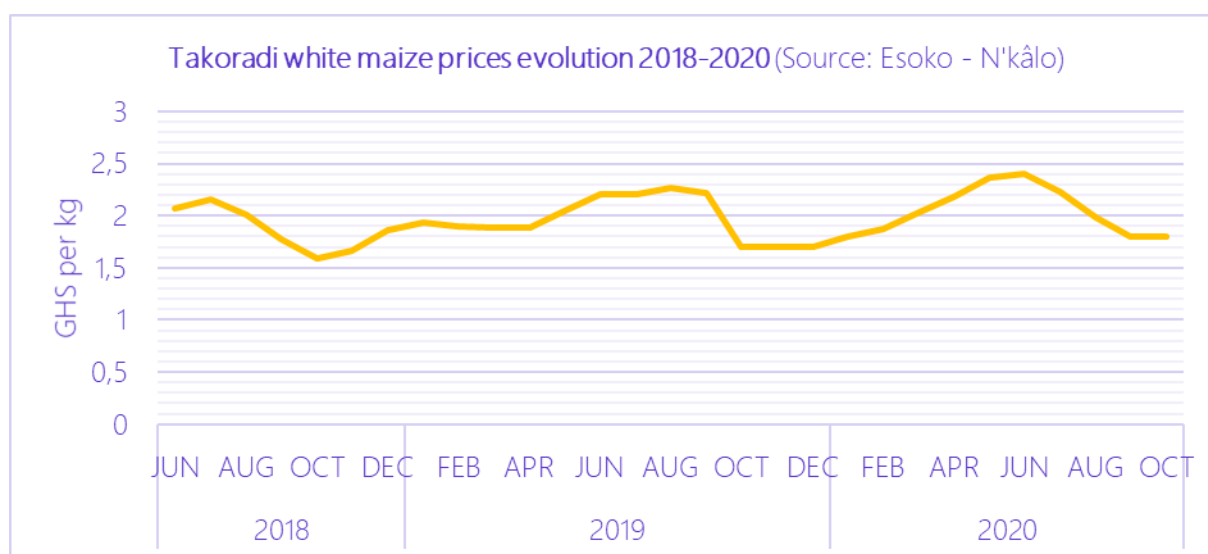


Figure 48: Takoradi white maize prices evolution 2018-2020

Maize production is already well practiced by the farmers of the Takoradi region, and it could have good synergies with breeding activities. There is a high demand on the national market for both Yellow (mostly used for animal feed, but also nutritious for human) and White varieties (human consumption mostly). Imports have been decreasing over the past years, showing a dynamic development of this value chain in Ghana. However, Western and Central regions are in direct competition with best-placed producing regions such as Brong Ahafo and Eastern and Ashanti Regions, where more land is available with less pressure from perennial cashcrops and urbanization.

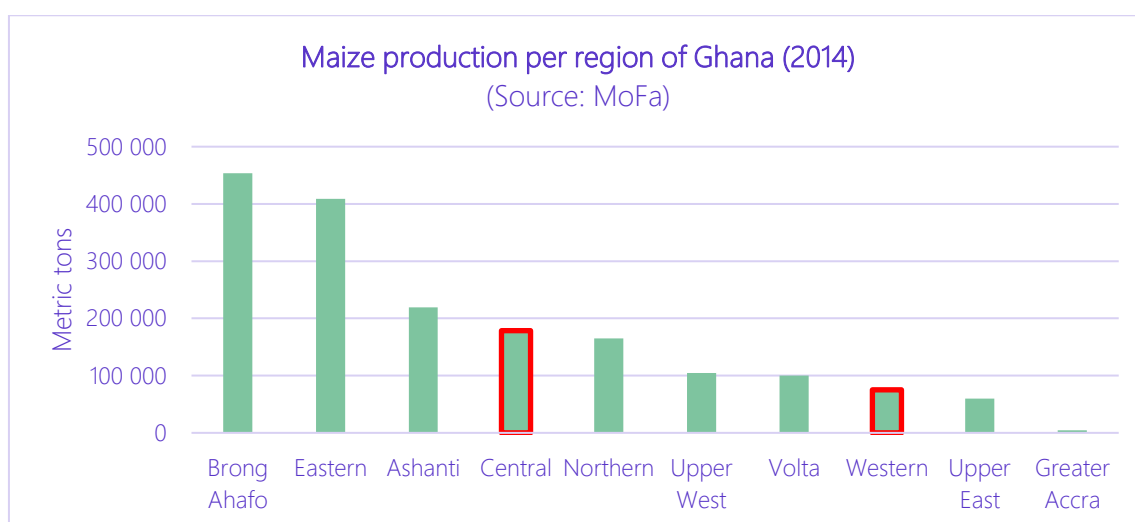


Figure 49: Maize production per region of Ghana (2014)

Participants of the focus groups were more focused on fresh maize production, avoiding the drying stage which can be problematic in an area with high rainfalls such as the Western Region. A governmental program has supported the construction of warehouses with dryers, but none was set up in or around Takoradi. If the drying issue can be overcome, several buyers would be interested (cf. table in section 2), but most of them are either around Kumasi or Accra (5-hour drive).

Conclusion: Maize is an important crop for self-consumption and food security which benefits from a steady growth on both regional and international market. However, the Western Region (and to a certain extent the Central Region) is not the most suitable area for maize production in Ghana. Farmers from these regions face a harsh competition with regions more in the North, more fitted for maize production. This explains why buyers are not located around Takoradi.

However, since maize production have good synergies with breeding, which seems to interest the studied farmers, this diversification option should be shortlisted.

Another advantage is the opportunity to have a harvest after the short rainy season (= > harvest in July) which correspond to the lean season in Northern Ghana and the Sahelian countries, meaning higher prices during this period.

6.3.4. Rice

As maize, rice is benefitting from an important growth. Rice production in Ghana is steadily growing. However, this growth is following national consumption's increase. According to official data, the share of imports is still superior to 50%.

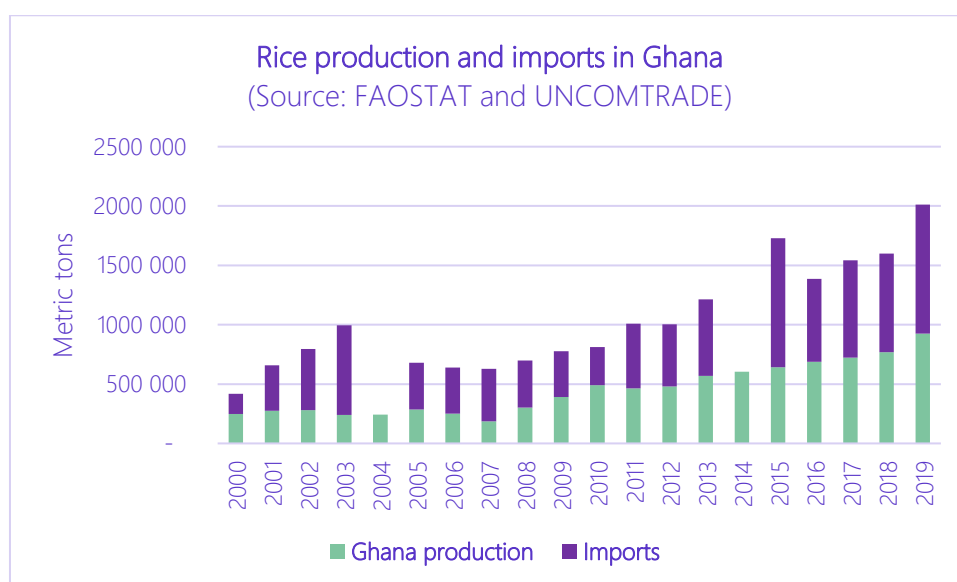


Figure 50: Rice production and imports in Ghana

Even though the price of the local rice is lower than imported rice, consumers' perception of locally produced rice as being inferior to imported rice has over the years affected sales and production. Poor drying and processing methods impact the local rice quality, which can contain stones and chaff. Despite this, the local value chain has increased its processing practices during the last years and benefits from the increasing urban populations' interest especially after rumors about imported « plastic rice » and the "Eat Ghana Rice" campaign.

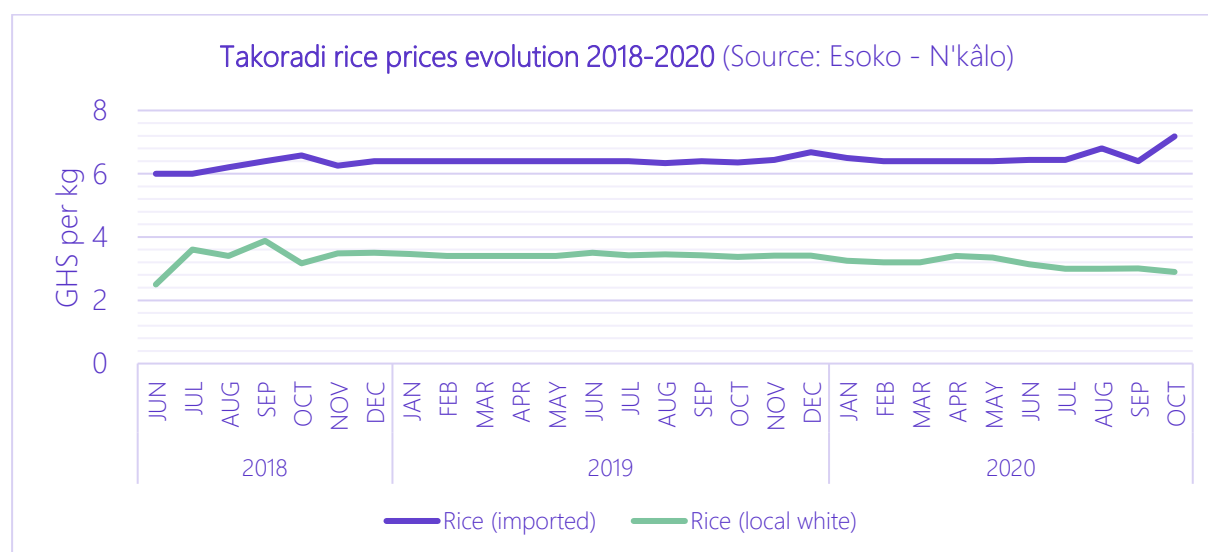


Figure 51: Takoradi rice prices evolution 2018-2020

Prices have been very stable these past 3 years, even though a slight fall in price can be seen since the end of 2020.

Rice did not really stand out as an interesting diversification option for the farmers during the focus groups. Indeed, most of the time this crop is grown in lowlands which are the preferred type of land for planting oil palm trees.

Moreover, no specific off-taker or partner could be found in the area to provide a consistent outlet for large volumes of rice, as Western and Central Regions are not the main producing regions (cf.

graph below). Most of the rice processing is undertaken by medium to small scale rice mills in these regions.

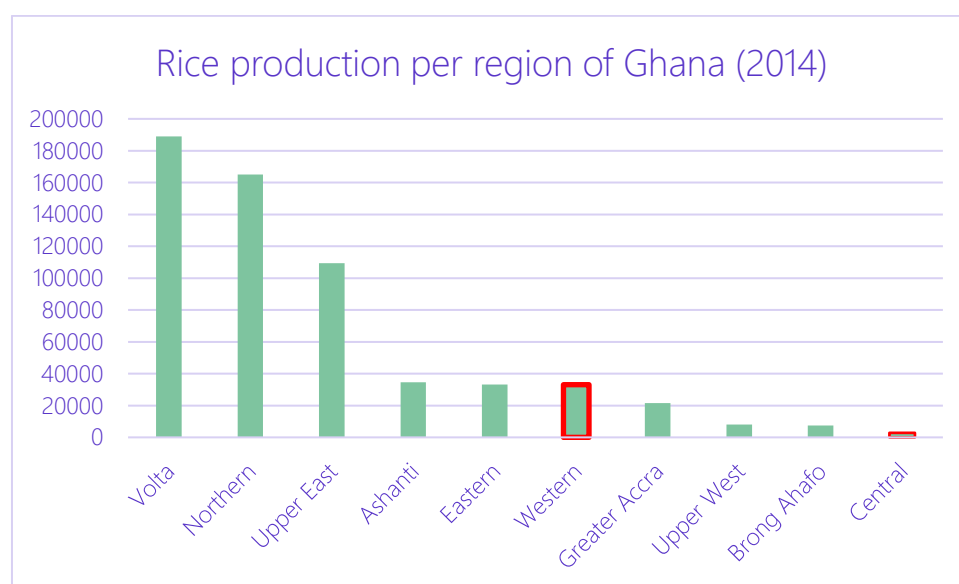


Figure 52: Rice production per region of Ghana (2014)

Conclusion: Rice is an important crop for self-consumption and food security which benefits from a steady growth on the local market. However, the Western and Central Regions are not the major rice producing areas in Ghana, and have only small to medium rice mills as outlet. Besides, rice is competing with palm as it is grown on the same lowlands, it requires a lot of know-how, and is extremely labor intensive (between 150 to 200 days of farmer labor per hectare for rice, versus 30 to 40 for oil palm). This value chain should therefore be left out of the diversification program.

6.3.5. Plantain

During the main campaign (November to February), plantain suffers from the same market saturation as cassava. It is largely intercropped with cocoa on young plantations with a very low production cost. Indeed, most of the work is the same for cocoa and plantain. In such conditions, the offer tends to become surplus during the main campaign, and prices are close to the production costs, leaving farmers with a very low margin.

However, this good is characterized by a very strong seasonality and off-season production can be particularly profitable. Moreover, this seasonality is getting stronger these last years as more and more urban consumers want to eat plantain during the whole year. Restaurants and supermarkets tend to increase their order during the scarcity period strengthening inter-annual seasonality of prices. In Ghana, two main varieties are cultivated: Apem and Apentu.

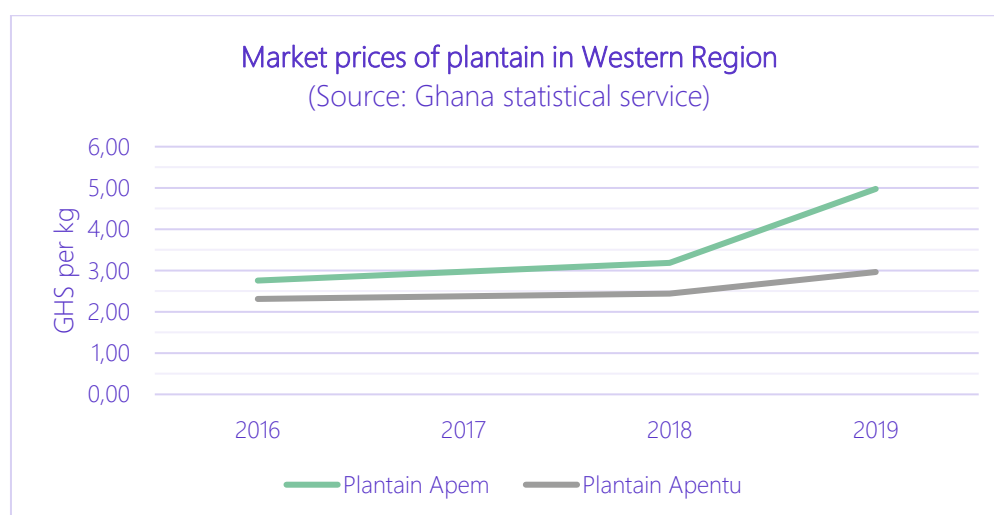


Figure 53: Market prices of plantain in Western Region

No off-taker has been identified for plantain, it is mainly a local-consumption crop, and sold at market level by “market women”. As said earlier, Takoradi market is not organized around big wholesalers.

Conclusion: Plantain is a sister-crop to cocoa, it is cultivated during the 3 first years of cocoa plantations. Hence, the market is already supplied by cocoa farmers in areas close to cocoa production basin, which is the case of the zones of this study. As a matter of fact, plantain did not stand out during the focus groups. This option would only interest farmers from type 2. Cocoa/palm, but even them were not so much inclined in being supported for this crop.

The only interesting axis to support this option could be counter-season production, however it requires irrigation system, hence investments and costs far from the reach of the studied farmers.

6.4. Commercial fruits

Fruit production plays a crucial role in Ghana’s economy and it is one of the important sources of export earnings contributing 15.74% to the Ghanaian economy in 2015 (mainly fresh fruits).¹⁰ As for vegetables, the economic drivers for the Ghanaian fruit market are the growing urban population in Ghana and the increasing awareness of a healthy lifestyle, coupled with the rise of supermarkets. The proximity to the European markets and increasing irrigation facilities are also stimulating the increased production.

Fruit processing companies can be categorized into companies producing for the export as well as the local market and those producing solely for the local market.

- The six major fruit processing companies are **Blue Skies, HPW Fresh & Dry Ltd, Bomarts Farms Ltd, Pinora** (Eastern Region), **Peelco and Fruittiland** Processing Company. These companies are mainly operating in the free zone enclaves and export mainly to the EU market, the following products: Fresh pre-cut fruit; Dried fruits; Orange and pineapple juice and concentrate (mango juice and fruits blend juices are sold mainly on the local market) and Essential oils. Together, these companies have a theoretical processing capacity of 1,600 MT per day, but currently they are producing at a total capacity of 1,100 MT/day.

¹⁰ Agriculture in Ghana – Facts and Figures 2015, MoFA

- On the domestic market, fruit processing is undertaken by **Vintage Farms, Crescent Juice, Kalypso, St Michael, Healthy Life, Papso** to mention a few. **Ekumfi Juices** near Cape Coast seems to be the closest to the zone of the study. However, the companies face competition from imported fruit juices such as Don Simon, Ceres, Frutelli, Sammi, Stute, etc.¹¹

However, supplying fruits to these companies entails similar challenges as those listed above for vegetables, leading to low yields, poor quality fruits and high post-harvest losses per acre. They expect high volumes, good quality and consistency, as well as compliance to certification standards in many cases. This means that linking producers with those processing companies or to exporters would require a support in forming and training cooperatives (cf. horticulture), as the studied farmers are not large-scale fruit producers.

6.4.1. Citruses

Citrus is one of the most important fruit crops grown by both large- and small-scale farmers in Ghana. The crop is grown mainly in the Central, Eastern and Ashanti Regions.¹² In the region of this study, citrus production only takes place in Zone 4. Citrus varieties grown in Ghana include mainly Sweet orange (*Citrus sinensis*), Tangerine (*Citrus reticulata*), Lemons (*Citrus limon*) and Lime (*Citrus aurantifolia*). The harvest season ranges from October to March and from April to July for the lean season depending on the varieties.

Orange production witnessed a Compound Annual Growth Rate of 4.78% over the 2011–2014 period. Orange dominates the fruit segment, followed by pineapple. However, the current lack of activities by the citrus value chain actors have rendered the sector inactive resulting in farmers having challenges in marketing their fruits and most of the processing companies are not functioning well.¹³

Besides, citrus production is facing many challenges including insect infestation and plant diseases, together with unproductive work processes, which often hamper cultivation. Many of the seedlings are pest-ridden, making them useless for further planting.¹⁴ Fungal diseases cause serious losses to citrus in Ghana, with black spot and *Pseudocercospora* leaf and fruit spot being the most important problems.¹⁵ In the activities that farmers would like to extend, fruit production is rarely quoted as shown in Deliverable 2 (figure 26), and is absent from the activities that farmers would like to create. It also did not stand out during the focus group discussions.

Conclusion: Farmers of the type 4.1 Orange/Palm located in Zone 4 could be interested in getting support mainly for improved pest management. However, it seems not to be a major focus for farmers and the diversification program could bring more leverage on other crops.

¹¹ Yeboah *et al.*, Hortifresh, 2019.

¹² Asare-Bediako, E., Addo-Quaye, A. A., Tetteh, J. P., Buah, J.N., Van Der Puije, G.C. and Acheampong, R.A. (2013). *Prevalence of Mistletoe on Citrus Trees in the Abura-Asebu- Kwamankese District of the Central Region of Ghana*. International Journal of Scientific & Technology Research 2: 122-127. [link](#)

¹³ Yeboah *et al.*, Hortifresh, 2019.

¹⁴ GIZ, Citrus program. [link](#)

¹⁵ Dewdney, M., Timmer, L.W., *Citrus Production and diseases in Ghana*. Citrus Industry, 2009. [link](#)

6.4.2. Pineapple, papaya, banana

The main producing areas for **pineapple** are around Accra and in the Volta region. The varieties of pineapple grown in Ghana are Sugar loaf (only for the local market), Smooth cayenne (exported, better for juices), and MD2 (more yellow in colour than the smooth cayenne, higher international demand).

The Ghana pineapple industry has started to decline in 2004, due to a change in the cultivated variety for export, from Smooth cayenne (adapted to the Ghanaian climate) to the MD2 for which the European demand had increased. However, the MD2 thrives better in Latin America, where it is produced at a much cheaper cost, and Ghana is facing difficulties to catch up.¹⁶ Besides, pineapple requires logistics and therefore needs to be cultivated near a production basin, which is not the case for the studied farmers.

Papaya thrives well in different areas in Ghana. Its commercial production sees a vibrant export. For export, papaya is more specifically cultivated in the south eastern corner of Ghana in Central, Eastern, Greater Accra and Volta Regions. The number of farmers producing papaya is limited and they do not have access to the right varieties demanded by the export market (the solo dwarf papaya).¹⁷ Papaya, as for other fruits, faces a massive post-harvest challenge, with important losses during transport. Small-scale farmers sell their production on the local market, but it is not a target crop for the studied farmers as they only have few papaya trees scattered on their farm.

The **banana** export industry is led by two large companies: Golden Exotics Ltd. (GEL) and the Volta River Estates Ltd (VREL), both located in the Eastern Region of Ghana. As for papaya, it is not a target crop for the studied farmers.

Conclusion: Pineapple, papaya and banana do not seem to have a great potential to complement palm revenues for the studied farmers.

The only way of supporting this value chains could be of setting-up a supply chain for organic pineapple with an interested buyer, since organic is very scarce although its demand for export is growing.

6.5. New high-value export products

If local market entails challenges related to low prices and strong competition, with the difficulty of finding partner companies or buyers, export markets for highly sought-after products could offer higher prices and interest potential partners. Three main crops - suitable for the Western and Central regions – have been identified as having an increasing export market, with several companies interested in partnering with groups/cooperatives of farmers: **orange-fleshed sweet potato, okra and Hass avocado**.

Some of the challenges regarding cooperative logistics and management remain. However, a strong partner company could support in facilitating the purchase and payment and could as well train farmers in good practices and provide the required inputs. As the target would be most likely the

¹⁶ NEPAD, CAADP, GIZ, *Introduction to pineapple production*. [link](#)

¹⁷ Ghana Export Promotion Authority ([link](#)) and Yeboah *et al.*, Hortifresh, 2019.

European market, the Global Gap certification would be needed. The partner company would also take that aspect in charge.



6.5.1. Orange-Fleshed Sweet Potato (OFSP)

Sweet potato variety containing high levels of beta-carotene providing additional nutritional benefits, especially high levels of vitamin A.

OFSP production and consumption is promoted through several programs in countries facing undernourishment (ex. [FAO](#)). OFSP can be used in many products such as bread, juices, and pastries.

OFSP does not require too much attention, and is not quickly perishable, it is therefore suitable as side-crop for farmers. Farmers in the Takoradi area are already producing it, but it is yet to be fully adopted at a larger scale. The local market is good, and the export market is increasing, with a high demand from several companies, ready to partner with outgrowers. OFSP could be part of a diversification program combining self-consumption and sales for the local and export market.

Maphlix Trust ([website](#))

Contact: Felix Kamassah, CEO (felix.kamassah@maphlixtrust.com), also president of the Vegetable Producers and Exporters Association of Ghana ([VEPEAG](#))

Products: Orange-fleshed sweet potatoes, Okra, chilli, turia, tinda, etc.

Location: Office in Accra, Farm & big pack house (to be built) in Volta region + small pack house in Accra (export by flight)

Established in 2013, Maphlix has its own nucleus farm and works with 420 outgrowers in the Volta Region. Maphlix provides planting material (imported from South-Africa and Germany), organic pesticides and fertilizer, land preparation and harvest services (tractor), on-farm training (to ensure best practices and meet quality standards), and offtake. The cost of the inputs and services is deducted from the purchase payment to the farmers. They export fresh OFSPs to EU. Their goal is to set up a processing factory to produce OFSP purée.

Maphlix is interested in partnering with groups of farmers to develop the OFSP value chain in the Western and Central regions. They proposed to start with 500 farmers, approx. 50 per community to have sufficient volumes, with 1 to 3 acres/farmer (expected yield: 7 MT/acre, purchasing price 2-3 GHS/kg depending on the quality). They could provide the same support package as for their current outgrowers (inputs, services, trainings, offtake). Maphlix expressed the need for a refrigerated van to transport the products to Accra, as well as tractors (ideally two) including a harvester to reduce workload, increase yields, ensure a better quality, and lower post-harvest losses.

Symboil ([website](#))

Contact: Erich R. Mosebach, Chairman (ronny.mosebach@gmail.com)

Products: palm oil, coconut oil, orange-fleshed sweet potato (OFSP) (want to go organic and fair trade). They are trading farm products.

Location: Western Region

Symboil expressed interest to partner with farmers to support the OFSP value chain and purchase the product. They have a buyer in Germany willing to purchase 1 container of OFSP/week.

Casa de Ropa ([website](#))

New orange-fleshed sweet potato processing factory near Winneba (3h from Takoradi towards Accra), constructed with the support of the 1 District, 1 Factory (1D1F) government's program. They have a total of 220 hectares of land for production, but they could be interested in purchasing OFSP from outgrowers (to be confirmed - they were contacted but did not reply).



6.5.2. Okra

One of the most important vegetable crops of the tropical and subtropical regions of the world. Okra is a multipurpose crop valued for its pods¹⁸.

Most farmers are already producing okra in the region of this study, for the local market. Okra seems to get more and more interest from exporters. Several interviewed stakeholders (GEPA, GIZ) described it as a successful and profitable export crop.

Like OFSP, Okra could be part of a diversification program targeting self-consumption, local and export market. **Maphlix** has also expressed interest in partnering with outgrowers on this crop (expected yield: 4-5 MT/acre, purchased at 4 GHS/kg). To be noted, okra requires more attention than OFSP. It can be grown on soils that are not suitable for OSFP.



6.5.3. Hass Avocado

Cultivar of avocado (*Persea americana*) with dark green-colored, bumpy skin, common on the EU market.

Almost Ghana's entire avocado is grown by smallholders. Fruits are obtained from backyard plantings and volunteer crops scattered in cocoa and other farms in most parts of the country, more specifically in Western, Ashanti, Central, Eastern and Volta Regions. Avocado fruits are of different shapes, sizes and colors, an indication of a large gene pool in the country. Most of the lines belong to the West Indian race, which does not meet the EU market demand. Avocado is a highly perishable fruit and require a strong logistic chain allowing fruits to be packaged and shipped in the 24 hours following the picking.

An increasing attention is directed towards the avocado value chain in Ghana (ex. [article](#)), due to the increasing market demand both for the oil and for the fruit. The Hass variety grows well in Ghana (ex. [article](#)) and the Ghana Export Promotion Authority (GEPA) is supporting its development through pilot demonstration farms ([article](#)).

Two main private stakeholders were identified:

¹⁸ Okra has an average nutritive value of 3.21, which is higher than tomato, eggplant, and most cucurbits.

Rubber Plantations Ghana Ltd (RPGL) ([website](#))

Contact: Jimmy Khubchandani, CEO (info@rubberplantationghana.com)

Location: Eastern Region

The CEO expressed interest in partnering with outgrowers to start the production of Hass avocado on their farms. They have a nursery with 20'000 seedlings (it takes 2-4 years before producing). They could support the farmers by providing seedlings, trainings, and perhaps pruning services. They also want to take the harvest in charge as fruits must be handled gently and packaged quickly after picking.

Akuapem Gold Avocado Cultivation and Processing Limited

Location: Eastern Region

Under the 1 District, 1 Factory Program (1D1F), the government supports Akuapem Gold in the construction of a large-scale factory in the Eastern Region for the packaging of avocado and the production of oil for export. The supply will be based on nucleus and out-growers' farms ([article](#)). Akuapem Gold is nursing three avocado varieties in a large-scale nursery located in Abuakwa South, Eastern Region.

Conclusion: Farmers who are willing to dedicate time on one of these export crops could be linked with the identified private partners who could support with seedlings, services, trainings and offtake. Private partners could work with individual farmers rather than cooperatives, but a sufficient number of farmers would however be required per community (and ideally several close-by communities would need to get on board) to ensure sufficient volumes, making it worth-it for the private partner to work in the area.

6.6. Animal husbandry

Demographic and economic growth (purchase power) increase in Ghana resulted in a significant increase of animal product consumption, specifically poultry meat since 2000s.

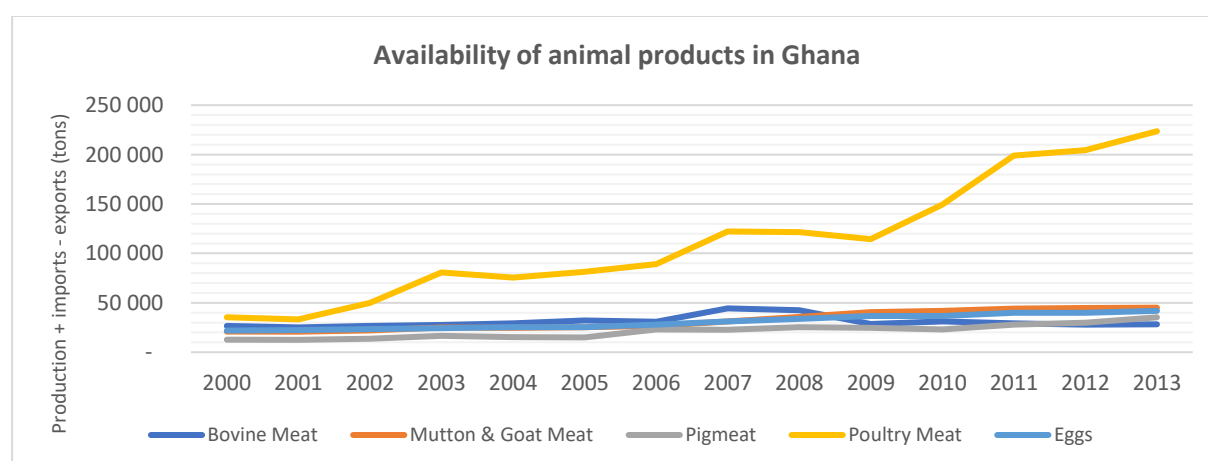


Figure 54: Evolution of availability of animal products in Ghana

However, as can be seen in the next graph, this increase of consumption is mainly fueled by imports:

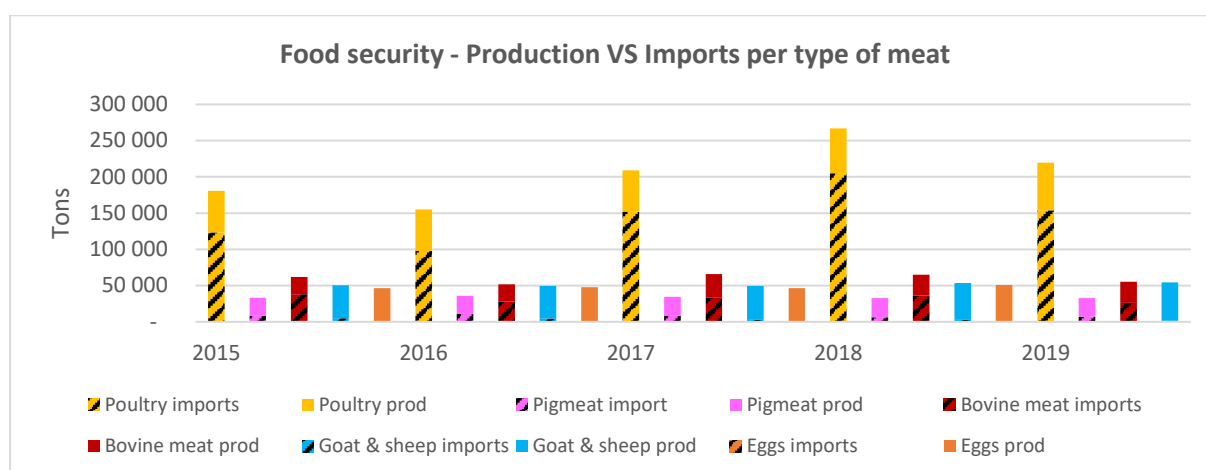


Figure 55: Ghana production VS imports per type of meat

Domestic broiler production struggles to keep up with increased demand and import competition. In 2017, domestic broiler meat production was expected to reach only 35'000 metric tons and supply less than 25% of demand (compared to 67% in 1992)¹⁹. Indeed, imported products are cheaper (12,5 GHS for imported versus 15 GHS for local chicken in 2019²⁰), however, this price can fluctuate from one year to another (imported chicken were 15 GHS in 2016), based on international logistics complications, which are increasing recently due to the COVID-19 sanitary situation.

A 2019 study found that, while 74.3% of chicken farms produced eggs, only 38.8% produced broilers (13.1% of poultry farmers produced both)²¹. Broiler production seems not as profitable or competitive as layer production in Ghana. Because eggs are easily perishable, they are more difficult to ship and do not face the same import competition that broilers do from frozen, processed chicken meat. Also, egg producers have the option to sell their spent layers for meat in live bird markets, offering another source of income. Layer farms still see low profit margins (4.3%) and are vulnerable to sudden changes in market conditions²² but, globally, the chicken industry has proven to be effective in improving incomes in low resource agricultural economies like Ghana because of its relatively short time-to-market compared to other livestock industries.²³

Focus on palm kernel cake for animal feed

Palm Kernel Cake is a by-product of palm mills, the possibility of using this by-product from palm oil mills as an animal feed should be investigated further.

Indeed, it seems that this material is used sometimes as animal feed, however, its relatively low content in crude proteins (15-21%) and in amino-acids, especially lysine, methionine and tryptophan, make of it a poor feed, especially for ruminants.²⁴

¹⁹ Ashitey, E. (2017). *2017 Ghana Poultry Report Annual*. USDA Foreign Agricultural Service. [link](#)

²⁰ Ghana Poultry Project and Analysis poultry sector Ghana 2019 for the Netherlands Enterprise Agency [link](#)

²¹ Nti, F.K. (2018). *Economic Analysis of Ghana's Chicken Industry* [Doctoral dissertation, Kansas State University]. K-State Research Exchange. [link](#)

²² Andam, K.S., Gupta S.D., Kufoalor, D., & Ragasa, C. (2017). *A Chicken and Maize Situation: The Poultry Feed Sector in Ghana*. International Food Policy Research Institute. [link](#)

²³ Nti, 2018

²⁴ Abd El Tawab, Ahmed & Khattab, Mostafa. (2018). Utilization of Palm Kernel Cake as a Ruminant Feed for Animal: A Review. *Asian Journal of Biological Sciences*. 11. 157 - 164. 10.3923 [link](#)

However, when readily available, and in a context of scarcity of other feed sources, palm kernel cake appeared as an adequate source of feed for sheep, goats, pigs or poultry.²⁵ The key to this practice lies in the formulation of the feed and the diet, which can vary from one animal to the other. Balanced with cereals such as maize, and weeds from palm plots, palm kernel meal could be interesting.

Conclusion: As shown in Deliverable 2, breeding is the most interesting activity for most of the farmers. It is not land-demanding, and it does not require seasonal peak of manpower. Hence it seems to match with the situation of most of the farmers. Also, it brings other advantages to the farmers than only cash: possibility of saving, meat for self-consumption, etc. Reinforcing and improving breeding activities could be a strong axis for the diversification support program.

Even though the share of imports has been high and unchallengeable for poultry meat, demand is still high for local poultry, especially in rural areas where imported products are more complicated to be found.

6.7. Timber

The demand for timber is high, in a context of continuous forest depletion. The informal sector would in any case be interested in purchasing timber from the farmers, however partnering with a timber company which would provide a support package (see below) and ensure the off-take of the timber at a good price would be the best option.

Besides off-take risk mitigation, choosing an inherently good design with sound species selection and silviculture will ensure good market position with multiple sales options once the timber is ready to harvest. Both short rotation (high volume, low value) and medium rotation (medium volume, medium/high value) options should be reviewed (long rotations are harder to make feasible). The key is to ensure high quality plant material and high-quality maintenance to deliver quality timber to stand out in the market. Producing in sufficient volume also brings good marketing options.

Planting trees also comes with important side-benefits especially in a changing climate, such as soil conservation, water retention, wind break, bio pest control, etc. Species providing Non-Timber Forest Products (NTFPs) can also be targeted to generate additional income or for self-consumption.

In practice, if the main goal is to increase farmers' income, the timber value chain comprises many barriers:

Low farmer interest: farmers are more interested in crops with quicker and higher returns. Farmers that are better connected to ready market for other products (ex. Located near main roads leading to cities) are less likely to be interested by timber. To get farmers' interest, they should be offered a "support package" including clearing, planting, maintenance, and offtake. Several stakeholders have also stressed the fact that environmental awareness raising would facilitate tree planting.

Challenging land tenure system: The land is generally owned by extended families, stools or chieftaincies. Landowners may be reluctant to let farmers plant trees on their land. Timber tree cycles can be long and go beyond the cycle of the main cash crop on which the land 'lease' agreement is based. However, tree species can be selected to follow the same cycle as the cash crop (to be fell at the same time).

²⁵ Feedipedia article on Palm Kernel Meal as animal feed

Farmers most of the time do not have official documents for their farms. It can be risky for both the farmer and the company to enter into an agreement without this legal basis. Support can be provided in facilitating the issuance of official documents or in improving the legal basis of the contract. As an example, Miro Forestry asks the farmers to provide a declaration stating their right to use the land for the next 10 years (based on a participatory mapping involving the chief, and for which the farmer needs to get the approval of all the relevant stakeholders).

Challenging tree tenure system: The farmer must register “natural” planted trees to have the right to harvest them (as naturally occurring trees belong to the State). The registration requires administrative work and comes at a cost (the forestry commission must come to the farm to do an inspection), disincentivising farmers to plant trees on their farm. This rule can be avoided for plantations of fast-growing species for which it is obvious that the trees were planted.

Conditional interest of timber companies: It is difficult for a timber company to commit itself in providing a support package to farmers who could end up selling the trees to other buyers. Outgrower schemes also demand more logistics (aside the land & tree tenure challenges explained above), making it less cost-effective and more complex to manage for companies. They can however be interested if it is part of their CSR or there is a substantial grant that could support the program.

Most of the timber companies are located further North (around Kumasi or Sunyani), too far from the zone of the study. Three companies were approached to assess their interest in an outgrower scheme involving farmers of the zone of study.

Samartex ([website](#))

Contact: Richard Nsenkyire, CEO (richard.nsenkyire@samartex.com)

Location: Samreboi in the Western Region, 4 hour-drive from Takoradi

Samartex is a logging company (traditionally focussed on long-cycle species). Samartex already works with outgrowers around Samreboi and supports agroforestry (cf. its [CSR](#)). Usually, they do not source further than 75 km away from the sawmill, but they have some exceptions (Tarkwa is 120 km away and Takoradi 200 km).

However, Samartex expressed interest in participating in an outgrower scheme involving farmers of the study - perhaps prioritising farmers closer to Samreboi (i.e. Tarkwa). Samartex could support with seedlings and technical advice and could purchase the timber.

Samartex's interest must however be confirmed, based on a more detailed proposal and discussions to be held with relevant stakeholders.

Form international ([website](#)),

Contact: Rik Sools, Technical Director (r.sools@forminternational.nl)

Location: In Ghana, they are based in Sunyani (→ *too far away*)

Form supports afforestation and reforestation projects in various countries. In Sunyani, they have a plantation, and they are piloting an outgrower system (cashew & teak).

Form is in the process of setting up a new company in Ghana that provides forest management services to clients. They offered to roll out a timber outgrower programme for any palm oil company, as a service which could entail:

- Define the business and operational plans (includes tree species selection, agroforestry design, cost-benefit, benefit sharing arrangements, market plan, carbon crediting)
- Selection and on-boarding of farmers
- Farm mapping
- Delivery of plant material to farmers (selected species, high quality)
- Technical assistance for farm preparation, planting and maintenance (weeding, pruning, singling, thinning, harvesting, pest & disease prevention/control)
- (Long term) timber marketing and sales
- Monitoring and evaluation
- Carbon credit certification and if desired sales of carbon credits
- Attract further grant funding

This option could be of interest if a palm oil company and its partners are able to cover the cost of Form's support.

Miro Forestry ([website](#))

Contact: Kate Mathias, consultant (kate.mathias@baobab-agribusiness.co.uk)

Location: East of Kumasi (→ *too far away*)

Miro Forestry is designing an outgrower scheme (gmelina + acacia in monoculture (1111 trees per ha), short cycles of 6-8 years (10-25 cm diameter = 120m³, @30\$/m³ = 3600\$/ha gross)).

According to them, 1 ha is the maximum plantation surface that one farmer can manage.

In theory, timber tree species could be planted by farmers (either intercropped with palm, along the borders of the farm, or on dedicated land) to **act as a 'financial saving'**, generating income in either 8-10 years for short cycles, or more for medium/long cycles.

Conclusion: Timber could be a multiple-benefit diversification option if Samartex confirms its interest, but it would require a partner with strong commitment to support farmers in complying with administrative procedures for tree registration. Without this support, the risk taken by the farmers would be too high, resulting in a low adoption rate or low maintenance of the trees. It would still be possible to support farmers in planting timber trees in an intercropped design, along the borders of the farms as hedges, or on dedicated land, but it will be aimed at sale to informal sector. Taking in consideration these reflexions, timber trees seem a risky diversification option to support. Seedling distribution and technical assistance for planting could be considered but not on a large scale.

6.8. Non-Timber Forest Products (NTFP)

NTFPs were not common among the focus group communities, because they are not located near forested areas. They did not appear either in farmers' future projects for their farm. Their markets were therefore not studied in detail. The local market demand is high for many NTFP products, but it is not considered as an income generating activity by farmers, mainly due to their low production capacity. As an example, one of the interviewed farmers kept a Cola tree on his farm, but only for self-consumption.

[ASNAPP](#) is an NGO specialised in NTFPs, especially [griffonia](#), [voacanga](#), and [Kombo nuts](#) (*Pycnanthus angolensis*, otie in Twi) which can be picked and sold to aggregators for the export market. According to them, Kombo trees can be found in Twifo (Zone 7) and Mankessim areas (Zone 4). Farmers in this area, depending on how many Kombo trees are present on their farm, could be

easily trained to pick and dry the nuts, and linked with a buyer (e.g., [Baraka](#), contact: Wayne Dunn, CEO, wayne@waynedunn.com).

NTFPs could also be developed as part of an agroforestry system, for self-consumption and medicinal purposes (and perhaps generating some additional revenues if planted in a sufficient number). As an example, Kola (Ghana imported 1'200 MT of Kola nuts in 2019), Prekese (*Tetrapleura tetraptera*), Grains of selim (*Xylopia aethiopica*) as well as Moringa were planted in a demonstration agroforestry plot of a palm oil company of the Takoradi region (B-BOVID). However, it is a risky option for farmers in terms of cash generation since these trees take a long time before producing (7 to 10 years for some of them).

7 Summary of the diversification options' characteristics, risks and opportunities

7.1. Risks and opportunities

Table 18: Summary of risks and opportunities of the value chains

PERENNIAL CASH CROPS			
	Opportunities	Risks	Identified buyers
COCONUT	<p>Demand exceeds offer, both for dry and fresh. Buyers are “poaching” coconuts. Increasing but varying annual price due to link with international prices.</p> <p>New resistant variety available.</p> <p>Interested private partner (GKV).</p> <p>Regular income, weak seasonality effect.</p>	<p>The yellowing disease has drastically reduced coconut production in the area, except Z.5</p> <p>The new variety requires an intensive management (labour and inputs).</p> <p>It requires a lot of land.</p> <p>Farmers’ interest seems low (except in Zone 5)</p> <p>Cash flow risk (3 to 5 years before first production)</p>	<p><u>Dry nut:</u></p> <ul style="list-style-type: none"> • Buying agents from Nigeria and Côte d'Ivoire • Coconut chips: Coconut_hub, Blue skies, HPW, Bomarts <p><u>Coconut oil:</u></p> <ul style="list-style-type: none"> • GKV investment (Takoradi): confirmed interest • Feanza (Nzema East) • True coco (Jomoro)
COCOA	<p>Stable market and relatively good price.</p> <p>Well-organized value chain.</p> <p>High farmers interest.</p>	<p>Demands know-how, land, time and labour.</p> <p>Since cocoa is already heavily supported by numerous institutions, NGOs or private companies, it does not seem to be the most adapted option.</p>	<p>Many Licensed Buying Companies in the producing areas (Central region and from Mpohor to Tarkwa).</p>
RUBBER	<p>Good market and good price.</p> <p>Regular income, no seasonality.</p> <p>Excellent knowledge and technical support from GREL outgrower program.</p>	<p>It requires a lot of land (min of 4 ha) and high investment capital. Also requires availability of external manpower, or training for the farmer, to undertake the tapping.</p> <p>Conflicting with palm: risks of rubber to overtake palm cultivation.</p> <p>Cash flow risk (7 years before first rubber production)</p>	<ul style="list-style-type: none"> • GREL

CLASSICAL FOOD CROPS			
	Opportunities	Risks	Identified buyers
HORTI-CULTURE (tomato, eggplant, pepper, okra)	<p>Good potential for food security, high interest of farmers in general (especially women of the focus groups).</p> <p>Okra has a high export market, with interested private partners.</p> <p>Easy support activity: providing seeds</p>	<p>Low prices, high competition, difficult to store.</p> <p>Many challenges hindering a business scale-up (lack of capacities, low volumes and low quality + reluctance to work as a cooperative).</p> <p>Would require strong and diversified support from partners such as palm oil companies.</p> <p>Very specialized crop, not suited for farmers focused on a main cash crop (palm).</p>	<p>If good quality and high volumes are achieved, wholesalers could be interested:</p> <ul style="list-style-type: none"> • Ropryn (SME of catering, Takoradi) • Eden tree (Wholesaler, Accra) • Farmers market (Wholesaler, Accra) • Mining sites & hotels in Takoradi
CASSAVA	<p>Can be transformed and stored easily (gari, cassava flour).</p> <p>Supports women entrepreneurship with transformation.</p> <p>Peelings can feed sheep/goat/cows.</p> <p>Can be grown on small pieces of land.</p> <p>Local stable demand.</p> <p>Staple food for household.</p> <p>Possible support of the government to install a processing facility in the region.</p>	<p>High competition, very low prices. Issues of rotting tubers in Western Region (does not seem to be well understood by MoFA/Crop services).</p> <p>Small scale gari processing units in Western Region were promoted, but many have collapsed. Low interest of focus group participants in processing, because the ratio benefit/time is not attractive.</p> <p>Large-scale factories are far from the studied area.</p>	<ul style="list-style-type: none"> • Savannah Fruits Company • SINO STONE, new large-scale ethanol factory in Eastern Region → could be interested in purchasing from Central and Western. • New Cassava starch processing centre in Wassa Amenfi district - Wassakropong (4h drive from Takoradi – seems too far) • Caltech in Volta Region for Ethanol (too far)
MAIZE	<p>High demand on the local market (there is a gap of maize production in Ghana) for both Yellow (animal feed + very nutritious also for human) & White varieties (human consumption).</p> <p>High interest from farmers.</p>	<p>Competition with more suitable producing regions having more land available (North).</p> <p>Big challenge of high moisture level for the drying of maize.</p> <p>Farmers are mostly focused on fresh maize for the local market (less post-harvest cost and less issues related to drying). Linking farmers with buyers would be more relevant for dry maize, as</p>	<p><u>Dry maize:</u></p> <ul style="list-style-type: none"> • Agricare (feed processor, Kumasi) • Premium foods (for breweries, Kumasi) • Yedent (grain trader, Sunyani) • Akwabaa feeds (feed processor, Kasua) • Koudijs Ghana Limited (Grain trader, Tema) • Ranaa fishery feed (would buy maize but also rice bran, Prampram)

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	Maize production has good synergy with breeding activities since it is an excellent feed.	fresh maize is targeted for the local food market. High price volatility.	<u>Poultry farms:</u> <ul style="list-style-type: none"> • Darko Farms – Kumasi, Akate Farms - Kumasi • RansBOAT - Nsawam • Pent Ranch - Cape Coast/Winneba area
RICE	High demand on the local market for paddy rice (gap of 350MT of white rice in Ghana - which is equivalent to approx. 500MT of unprocessed rice). Rice does well in Western Region (can be harvested 3 times a year). Shama and the area along the road to Tarkwa are existing producing areas.	Conflicting with palm (farmed on low land), requires a lot of know-how and labour-intensive mainly for planting. Competition with Volta and Northern regions which are important producing areas. Low farmer interest.	There are many small and medium scale rice mills (cf. list of mills of the crop service) <ul style="list-style-type: none"> • Roland Rice – Ohiamadwene (Shama)
PLANTAIN	Staple crop for households. Strong local consumption. Easy to store and transport.	Does not seem to be a target crop for farmers, focus group participants did not request for support.	
COMMERCIAL FRUITS			
PINEAPPLE PAPAYA BANANA	Papaya grows well in WR (also during dry season when prices are high, during raining season it could be sold to dry fruit companies). There is a demand on the EU market for organic papaya (but huge challenge of quality, needs to be certified Global GAP).	Fruits do not seem to be a target crop for the studied farmers (figure 26, D.2), it also entails transport challenges (post-harvest loss). Pineapple: complex crop, with high competition of larger farms.	If good quality and high volumes, wholesalers (cf. above) and fruit processing companies: <ul style="list-style-type: none"> • <i>Local & International market:</i> Blue Skies, HPW Fresh & Dry Ltd, Bomarts Farms Ltd, Pinora (Eastern Region), Peelco and Fruittiland Processing Company, Ekumfi juices - East of Cape coast • <i>Local market:</i> Vintage Farms, Crescent Juice, Kalyppo, St Michael, Healthy Life, Papso <u>Papaya:</u> <ul style="list-style-type: none"> • Wine & juice processing factory in Côte d'Ivoire

CITRUSES		Demanding crop, low prices, high competition, only limited interest in Z.4	Pinora juice (Sono Global) in Eastern Region
NEW HIGH VALUE EXPORT PRODUCTS			
HASS AVOCADO	High international demand, attractive prices and interested private partners.	New innovative crop, with logistics challenges (highly perishable). Farmers of Z.4 do a bit of local avocado, but high competition.	<ul style="list-style-type: none"> • Rubber Plantations Gh. Ltd (Eastern Region) • Akuapem Gold Avocado Cultivation and Processing Ltd. (Eastern Region)
SWEET POTATO	Good local and export markets for Orange-fleshed sweet potato, highly nutritious, supported by several programs, interested private partners.	Does not seem widely produced by farmers yet (needs further adoption). Yields are more interesting with mechanization (tractor). Most challenges of horticulture remain.	<ul style="list-style-type: none"> • MAPHLIX (Volta Region and Accra) • Symboil (Western Region and Accra) • Casa de Ropa (Winneba, Central Region)
GINGER	Strong local and regional markets (Nigerian buyers come to Ghana).	Not cultivated by the studied farmers. Low interest.	
ANIMAL HUSBANDRY			
GOATS SHEEPS	Big demand during muslim celebrations. Good motivation for young people. Old people can look after them. Most farmers have some heads in free range.	Conflicts if wandering and risk of thefts. Difficult to find the feed. Sanitary problem (dysentery), lack of breeding knowledge and lack of vets.	
PIGGERY	Several interviewed stakeholders stressed piggery as being a good venture. Some farmers already do it.		
POULTRY	Good motivation for young people. Quick income (3 months). Manure can be used in palm plots or sold to palm/cocoa farmers. Possible home-consumption, traditional welcoming gift.	Broilers is facing a high competition from cheap import "Argentina chicken". Need investment to build the farm, to buy the food and the veterinary inputs. Need technical knowledge or to hire a technician dedicated to the activity.	

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	Some of the food (corn) can be locally grown. Does not need additional land. Most farmers have chicken in free range.		
CATTLE		Not traditionally present in the area.	
FISH FARMING	High and stable local demand. Can be smoked and stored. Could work locally if no major river nearby.	Proximity of a galamsey polluting water makes it impossible. Labour need for implementation (dig the pond). Very technical. Focus group participants did not stress this option.	
GRASSCUTTER	High demand, High price on the local market. Can be fed with grass growing in palm plantations (Pueraria sp.) or with cassava peels. Give birth every 6 months.	No interest of Focus group participants, as it is considered as available in the bush. Need investment (hutches) and training.	
SNAILS	High demand, High price on the local market.	No interest of Focus group participants (market demand focused on <u>wild</u> snails considered as tastier).	
TIMBER			
TIMBER	Ecological advantages. Long-term savings. Strong local demand from informal sector.	Challenging tree tenure system. Possibility of conflicts between farmer and landowner. Not fitted for farmers with low land reserve. No long-term experience with palm trees in agroforestry systems.	<ul style="list-style-type: none"> • Samartex – Samreboi • Form International – Sunyani • Miro Forestry – Kumasi

7.2. Quick comparing matrix of most interesting diversification options

Table 1 below gives an overall overview of the potential of the various value chains / products considered in this study (the pre-selection was based on crops already known by farmers in the area, with some additional “innovative” products added, having a high market potential).

Table 19: Value chain overview. Green = High/Good, Yellow = Medium, Orange = Low/Bad, Red = Very low/Very Bad. TBC = To Be Confirmed

Products	VALUE CHAIN ANALYSIS					FARMER CONSULTATION AND TYPOLOGY					
	Local market	Export market	Price	Competition	Off-taker identified	Palm conflict	Capital	Land	Work	Know-how	Interested farmer types
Coconut					GKV Ava oil						4.2
Cocoa											2 > 1
Rubber					GREL						none
Cassava											3 > 1 > 2
Maize			If dry								none
Rice											none
Horticulture					Ropryn						4.4 > 1 > 2
Citruses					Juice factories						4.1
Goats, sheep					No off-taker found but no need since it is for local market and consumption						All: 1 > 5 > 3 > 2 > 4
Piggery											
Poultry											
Fish farming											
Grasscutter											
Hass avocado			TBC		Rubber plant. Ltd. Akuapem						To be assessed
Sweet potato	Fairtrade/ Organic		TBC		MAPHLIX						Possibly same as cassava
Timber					Samartex						1 and 2 with land available

8_ Conclusions and recommendations for a diversification support program for the oil palm farmers

Some insights about diversification for the targeted farmers can be highlighted from the analysis of the results of the study:

- Farmers who sell directly to the oil palm company should be targeted in priority for the diversification program, since dealing with the buying agents would bring confusion and complication to conduct the support measures.
- For the large majority of the studied farmers, their production strategy is strongly linked to palm, and they intend to even more specialize in palm. That is why creating new activities will be complicated, especially with farmers with already low available land or manpower.
 - ➔ The diversification support program should firstly aim at reinforcing existing diversification options rather than creating new ones, or pushing innovative ones.
- Animal rearing /breeding is the most interesting activity for most of the farmers (see figures 36 and 37 below). It is so because it does not demand land or seasonal peak of manpower. Hence it seems to match with most of the farmers situations. Moreover, the periods of income of this kind of activity match with the palm lean period, bringing money very welcome in times of high expenses. Finally, it brings other advantages to the farmers than only cash: possibility of saving, meat especially for celebrations...
 - ➔ Reinforcing and improving animal rearing / breeding activities could be a strong axis for the diversification support program. It could also be a good option for the largest type which is type 1. Focus palm.
 - ➔ A mission should be organized in order to dig deeper the existing animal rearing / breeding practices, knowledge gaps and specific needs.
- According to this report, and the farmers' typology, there are other strong leads for diversification options:
 - Farmers from type 3. **Cassava** / palm seem to be interested in reinforcing their cassava activities. This could be done in several ways, especially organizing groups of women around artisanal cassava-processing, or linking cassava farmers with an off-taker.
 - **Maize** could be a very interesting option to develop since it is already well practiced in the zone, and it could have good synergies with breeding activities. Also, local and regional market potential seem very positive.
 - **Vegetables** seem to be a relevant option for farmers from type 4.4 Vegetables / palm, and farmers from type 1. Focus palm located in zone 1, 2,3 and 6. Although vegetables farming is a low land-demanding option, it is very demanding in terms of manpower and know-how, often practiced by specialized farmers.
 - Farmers from type 4.2 **Coconut** / palm could be easily supported in their coconut activities by supplying Yellowing disease resistant seedlings.

- o Farmers from type 2. **Cocoa** / palm seem to be very interested in reinforcing their cocoa activities. Farmers from type 1. Focus palm also seem like interested in farming adding cocoa in their farming strategy. However, cocoa is a sector that is already being strongly supported by other specialized institutions, private companies, NGOs and specific programs.

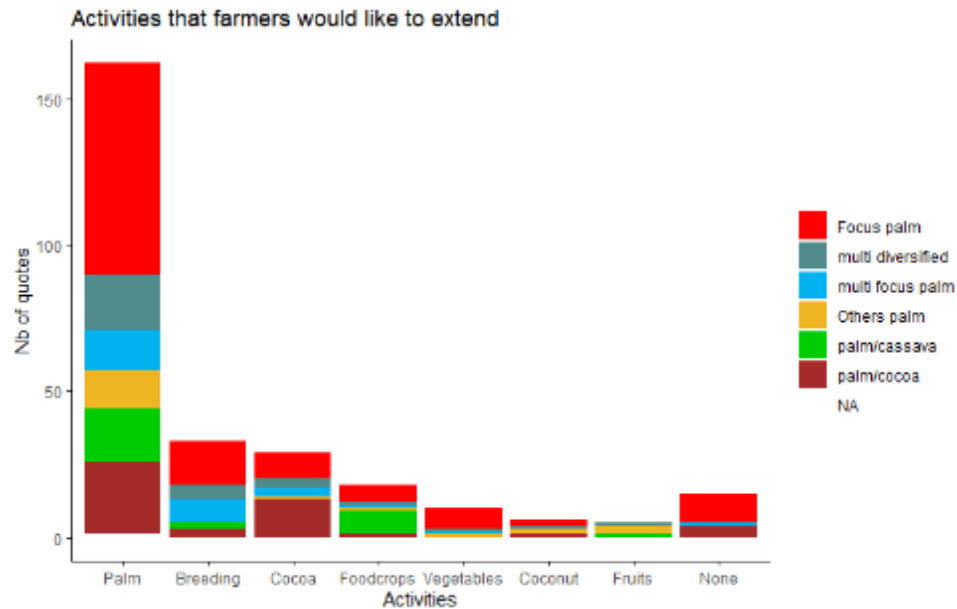


Figure 56: Activities that farmers would like to extend per farmer type

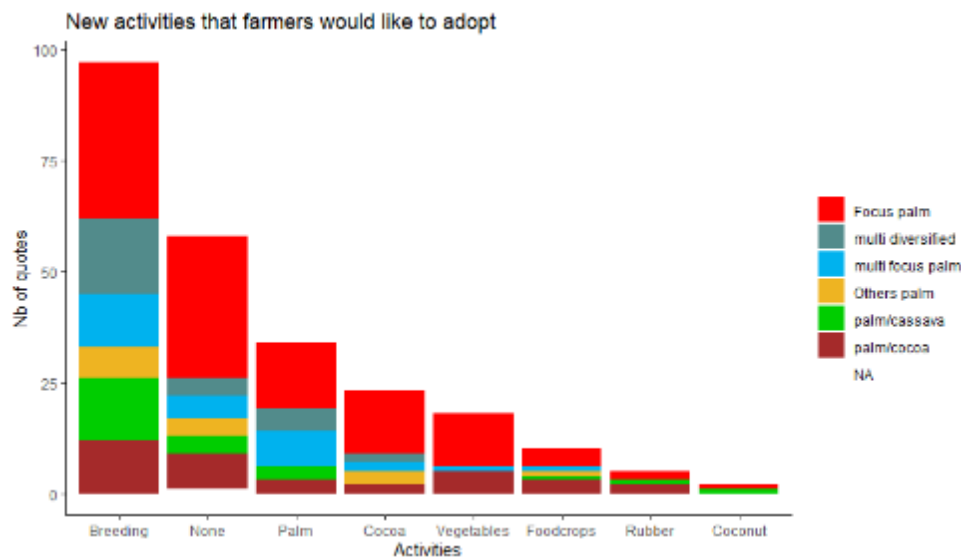


Figure 57: Activities that farmers would like to create per farmer type

Annex 1: Compared workload repartition per type of crop per acre

