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Crop choice and diversification

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Cocoa has sometimes been described as a ‘poor man’s crop’,¹ as some recent studies have calculated that a large proportion of cocoa farmers live in extreme poverty.^{2,3} Concerns increased with negative movements in world cocoa prices in the 2016/2017 season, and how this may negatively impact on the livelihoods of cocoa households.

One narrative that has been gathering pace is that farmers should diversify further into other crop options. Proponents of this narrative suggest that diversification can help cocoa households mitigate risk from cocoa price fluctuations. Greater diversification with food crops is also considered to be useful for mitigating food insecurity and malnutrition, particularly outside of the main cocoa season.⁴ Some see diversification as a kind of insurance against climate change, which is expected to have at least some effect on producers in the coming decades.^{5,6} Others have suggested that increased diversification could also slow the worrying trend of deforestation and ‘bush clearing’ for cocoa.⁷ A final version of the diversification narrative is that diversified income from other crops can raise household incomes. In this view, population trends will lead to more demand for food and an associated increase in food prices.⁸

We caution that crop diversification is quickly becoming a new mantra, and yet the benefits of increased diversification for cocoa households is still under-researched. For each of the arguments presented above in favour of greater diversification we note there are also compelling counter-arguments. For example, diversification may reduce risks associated with cocoa price fluctuations, but economic theory suggests that specialisation has its advantages in terms of technical and economic efficiency and that highly diversified farms may face higher costs in marketing small volumes, especially in remote locations.⁹ Likewise, the production of a higher number of food crops intuitively suggests a household would be more secure throughout the year. However, if cocoa generates higher income to buy food from sufficiently well-functioning markets, this is not necessarily true – particularly if the diversified crops

¹ v.d. Kooij, S. (2015). De McDonaldisatie van de cacaosector. Vice Versa. Available at <http://hetnieuwe.viceversaonline.nl/blog/de-mcdonaldisatie-van-de-cacaosector/>

² Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C. & Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

³ Fountain, A.C. and Hütz-Adams, F. (2015) Cocoa Barometer 2015-USA Edition. Available at http://www.cocoabarometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf

⁴ Anderman, T. L., Remans, R., Wood, S. A., DeRosa, K., & DeFries, R. S. (2014). Synergies and tradeoffs between cash crop production and food security: a case study in rural Ghana. *Food security*, 6(4), 541-554. Available at: <https://link.springer.com/article/10.1007/s12571-014-0360-6>

⁵ Schroth, G., Läderach, P., Martinez-Valle, A. I., & Bunn, C. (2017). From site-level to regional adaptation planning for tropical commodities: cocoa in West Africa. *Mitigation and Adaptation Strategies for Global Change*, 22(6), 903-927. Available at: <https://link.springer.com/article/10.1007/s11027-016-9707-y>

⁶ Schroth, G., Läderach, P., Martinez-Valle, A. I., Bunn, C., & Jassogne, L. (2016). Vulnerability to climate change of cocoa in West Africa: Patterns, opportunities and limits to adaptation. *Science of the Total Environment*, 556, 231-241. Available at: <https://www.sciencedirect.com/science/article/pii/S0048969716304508>

⁷ Ruf, F., Schroth, G. & Doffangui, K. (2014). Climate change, cocoa migrations and deforestation in West Africa: What does the past tell us about the future? In *Sustain Science* (2015) 10:101-111. Springer. Available at https://www.researchgate.net/profile/Goetz_Schroth2/publication/268507038_Climate_change_cocoa_migrations_and_deforestation_in_West_Africa_What_does_the_past_tell_us_about_the_future/links/549dfabd0cf2d6581ab6437e/Climate-change-cocoa-migrations-and-deforestation-in-West-Africa-What-does-the-past-tell-us-about-the-future.pdf?origin=publication_detail

⁸ Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, 74, 1-7. Available at: <https://www.sciencedirect.com/science/article/pii/S1573521415000160>

⁹ Ruf, F., & Schroth, G. (Eds.). (2015). *Economics and ecology of diversification: the case of tropical tree crops*. Springer. Available at: <http://www.springer.com/cn/book/9789401772938>

are easy perishable. Concerns about climate change are valid, although specific scenarios are still being modelled. There are also no guarantees that crop options for diversification will fare better than cocoa in the context of a changing climate. Finally there is a lack of evidence that encouraging farmers to diversify more will lead to higher household incomes. In fact, encouraging households to diversify part of their land holdings out of cocoa may worsen household incomes if the markets for the alternative options are not strong and established, and if alternative crops generate lower profits per unit of land allocated. The narrative is also unclear on the optimal 'level' of diversification, or the optimal crop combinations for different purposes (e.g. to combat periods of food insecurity or to slow down deforestation).

In this study, we took a broad perspective to understand the relative importance of cocoa in cocoa growing areas, and to understand typical household strategies for generating income and improving their livelihoods. By taking this perspective, we found that 'diversification' is not a new phenomenon, but is already part of the farming system of cocoa and non-cocoa households alike.

Households make conscious decisions about the crop types and combinations to grow. These decisions may not always appear to be optimally efficient. However, by carefully analysing the factors that play on the minds of households, we can better understand household motivations, and the kinds of incentives or market conditions that would be required for them to change their choices and practices. For example, we must take into consideration factors such as profitability, access to a good market with good prices, the perceived risk of crop failure or a market price crash, different labour demands for each crop, climate and soil conditions, the seasonality of different crops and much more. Male and female-headed households may also have different preferences or face certain barriers to producing and marketing different crops. The reasons why households choose to grow certain crops was captured during focus group discussions, a summary of which is presented in this chapter.

5.1 Crops produced

Many household studies in cocoa growing regions in Ghana and Côte d'Ivoire suggest that cocoa is the most important source of income.^{10,11} But other crops are also considered to be of relative importance, such as cassava, plantain, oil palm, maize, and

¹⁰ Waarts, Y., Ge, L., Ton, G. & van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at: <http://library.wur.nl/WebQuery/wurpubs/fulltext/305316>

¹¹ Ingram, V., Waarts, Y., Ge, L., van Vugt, S., Wegner, L., Puister-Jansen, L., Ruf, F., Tanoh, R. (2014). Impact of UTZ certification of cocoa in Ivory Coast; Assessment framework and baseline. Wageningen, LEI Wageningen UR (University & Research centre), LEI Report 2014-010. Available at: <http://edepot.wur.nl/307584>

yam.^{12,13,14} In Côte d'Ivoire, different studies suggest that rubber, palm oil or cashew production could become an alternative to cocoa.^{15,16,17} However, before considering diversification strategies, we first analyse household's current crop choices.

In our study, respondents were asked about the crops their households produced. The most frequently produced crop in both Ghana (90%) and Côte d'Ivoire (69%) was cocoa. After cocoa, the next most commonly produced crops are cassava and plantain (Table 5.1). These crops partly derive their popularity from their dual role as food and cash crops. Furthermore, both are frequently intercropped with young cocoa (Table 5.2). In Côte d'Ivoire, a variety of crops such as chili, yam, eggplant, okra, tomatoes and groundnuts are more frequently produced than in Ghana. Vegetables are often produced on small plots, compared with more staple crops such as maize, rice, and yam. The reasons why farmers grow cocoa and other major crops are presented in later chapters of this book.

Table 5.1 Crops produced, by country

	Ghana	Côte d'Ivoire	pvalue	sig
Cocoa	90%	69%	0.00	***
Cassava	84%	66%	0.00	***
Plantain	80%	45%	0.00	***
Maize	46%	34%	0.00	***
Cocoyam	45%	19%	0.00	***
Peppers	27%	0%	0.00	***
Yam	24%	48%	0.00	***
Tomatoes	21%	28%	0.00	***
Palm	14%	7%	0.00	***
Okra	14%	46%	0.00	***
Eggplant	10%	44%	0.00	***
Rice	6%	28%	0.00	***
Bananas	6%	1%	0.00	***
Rubber	5%	19%	0.00	***
Other	4%	6%	0.00	***
Coconut	4%	1%	0.00	***
Oranges	3%	0%	0.00	***
Cashews	3%	21%	0.00	***
Pineapple	3%	0%	0.00	***
Chili ¹⁸	2%	53%	0.00	***
Beans	1%	5%	0.00	***
Groundnuts	1%	25%	0.00	***
Coffee	0%	14%	0.00	***

Note: Only includes crops for which at least 2% of respondents reported producing in either country

¹² Wiggins, S & Leturque, H. (2011). Ghana's sustained agricultural growth: Putting underused resources to work. London: ODI Publications. Available at: <https://www.odi.org/publications/5059-ghana-agriculture-growth-development-progress>

¹³ Traoré, S, Kobenan, K., Kouassi, K.S. & Gnonhouiri, G. (2009). Systèmes de culture du bananier plantain et méthodes de lutte contre les parasites et ravageurs en milieu paysan en Côte d'Ivoire. Journal of Applied Biosciences, 19, 1094-1101. Available at: <http://m.elewa.org/JABS/2009/19/8.pdf>

¹⁴ Hainmueller, J., Hiscox, M., & Tampe, M. (2011). Sustainable development for cocoa farmers in Ghana. MIT and Harvard University. Available at: <https://www.theigc.org/wp-content/uploads/2015/02/Hainmueller-Et-Al-2011-Working-Paper.pdf>

¹⁵ Tano, M. A. (2012). Crise cacaoyère et stratégies des producteurs de la sous-préfecture de Méadji au Sud-Ouest ivoirien (Doctoral dissertation, Université Toulouse le Mirail-Toulouse II). Available at: <https://halshs.archives-ouvertes.fr/tel-00713662/>

¹⁶ Lemeilleur, S., N'Dao, Y. & Ruf, F. (2015). The productivist rationality behind a sustainable certification process: evidence from the Rainforest Alliance in the Ivorian cocoa sector. International Journal of Sustainable Development, 18(4), 310-328. Available at: <https://www.inderscienceonline.com/doi/abs/10.1504/IJSD.2015.072661>

¹⁷ ICCO (2010). Inventory of diversification strategies on cocoa farms. Consultative board on the World Economy, 22nd meeting. London 13th of September 2010. Available at: https://www.icco.org/about-us/international-cocoa-agreements/cat_view/30-related-documents/32-consultative-board-on-the-world-cocoa-economy.html

¹⁸ Respondents in Ghana and Côte d'Ivoire may have used the terms 'chili' and 'peppers' for the same crop

In Ghana, we find relatively few crops for which there are large, statistically significant differences between male and female headed households. Cocoa was produced by a high proportion of both male (91%) and female (86%) headed households (*highly significant*). Cassava, which is sometimes described as a ‘women’s crop’ was produced at more or less equal rates by male and female headed households. We do find some significant differences in the choice to grow cocoa, oil palm, rubber and rice – crops which are sometimes considered ‘cash crops’ – but the difference in effect size is only between 3% and 5%.

In Côte d’Ivoire, we find more meaningful differences between male and female headed households. Cocoa was produced much more frequently by male headed households (73%) than by female headed households (36%) (*highly significant*) (Table 5.2). Maize, plantain, rice, rubber and coffee are other significant crops produced more frequently by male headed households. However, for some of these crops the effect size is relatively small, whilst for others the total sample of households producing the crop is relatively small, thereby affecting confidence in the strength of the results. Likewise, a higher proportion of female headed households produce cassava, although the effect size is not particularly large.

Table 5.2 Crops produced, by sex of household head

	Ghana female head	Ghana male head	pvalue	sig	Côte d’Ivoire female head	Côte d’Ivoire male head	pvalue	sig
Cocoa	86%	91%	0.02	**	36%	73%	0.00	***
Cassava	84%	84%	0.92		76%	65%	0.01	***
Plantain	82%	80%	0.36		35%	47%	0.01	***
Maize	44%	47%	0.43		20%	36%	0.00	***
Cocoyam	44%	45%	0.84		18%	19%	0.84	
Peppers	31%	26%	0.09	*	1%	0%	0.35	
Yam	20%	25%	0.09	*	50%	48%	0.70	
Tomatoes	24%	20%	0.09	*	34%	27%	0.05	*
Oil palm	9%	15%	0.01	***	4%	7%	0.14	
Okra	14%	14%	0.75		52%	46%	0.18	
Eggplant	8%	10%	0.16		52%	44%	0.04	**
Rice	2%	8%	0.00	***	16%	29%	0.00	***
Bananas	5%	6%	0.27		1%	2%	0.82	
Rubber	3%	6%	0.04	**	10%	20%	0.00	***
Coconut	3%	4%	0.55		0%	1%	0.17	
Other	3%	4%	0.76		8%	6%	0.29	
Oranges	2%	4%	0.19		1%	0%	0.00	***
Cashews	2%	3%	0.41		18%	21%	0.46	
Chili	1%	2%	0.18		62%	52%	0.02	**
Beans	2%	1%	0.14		3%	6%	0.18	
Groundnuts	0%	1%	0.27		21%	25%	0.26	
Coffee	0%	0%	0.63		7%	15%	0.01	***
N	288	1,270			157	1,323		

Note: Table sorted on Ghana male head. Only includes crops for which at least 2% of respondents reported producing in either country

5.2 Crops sold

Distinctions between cash crops and food crops are often not clear cut. A cash crop is often thought of as a non-food commodity, but 'food crops' can also be profitably produced and marketed. The term 'food crop' usually refers to crops produced mainly for household consumption. Confusion arises when some households produce a given crop predominantly for household consumption, whilst other households produce the same crop mainly to sell. In addition, confusion arises when 'cash crops' and 'export crops' are used synonymously, when cash crops can also be produced to market locally or regionally.¹⁹ A good understanding of the distinction between food, non-food, cash and export crops is important in light of the discussion on how the expansion of cash cropping for export affects food production, or pushes subsistence farming to marginal areas.

In our study, we find that many crops commonly thought of as 'food crops' play a dual role, defying a binary categorisation. Table 5.3 presents the percentage of respondents who sold some of their crop if they produced it.

In both Ghana and Côte d'Ivoire, a fairly high proportion of respondents reported selling at least some of their staple food crops, including cassava (Ghana 72%, Côte d'Ivoire 52%), plantain (72%, 38%), maize (62%, 34%), yam (34%, 27%) and rice (80%, 46%).

It should be noted that for some 'cash crops' (such as cocoa, coffee, palm and rubber) not all respondents reported selling the crop last year. In some cases these may have been planted relatively recently, and not yet being mature enough to harvest. In other cases, respondents may have also let old and unproductive trees remain on the land and thus still reported these as being 'produced'.

In Côte d'Ivoire, a higher proportion of female-headed households (48%) reported selling cassava than male-headed households (28%). While the number of female-headed households in the sample in Côte d'Ivoire is too small to draw firm conclusions, it seems plausible that cassava is a more important 'cash crop' for women than for men.

¹⁹ Barbier, E. B. (1987). Cash crops, food crops and agricultural sustainability. Agriculture Programme. Gatekeeper, Series No SA2. Available at <http://eprints.icrisat.ac.in/12180/>

Table 5.3 Percent of households who sold the crop in the last year (if they produced it), by country

	Ghana	Côte d'Ivoire	pvalue	sig
Cocoa	96%	94%	0.02	**
Cassava	72%	52%	0	***
Plantain	72%	38%	0	***
Maize	62%	34%	0	***
Cocoyam	42%			
Peppers	58%	75%	0.50	
Yam	34%	27%	0.01	***
Tomatoes	52%	27%	0	***
Oil palm	79%	62%	0	***
Okra	43%	36%	0.06	*
Eggplant	43%	37%	0.17	
Rice	80%	46%	0	***
Bananas	43%	9%	0.00	***
Rubber	65%	47%	0	***
Coconut	72%	31%	0.00	***
Cashews	80%	69%	0.11	
Chili		44%		
Groundnuts		61%		
Coffee		85%		

Note: The above table has retained the same order as that presented for crops produced.

5.3 Most important crops

Survey respondents were asked what they considered to be their most important and second most important crops. Respondents could interpret 'important' as they saw fit.²⁰

In Ghana and Côte d'Ivoire, cocoa was frequently reported as the most important crop produced by the household (Table 5.4). In the Ghana sample, 79% of respondents said that it was their household's most important crop. By way of contrast, only 4% of respondents said that cassava was their household's most important crop. In Côte d'Ivoire, 53% of respondents also indicated that cocoa was their most important crop. Only 13% indicated that cassava was their household's most important crop.

Table 5.4 also shows changes in perceived importance ascribed to a crop compared with 5 years ago. We observe, particularly in Ghana, an increase in the importance given to cocoa (4%). In Côte d'Ivoire, the growing importance of cashews (3%) is perhaps most remarkable, although this is largely a regional phenomenon (Table 5.8).

²⁰ This question is simpler than asking about the 'most profitable crop', 'most produced', or 'most land under each crop'. Asking about 'importance' shows how households value certain crops. Furthermore, the question was used to ask more detailed questions about the most important and second most important crops later in the survey.

Table 5.4 Most important crop now and five years ago, by country, percentage of respondents

Most important crop	Ghana	Ghana 5 years ago	Côte d'Ivoire	Côte d'Ivoire 5 years ago
Cocoa	79%	75%	53%	52%
Cassava	4%	5%	13%	11%
Rubber	3%	2%	4%	3%
Maize	3%	3%	1%	1%
Plantain	2%	3%	1%	1%
Palm	2%	2%	2%	1%
Rice	1%	1%	4%	2%
Cashews	1%	1%	12%	9%
Yam	0%	0%	2%	3%
N	1,560	1,560	1,485	1,485

Note: Table includes only crops that were cited as the 'most important' by at least 2% of respondents in either country. Differences between Ghana and Côte d'Ivoire were highly significant *** (Pvalue 0.00). Respondents were also asked what crop was the most important 5 years ago. The questions 'What was your household's most important crop last year?', and '5 years ago, what was your household's most important crop?' have been combined into a single table for ease of reading.

While cocoa was clearly found to be the most important crop, both countries reported a lot more variation in their choice of second most important crop. We believe that it is more relevant to look at which crops were identified as either the most or second most important crop, as presented in Table 5.5. In this study, we refer to households that identify cocoa as their most or second most important crop as 'cocoa households'. For other households, we refer to them as 'non-cocoa households'.

In Ghana, currently 84% of respondents identified cocoa as the 'most important' or 'second most important'. A big gap separates cocoa from plantain (26%), cassava (23%) and maize (10%). No other crop in Ghana had more than 10% of respondents identifying it as either their most important or second most important crop. In Côte d'Ivoire, 61% of respondents identified cocoa as the 'most important' or 'second most important'. Cassava was the next most frequently reported at 25% followed by cashews (15%) and rice (12%). No other crop in Côte d'Ivoire had more than 10% of respondents identifying it as either their most important or second most important crop (Table 5.5).

Comparing today with 5 years ago, we observe that, for cocoa households in both Ghana and Côte d'Ivoire, the importance of cocoa increased (5% and 4%) (*highly significant*). In Côte d'Ivoire, cashews (4%) and rubber (2%) became more important. Crops that have declined slightly in importance are plantain, maize and cassava, in Ghana, and yam and coffee in Côte d'Ivoire.

Table 5.5 Most important or second most important crop, now and five years ago, by country

	Ghana					Côte d'Ivoire				
	Now	5 years ago	Change	pvalue	sig	Now	5 years ago	Change	pvalue	sig
Cocoa	84%	79%	5%	0.00	***	61%	57%	4%	0.00	***
Plantain	26%	29%	-3%	0.00	***	5%	6%	0%	0.48	
Cassava	23%	25%	-2%	0.01	**	25%	23%	1%	0.04	**
Maize	10%	13%	-3%	0.00	***	6%	5%	1%	0.30	
Oil palm	8%	8%	1%	0.14		4%	3%	1%	0.00	***
Peppers	5%	4%	1%	0.08	***	0%	0%	0%	0.56	
Rice	5%	5%	0%	0.74		12%	13%	-1%	0.02	**
Rubber	3%	3%	1%	0.00	***	9%	7%	2%	0.00	***
Tomatoes	3%	3%	0%	0.65		2%	2%	0%	1.00	
Cashews	2%	2%	0%	0.10	***	15%	11%	4%	0.00	***
Cocoyam	2%	3%	0%	0.51		0%	0%	0%	0.56	
Okra	2%	1%	0%	0.53		3%	2%	0%	0.18	
Yam	1%	1%	0%	0.21		8%	11%	-3%	0.00	***
Eggplant	1%	1%	0%	0.25		4%	3%	0%	0.37	
Chili	0%	0%	0%	0.08	***	8%	6%	1%	0.00	***
Groundnuts	0%	0%	0%	0.32		5%	5%	0%	0.33	
Coffee	0%	0%	0%			7%	10%	-2%	0.00	***

Note: The above table presents the percentage of respondents in each country for which a crop was reported to be either the most important or second most important crop. This categorisation of 'most important or second most important' was used to ask survey respondents detailed questions about each crop later in the survey. For example, those with cocoa as the most important or second most important crop are defined as 'cocoa households' throughout the book. The table includes only crops reported by at least 2% of respondents in either country, sorted by Ghana.

Male and female headed households reported some differences in terms of crops they rank as being first or second most important (Table 5.6). In Ghana, there was found to be little relatively little difference in the importance of cocoa or any other crop.

Where statistical significance was found, the effect size tended to be relatively small, or the number of observations was quite low.

However, in Côte d'Ivoire, only 31% of female headed households reported cocoa as their most or second most important crop, compared to 65% of male headed households (*highly significant*). Cassava was regarded as important by 40% of female headed households compared with 23% of the male headed households (*highly significant*). For chili, 15% of the female headed households reported this crop being their first or second most important crop, compared with 7% of the male headed households (*highly significant*). Statistical significance was also found for some other crops such as coffee and rubber, however the number of observations is quite low for these other crops making it difficult to make firm claims.

Table 5.6 First or second most important crop, by sex of the household, by country

	Ghana female head	Ghana male head	pvalue	sig	Côte d'Ivoire female head	Côte d'Ivoire male head	pvalue	sig
Cocoa	81%	86%	0.04	**	31%	65%	0	***
Plantain	32%	25%	0.01	**	8%	5%	0.19	
Cassava	24%	23%	0.75		40%	23%	0	***
Maize	9%	10%	0.63		4%	6%	0.46	
Tomatoes	7%	2%	0	***	2%	3%	0.62	
Peppers	6%	4%	0.31		0%	0%	0.73	
Oil palm	5%	9%	0.04	**	3%	4%	0.48	
Cashews	2%	2%	0.52		15%	15%	0.84	
Coconut	2%	2%	0.8		0%	0%	0.55	
Cocoyam	2%	2%	0.84		1%	0%	0.03	**
Rubber	2%	4%	0.31		4%	10%	0.01	**
Okra	1%	2%	0.2		6%	2%	0.01	**
Rice	1%	6%	0	***	10%	12%	0.34	
Chili	0%	0%	0.41		15%	7%	0	***
Coffee	0%	0%	0.63		3%	8%	0.03	**
Eggplant	0%	1%	0.05	**	4%	3%	0.53	
Groundnuts	0%	0%	0.5		7%	5%	0.24	
Yam	0%	1%	0.12		7%	8%	0.53	
N	288	1,270			157	1,323	N	

In Ghana, cocoa was regarded as the most important or second most important crop in all regions sampled. Plantain competed for importance in all regions. Cassava was found to be particularly prominent in the Western region, and much less so in the Eastern region. Maize has relative importance in Brong Ahafo, but has low presence in the Western region. Oil palm stands out in the Eastern region and rice is relatively popular in the Central region (although the sample size in the Central region is quite small so this is not considered to be a strong finding). Two other crops have a regional presence in Brong Ahafo: cashew and peppers. This may be related to its geography as a border region with Côte d'Ivoire, where both cashew and (chili) peppers have more prominence (Table 5.7).

Table 5.7 Most important or second most important crop (combined), by region in Ghana

	Ashanti	Brong Ahafo	Central	Eastern	Western	pvalue	sig
Cocoa	84%	75%	94%	97%	82%	0.00	***
Plantain	37%	25%	35%	25%	20%	0.00	***
Cassava	20%	13%	28%	10%	34%	0.00	***
Maize	14%	20%	8%	13%	3%	0.00	***
Palm	10%	4%	4%	17%	6%	0.00	***
Rice	4%	3%	19%	7%	3%	0.00	***
Peppers	3%	10%	0%	2%	5%	0.00	***
Oranges	3%	1%	0%	2%	0%	0.00	***
Cocoyam	1%	4%	0%	1%	3%	0.02	**
Yam	1%	4%	0%	0%	1%	0.00	***
Coconut	0%	0%	0%	0%	4%	0.00	***
Pineapple	0%	4%	0%	0%	0%	0.00	***
Tomatoes	0%	3%	1%	1%	6%	0.00	***
Cashews	0%	13%	0%	0%	0%	0.00	***
Rubber	0%	0%	0%	0%	8%	0.00	***
N	317	270	72	256	645	N	

Note: table shows only those crops where at least 3% of respondents indicated it was their households most important or second most important crop in at least one region. Sorted on Ashanti. This categorisation of 'most important or second most important' was used to ask survey respondents detailed questions about each crop later in the survey. For example, those with cocoa as the most important or second most important crop are defined as 'cocoa households' throughout the book.

In Côte d'Ivoire, we also observe some differences between districts. Cocoa was frequently regarded as the most or second most important crop, particularly in Lagunes, Bas-Sassandra and Sassandra-Marahoue, whereas in other districts, such as Yamoussoukro and Zanzan, only a small number of respondents saw cocoa as one of their most important crops. Cassava instead stands out in Yamoussoukro, and cashew is dominant in Zanzan. Oil palm is most prominent in Goh-Djiboua, while rice was relatively important in different districts, particularly in Montagnes and Sassandra-Marahoue (Table 5.8).

Table 5.8 Most important or second most important crop (combined), by district in Côte d'Ivoire

	Bas-Sassandra	Comoe	Yamoussoukro	Goh-Djiboua	Lacs	Lagunes	Montagnes	Sassandra-Marahoue	Zanzan	pvalue	sig
Cocoa	84%	74%	13%	79%	40%	91%	67%	81%	23%	0.00	***
Plantain	1%	2%	0%	5%	10%	7%	5%	5%	5%	0.00	***
Cassava	23%	12%	79%	21%	28%	29%	24%	20%	1%	0.00	***
Maize	3%	1%	7%	5%	5%	2%	2%	9%	16%	0.00	***
Oil palm	3%	16%	1%	31%	0%	0%	0%	0%	0%	0.00	***
Rice	18%	1%	0%	17%	4%	1%	28%	27%	0%	0.00	***
Peppers	0%	0%	1%	0%	0%	0%	0%	0%	0%	0.05	**
Oranges	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Cocoyam	0%	1%	0%	0%	0%	1%	0%	0%	2%	0.20	
Yam	3%	4%	22%	0%	20%	0%	0%	2%	16%	0.00	***
Coconut	0%	0%	0%	0%	0%	0%	0%	0%	2%	0.00	***
Pineapple	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Tomatoes	0%	0%	20%	0%	5%	0%	1%	0%	0%	0.00	***
Cashews	0%	0%	9%	0%	23%	0%	0%	5%	92%	0.00	***
Rubber	14%	58%	0%	4%	2%	27%	6%	1%	2%	0.00	***
N	159	97	90	136	358	126	142	251	126		

Note: This categorisation of 'most important or second most important' was used to ask survey respondents detailed questions about each crop later in the survey. For example, those with cocoa as the most important or second most important crop are defined as 'cocoa households' throughout the book.

5.4 Number of crops produced

Household cropping systems are characterised by a fair diversity of crops. Table 5.1 above presented the diversity of crops produced within the cocoa regions of Ghana and Côte d'Ivoire. We find that in Ghana, cocoa households produced 5.08 different crops in the last year compared with 4.60 for non-cocoa households (*highly significant*). This pattern is repeated in Côte d'Ivoire, where cocoa households grew 6.09 crops in the last year, compared with 5.46 crops for non-cocoa households (*highly significant*).

Two findings stand out here. First, in both Ghanaian and Ivorian cases, cocoa households feature greater crop diversification than non-cocoa households (*highly significant*). Second, Ivorian households have greater crop diversity (number of crops) than Ghanaian households. Both of these findings are linked to land size.

Cocoa households have on average slightly larger areas of cultivated land than non-cocoa households, and Ivorian households have larger plots of land than Ghanaian households.

This finding should dispel any myths that cocoa households lack crop diversity, at least in relation to other farming households in cocoa regions.

Table 5.9 Crop diversity, number of crops produced, by cocoa vs non-cocoa households

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
Mean	5.08	4.60	0.01	***	6.09	5.46	0.00	***
std.error	0.07	0.17			0.11	0.12		
N	1,318	242			910	575		
n_crops_produced								

In Ghana, there is no significant difference in the number of crops produced by male and female headed households. In Côte d'Ivoire on the other hand, there is a small difference, with female headed households producing around half a crop less than male headed households (*significant*). Nevertheless, female headed households in Cote d'Ivoire remain more diversified than male headed households in Ghana (Table 5.10).

Table 5.10 Crop diversity, number of crops produced, by sex of household head

	Ghana female head	Ghana male head	pvalue	sig	Côte d'Ivoire female head	Côte d'Ivoire male head	pvalue	sig
Mean	4.79	5.05	0.12		5.29	5.92	0.02	**
std. error	0.15	0.07			0.24	0.09		
N	288	1,270			157	1,323		
n_crops_produced								

In Ghana, this pattern changes little when we consider the number of crops sold. Cocoa households were also found to have sold, on average, a higher number of crops (3.42) than non-cocoa households (2.88) in the last year (*highly significant*) (Table 5.11). This is not particularly surprising because, on average, cocoa households grow a slightly higher number of crops on larger plots of land than non-cocoa households.

In Côte d'Ivoire, cocoa households sold 2.87 different crops last year, which was not significantly different to non-cocoa households (Table 5.11). This also shows that while Ivorian households produce a higher number of crops, they market proportionally fewer than Ghanaian households. This can probably be explained by the fact that Ivorian households reported producing more horticultural produce such as chilli, eggplant, tomatoes and okra, which may be planted in small gardens for household consumption.

Table 5.11 Number of crops sold, by cocoa vs non-cocoa household

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
Mean	3.42	2.88	0.00	***	2.87	2.72	0.14	
std.error	0.05	0.12			0.06	0.08		
N	1318	242			910	575		
n_crops_sold								

5.5 Crop combinations and diversification

There are quite a number of studies that discuss diversification in relation to cocoa farming, and different definitions are being used. Aneani *et al.*, (2011a) define agricultural diversification as: “The growing of new and/or different crops in addition to an existing one, or engaging in off- and non-farm activities using farm resources.”²¹ This understanding of diversification implies that it involves a shift in crop choice and combinations. A distinction that is often made is between ‘horizontal’ diversification or ‘vertical’ diversification.^{22,23,24} Horizontal diversification is about producers who move into or mix existing crop with other crops, horticulture, fisheries, and livestock. In such an approach, farmers could still be involved in the existing activity or they could move out of it completely. Vertical diversification involves graduating to a higher value-adding activity by going further downstream in the value chain.

In this study, we focus on ‘horizontal’ diversification. Horizontal (crop) diversification can take place by using separate fields for additional crops or intercropping. Intercropping is usually employed during the replanting of cocoa farms. The crops, such as plantain, provide shade for the young cocoa trees, while simultaneously providing the household with an income and food security.²⁵

The distinction between diversification and conversion relates to the scale at which we analyse the process. If farmers believe that they would be better off by allocating some of their labour or capital to a new crop, they have several options to do so. For example, instead of filling gaps in an old cocoa plantation with new cocoa seedlings,

²¹ Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

²² Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

²³ ICCO (2010). Inventory of diversification strategies on cocoa farms. Consultative board on the World Economy, 22nd meeting. London 13th of September 2010. Available at: https://www.icco.org/about-us/international-cocoa-agreements/cat_view/30-related-documents/32-consultative-board-on-the-world-cocoa-economy.html

²⁴ Ruf, F., & Schroth, G. (Eds.). (2015). *Economics and ecology of diversification: the case of tropical tree crops*. Springer. Available at: <http://www.springer.com/cn/book/9789401772938>

²⁵ Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

they can introduce an additional crop (banana, fruit, timber or rubber). Alternatively, they could decide to cut down the old cocoa trees when rubber trees or fruit trees are nearing the start of production, or even to cut down the old cocoa trees at the outset to make a rubber or teak plantation. Finally, different farmers in the same village or landscape may specialise in different crops. In this case, households and farms are specialised, but diversification takes place at the landscape level. In this scenario, the risks of specialisation are reduced at the regional level, but they remain high at the household level.²⁶

Diversification is not a new phenomenon. Ruf & Schröth (2015)²⁷ have explained the reasons for diversification in detail. Actually, they argue that for Côte d'Ivoire, the 'cocoa boom' of the 1970s can be seen as diversification at the national level from coffee cultivation to cocoa. This was influenced to a great extent by a decline in world coffee prices compared to those of cocoa, and also by guaranteed procurement prices for cocoa which encouraged adoption. According to the authors, there are innumerable cases of farmers adopting a new crop because of its more favourable price.

Another important, and linked, reason to diversify is to reduce risks. Volatility in international markets - partly stemming from boom-and-bust cycles - is one of the risks of producing a commodity like cocoa, coffee, rubber, oil palm, clove or pepper. Fluctuations in farm-gate prices are also linked to national policies, especially taxation policies.²⁸ According to Ruf & Schroth, diversification of cocoa cultivation towards rubber production observed in West Africa, especially in Côte d'Ivoire, reveals in particular the risks of replanting cocoa in a degraded environment. They pointed out that diversification is also response to the depletion of environmental resources. Thus, ecological change in these areas has clearly been identified as a factor, not only in farm abandonment and migration but also in diversification into alternative crops.²⁹

Other determinants of crop diversification are credit, market availability, land availability and size, land suitability and rights, infrastructure, public policy, behaviour of neighbours, labour requirements of certain crops, water availability and other resources.^{30,31,32}

²⁶ Ruf, F., & Schroth, G. (Eds.). (2015). *Economics and ecology of diversification: the case of tropical tree crops*. Springer. Available at: <http://www.springer.com/cn/book/9789401772938>

²⁷ Ibid

²⁸ Ibid

²⁹ See also Malézieux, É., & Moustier, P. (2005). La diversification dans les agricultures du Sud: à la croisée de logiques d'environnement et de marché I. Un contexte nouveau. *Cahiers Agricultures*, 14(3), 277-281. Available at: <http://revues.cirad.fr/index.php/cahiers-agricultures/article/view/30519>

³⁰ Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

³¹ Wiggins, S & Leturque, H. (2011). *Ghana's sustained agricultural growth: Putting underused resources to work*. London: ODI Publications. Available at: <https://www.odi.org/publications/5059-ghana-agriculture-growth-development-progress>

³² Malézieux, É., & Moustier, P. (2005). La diversification dans les agricultures du Sud: à la croisée de logiques d'environnement et de marché I. Un contexte nouveau. *Cahiers Agricultures*, 14(3), 277-281. Available at: <http://revues.cirad.fr/index.php/cahiers-agricultures/article/view/30519>

Diversification is increasingly promoted as a pathway to move 'out of poverty'. Oomes *et al.* (2016)³³ promote a dual transition whereby conditions are being created that would allow cocoa farmers to earn alternative income sources and become less dependent on cocoa. Ruf & Schroth (2015) agree that crop diversification usually leads to a better distribution of income and labour over the year.

Not all crops are seen as alternatives to cocoa, and there are important regional differences that affect diversification.³⁴ Ruf & Schroth (2015) and Aneani *et al.* (2011a)³⁵ point out that diversification or conversion of cocoa to another tree crop is a slow process since both crops are fixed assets from which an income can be derived for over 20 years. Therefore, they argue that unless the benefits of other tree crops are higher for a longer period of time, the farmer will not convert his cocoa farm into that activity. According to Ruf & Schroth (2015), "It is for this reason that rubber took several decades to emerge as a real alternative to cocoa in countries such as Côte d'Ivoire and Ghana."

In our study, we looked at current crop combinations and diversification patterns. In Ghana, it is well known that cassava and plantain are both staple food crops which are easily marketed and area also often intercropped on young cocoa farms^{36,37} (Table 5.12). The crop combinations in Côte d'Ivoire (Table 5.13) show more variation and less strong patterns. As in Ghana, cocoa is most often produced in combination with cassava and plantain.

³³ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C. & Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

³⁴ Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

³⁵ Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

³⁶ Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

³⁷ Ameyaw, K., Oppong, F. K., Acheampong, K., & Amoah, F. M. (2012). Long Term Assessment of the Agronomic and Economic Benefits of Cocoa Food Crop Intercropping in the Absence of Fertilizer Application. *American Journal of Experimental Agriculture*, 2(2), 186-197. Available at: http://www.journalrepository.org/media/journals/AJEA_2/2012/Mar/1331451859-Opoku-Ameyawetal_2011AJEA1015.pdf

Table 5.12 Crop combinations, percent of respondents reporting that the household produces each crop pair, Ghana

	Bananas	Cashews	Cassava	Chili	Cocoa	Coconut	Cocoyam	Eggplant	Maize	Okra	Oranges	Oil palm	Pepper	Pineapple	Plantain	Rice	Rubber	Tomatoes	Yam
Bananas		0	6	0	6	1	4	2	4	2	1	2	3	1	6	1	1	3	4
Cashews	0		3	0	3	0	2	1	2	1	1	1	1	0	3	0	0	1	2
Cassava	6	3		2	76	3	43	9	43	13	3	13	25	2	76	5	4	19	23
Chili	0	0	2		2	0	2	1	2	1	0	1	0	0	2	0	0	1	2
Cocoa	6	3	76	2		3	43	9	42	13	3	13	24	2	74	6	2	18	23
Coconut	1	0	3	0	3		2	1	2	1	0	2	2	0	3	0	1	1	1
Cocoyam	4	2	43	2	43	2		7	27	9	2	7	16	1	43	3	1	13	18
Eggplant	2	1	9	1	9	1	7		7	6	1	2	7	1	9	1	1	7	5
Maize	4	2	43	2	42	2	27	7		11	2	8	18	1	42	4	2	14	17
Okra	2	1	13	1	13	1	9	6	11		1	3	11	1	13	1	1	9	7
Oranges	1	1	3	0	3	0	2	1	2	1		1	1	0	3	0	0	1	1
Oil palm	2	1	13	1	13	2	7	2	8	3	1		4	1	12	1	1	4	5
Pepper	3	1	25	0	24	2	16	7	18	11	1	4		1	24	1	2	15	11
Pineapple	1	0	2	0	2	0	1	1	1	1	0	1	1		3	0	0	1	1
Plantain	6	3	76	2	74	3	43	9	42	13	3	12	24	3		4	3	19	22
Rice	1	0	5	0	6	0	3	1	4	1	0	1	1	0	4		0	1	1
Rubber	1	0	4	0	2	1	1	1	2	1	0	1	2	0	3	0		2	1
Tomatoes	3	1	19	1	18	1	13	7	14	9	1	4	15	1	19	1	2		9
Yam	4	2	23	2	23	1	18	5	17	7	1	5	11	1	22	1	1	9	

Note: Figures presented in the above table are percentages of households who report producing each pair. The percentage sign has been removed for legibility. Crops that do not have at least one crop pair produced by 3% of respondents have not been included.

Table 5.13 Crop combinations, percent of respondents reporting that the household produces each crop pair, Côte d'Ivoire

	Beans other	Cashews	Cassava	Chili	Cocoa	Cocoyam	Coffee	Eggplant	Groundnuts	Maize	Okra	Oil palm	Plantain	Rice	Rubber	Tomatoes	Yam
Beans other		1	4	4	5	2	2	4	3	4	4	1	3	4	1	2	2
Cashews	1		13	14	9	6	2	9	8	9	12	0	10	2	1	7	16
Cassava	4	13		42	45	17	10	36	18	25	37	4	38	17	12	23	38
Chili	4	14	42		35	17	8	39	19	24	41	2	33	14	9	24	35
Cocoa	5	9	45	35		15	14	30	15	24	31	5	37	24	16	20	28
Cocoyam	2	6	17	17	15		4	14	7	11	16	0	17	3	5	13	15
Coffee	2	2	10	8	14	4		7	5	6	7	1	8	6	3	5	6
Eggplant	4	9	36	39	30	14	7		17	20	35	2	28	13	9	23	28
Groundnuts	3	8	18	19	15	7	5	17		14	18	1	14	7	4	12	17
Maize	4	9	25	24	24	11	6	20	14		22	2	20	13	6	16	20
Okra	4	12	37	41	31	16	7	35	18	22		2	28	13	8	23	31
Oil palm	1	0	4	2	5	0	1	2	1	2	2		2	3	3	1	2
Plantain	3	10	38	33	37	17	8	28	14	20	28	2		12	10	20	28
Rice	4	2	17	14	24	3	6	13	7	13	13	3	12		5	5	7
Rubber	1	1	12	9	16	5	3	9	4	6	8	3	10	5		6	7
Tomatoes	2	7	23	24	20	13	5	23	12	16	23	1	20	5	6		21
Yam	2	16	38	35	28	15	6	28	17	20	31	2	28	7	7	21	

Note: Figures presented in the above table are percentages of households who report producing each pair. The percentage sign has been removed for legibility. Crops that do not have at least one crop pair produced by 3% of respondents have not been included.

Data collected during focus group discussion revealed several reasons for the high frequency of pairing of cocoa with plantain or cassava. First, cassava and plantain provide excellent possibilities for intercropping with young cocoa; Second, pairing these crops provides additional income more regularly and in the cocoa off-season; Third, households regard cassava and plantain as nutritious staple foods, and for these crops often fit current gender roles within households. For example, men are typically the ones engaged in heavy work such as land clearing and land preparation. When cocoa is young, women often tend to these and are responsible for the food crops that are intercropped with cocoa. Women are also frequently involved in processing and sales of cassava.

Other crops can be said to be ‘competing’ with cocoa. Households weigh up a variety of economic and non-economic reasons for their crop choices. Table 5.14 and Table 5.15 summarise participant responses from focus group discussions as to why they produce certain crops, in respectively Ghana and Côte d’Ivoire.³⁸

In the focus group discussions cocoa stood out as a point of reference. Participants often highlighted how certain crops complement cocoa - in terms of seasonal cycles, additional income, household consumption, or intercropping. Participants also often described why cocoa had an edge over other crop options when discussing benefits and challenges. Benefits (or opportunities) can be thought of as ‘pull factors’, which encourage a move into a certain crop. For example, a good, reliable market might give a household the confidence to invest a proportion of their land and labour to another crop. On the other hand, challenges can be regarded as ‘push factors’, which, if strong enough, may lead a household to leave a certain crop when there is perceived to be a better option available. Push factors may include a price crash, or deterioration of environmental suitability.

³⁸ This topic was discussed in total 76 focus group discussions, 38 in each country.

Table 5.14 Reasons to produce certain crops in Ghana, summary of farmers' perceptions

	Major benefits	Other benefits
Cocoa	<ul style="list-style-type: none"> • High income, guaranteed price, bulk income, easy to market • Land tenure security if cocoa is on the land. Land can be bequeathed to children • Harvested in a main and light season • Regarded as nationally important because it generates foreign exchange • Regarded as a traditional crop 	<ul style="list-style-type: none"> • Relatively short period to mature for a tree crop • Institutional support from COCOBOD in the form of training, inputs and price guarantees. • Less labour intensive than many crops, does not require replanting for at least 25 years. • Climate and soil is suitable • Credit more obtainable because cocoa income is reliable • Cocoa byproducts provide small additional revenue (mainly women)
Cassava	<ul style="list-style-type: none"> • Household staple food, ingredient in Fufu. • Regarded as a good source of energy and nutrition. • Reduces household food expenditure • Provides additional income to cocoa • Can be left in the soil to grow until needed for sale or consumption • Relatively fast maturing varieties available (6 months-1 year) • Can be intercropped with young cocoa trees • Easy to grow, low labour inputs 	<ul style="list-style-type: none"> • Can be processed into Gari which can be preserved. • Easy to market locally. Can be sold in multiple ways (harvested, sell the plot, processed as Gari) • Byproduct can provide feed for farmers' livestock
Plantain	<ul style="list-style-type: none"> • Household staple food, ingredient in Fufu, Red red stew, boiled in Ampesi • Reduces household food expenditure • Regarded as a good source of energy and nutrition. • Can be intercropped with young cocoa trees, providing shade • Provides additional income, particularly during the light cocoa season; • Bunches of plantain can be regularly harvested 	<ul style="list-style-type: none"> • It does not require replanting, requires low labour inputs
Maize	<ul style="list-style-type: none"> • Household staple food, ingredient in Banku and Kenkey • Reduces household food expenditure • Can be easily stored for consumption in the lean season or future sale • Can be harvested 2 times a year • Short maturation period of around 3 months 	<ul style="list-style-type: none"> • Easy to market locally. It can provide bulk income if sold at once • Byproduct leaves and stems can be used as livestock feed, grain as poultry feed
Oil palm	<ul style="list-style-type: none"> • Good income, steady source of weekly and monthly income; • Processed into oil for sale and consumed in the household with soup 	<ul style="list-style-type: none"> • A variety of products can be produced from oil palm, such as variety of oils, palm wine, local gin, soap, woven products from leaves, broom handles etc.
Rubber	<ul style="list-style-type: none"> • Regular income from rubber tapping • Generates jobs, including for youth 	<ul style="list-style-type: none"> • It is a new alternative to try

In the focus group discussions the focus was on reasons to grow certain crops, and not so much on challenges. However, participants mentioned some risks and challenges. In Ghana, for plantain and maize it was mentioned that the high supply in the main season drives the prices of these crops down. Oil palm was considered to be particularly hard work. In both countries, a major constraint for producing rubber was the long maturation period of 5-7 years. In Côte d'Ivoire, farmers emphasised some of the risks involved in coffee production. Coffee is perceived as traditional crop by many farmers. The reason why farmers shifted to cocoa was because coffee production was declining in the research areas, it is less profitable than cocoa, while it is more labour intensive than cocoa and there is only one harvest per year.

Table 5.15 Reasons to produce certain crops in Côte d'Ivoire, summary of farmers' perceptions

	Major benefits	Other benefits
Cocoa	<ul style="list-style-type: none"> • High income, guaranteed price, bulk income, easy to market • Harvested in a main and light season 	<ul style="list-style-type: none"> • National importance & traditional crop in some areas • Less labour intensive than other crops • Allows for intercropping on young farms (unlike rubber)
Cassava	<ul style="list-style-type: none"> • Household staple food, ingredient in Plakali (Fufu) • Can be fermented into Attieke and processed into Gari. • Additional source of income between cocoa seasons, some produce it as a major cash crop 	<ul style="list-style-type: none"> • Soil and climate suitability • Can be intercropped with young cocoa • Easy to sell at local markets
Plantain		<ul style="list-style-type: none"> • Household staple food, ingredient in Plakali (Fufu) • Additional income, easy to market • Intercropped (with young cocoa and young rubber.
Maize		<ul style="list-style-type: none"> • Household staple food • Easy to market locally • Byproduct leaves and stems can be used as livestock feed, grain as poultry feed
Oil Palm	<ul style="list-style-type: none"> • Good income, steady source of weekly and monthly income; • Processed into oil for sale and consumed in the household with soup 	<ul style="list-style-type: none"> • A variety of products can be produced from oil palm, such as variety of oils, palm wine, local gin, soap, woven products from leaves, broom handles etc.
Coffee	<ul style="list-style-type: none"> • Traditional crop in many areas • Good source of income, relatively good price; • Easy to market to pisteurs • Can harvest before the main cocoa season • Once planted coffee takes around 5 years to mature and can produce for 50 years or more 	<ul style="list-style-type: none"> • Dried coffee can be stored • With good pruning the coffee tree will start producing well again after 2 years.
Rubber	<ul style="list-style-type: none"> • Regular income from rubber tapping • Generates jobs, including for youth and those without land • Can replace cocoa in areas that have become less suitable for cocoa production • Can replace coconut if affected by diseases • Land planted with rubber can be bequeathed to children • Maintenance costs is said to be relatively low • Relatively few inputs are used. 	<ul style="list-style-type: none"> • Rubber is more resistant to a changing climate than cocoa

5.6 Summary

Cocoa is the most frequently produced crop in the researched areas of Ghana and Côte d'Ivoire. In Ghana, cocoa was produced by a high proportion of both male and female headed households in all regions. In Côte d'Ivoire, cocoa was found to be more commonly produced by male headed households, and there was more regional variation in the frequency of production.

In Ghana, the next most frequently produced crops are cassava and plantain. These crops partly derive their popularity from their role as being both food and cash crops. A further advantage is that they can be intercropped with young cocoa and act as shade trees.

In Côte d'Ivoire, the next most frequently produced crop was cassava. It is not uncommon for female headed households to treat cassava as a 'cash crop'. Other frequently produced crops are chili, okra, plantain, eggplant, and maize.

‘Cash crops’ such as rubber, cashew, palm and coffee are frequently mooted as alternatives to cocoa, but these are all produced at much lower rates in both countries (with some regional exceptions).

Many crops commonly thought of as ‘food crops’ actually play a dual role. Staple crops such as cassava, plantain, maize, yam and rice are frequently sold in both countries to supplement household incomes.

The study confirms the systematic intercropping of plantain and cassava on young cocoa farms before the canopy closes after 3-5 years. However, care should be taken with the interpretation of ‘intercropping’. Cocoa trees are not necessarily planted in rows, and intercropping with cocoa can be more in patches.

Cocoa households already diversify their crops, both for economic and non-economic reasons.

Cocoa households are actually more diversified than non-cocoa households in both Ghana and Côte d’Ivoire. The higher number of crops produced is correlated with the slightly larger average land sizes of cocoa households compared with non-cocoa households. There is no evidence that cocoa has adversely displaced crops needed for household food security.

More respondents report cocoa to be their most important crop than any other. This capacity of cocoa to remain attractive and important despite long periods of declining prices and revenues is explained by many factors. Among them are the guaranteed market and established knowledge and habits.

Competing crops are not (yet) perceived to be better than cocoa; the importance of cocoa is growing. The importance of cocoa was said to have increased in the past 5 years in both Ghana and Côte d’Ivoire. Presently, there are no signs that households will move out of cocoa in the short to medium term.