

# Farm Development Plans for Smallholder Cocoa Farmers in Ghana

# **Final Evaluation**

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### **EXECUTIVE SUMMARY**

#### Introduction

Satellite for Farming, or Sat4Farming, is a consortium of the Rainforest Alliance (lead institution), Touton, Grameen Foundation, University of Ghana, WaterWatch Projects (now AuxFin), and Satelligence and is funded by the Geodata for Agriculture and Water (G4AW) program of the Netherlands Space Office (NSO). Sat4Farming seeks to triple yields of cocoa farms from 400 kg/ha to 1,500 kg/ha within a decade through a strong focus on supporting farmers to renovate and rehabilitate their farms. The major vehicle through which the overarching goal will be achieved is the deployment of a digital agriculture advisory tool, known as FarmGrow. Agronomists use FarmGrow to observe and document farm conditions and farmer practices as well as to provide farmers with individualized coaching support that focuses on increased adoption of good agricultural practices (GAPs) and onfarm investments to improve planting material, farm and soil conditions (together these are considered adoption observations, or AOs). Each of the fourteen AOs are scored as 'good', 'medium' or 'bad' based on predetermined criteria. These scores, when combined with farmer profile data such as household income, expenditures, and labor sources, result in an 8-to-10 year investment plan outlining the profits and losses expected if the recommendations based on the AOs are followed. FarmGrow farmers can be assigned to one of eleven recommendation cohorts, depending on the status of their farm at the diagnostic stage: 'extra soil management (ESM)', 'replant', 'replant plus ESM', 'thin out', thin out plus ESM', 'fill in', 'fill in plus ESM', 'grafting', 'grafting plus ESM,' 'maintenance GAPs' or "/o farmer development plan'. After an initial diagnostic visit, the agronomist will return to monitoring progress with the farmer, based on an agreed-upon timeline.

#### Methodology

Given FarmGrow's theory of change relies on an 8- to 10-year plan with farmers, the project and research period is relatively short, allowing change to be detected only during a 2- to 3-year period, depending on the methodology used. The key performance indicator for FarmGrow is therefore a change in the AO scores, which can be scored as good, medium, or bad, as these are short-term behaviors and conditions that can change in a one-year period. All other indicators tracked, such as typical agricultural measures like output, yield, and income, are therefore considered more descriptive in nature and are used to deepen our understanding of the farmer profile. Under the Sat4Farming project, multiple research methodologies were used with Touton Ghana cocoa farmers, their spouses, and Touton's agronomists and staff, to monitor and evaluate change to provide insights into shortterm changes. A mixed-methods, quasi-experimental design was deployed by the University of Ghana (UofG) comparing outcomes between FarmGrow farmers and a comparison group between 2018 and 2020. FarmGrow data, assessing FarmGrow farmers only, was analyzed using the FarmGrow business intelligence tool and was conducted by the FarmGrow team as a point of comparison and triangulation, and also includes data from 2021. Important limitations of the study are the impact of the COVID pandemic which slowed Touton's engagement with farmers, particularly during 2020, and the negative impact of COVID on farmers' lives and livelihoods. The results of the Sat4Farming project should therefore be interpreted with this constraint in mind.

#### **Key Findings**

#### Participation

Along with ageing cocoa farms, concern has been raised about ageing cocoa farmers. FarmGrow data validates limited participation by young farmers (the average age is 53 and approximately 19 percent of farmers are age 35 and younger). Female farmers also make up a small percentage of farmers: 30 percent of all Touton farmers reached through Sat4Farming were women. Given Touton Ghana

prioritized working with land owners, assuming they would have the most decision-making power regarding farm investment, most landowners are older and male. While many farmers interviewed inherit their land, this most often occurs when a family member passes away. This does not mean younger farmers and women are not working the land, they are simply not visible until they inherit land, which can also limit their access to other resources, like credit, that can require collateral, such as land.

Participating cocoa farming households, despite being selected by Touton for their greater likelihood of adopting GAPs and capable of investing on their farms, are vulnerable. They are food insecure (68%), approximately 13 percent live below the USD \$3.10 international poverty line. Almost a quarter of them report that someone in their household suffers from a chronic illness, and the dependency ratio increased between baseline and endline suggesting increased stress on income earners to provide financially for the household. Almost half of farmers felt somewhat negatively impacted by COVID-19 due to loss of income and ability to travel freely.

#### Adoption Observations

Prior to the start of the FarmGrow implementation, Touton provided the profile data of 4,242 farmers. During the four-year project period, Touton aimed to conduct farm and plot diagnostics to establish baseline AOs. From the entire cocoa farm, participating farmers allot a maximum of two plots to FarmGrow to help limit the risk of the new financial investments. By the end of 2021, 4,064 farmers had completed a farm diagnostic, consisting of a total of 6,518 individual plots; 99 percent had agreed with the FarmGrow investment plans for their plots; and, 70 percent had received a monitoring visit, either through the agronomist or coach, of which the agronomist visit (also known as a "manager" visit") is considered the official monitoring visit. While approximately 480 plots had received a monitoring visit by a manager between 2018 and 2021, approximately 4,000 plots had been monitored by a coach.

Out of those who agreed to pursue a FarmGrow investment plan, a little over 40 percent of Touton's farmers in Ghana have received the recommendation to 'replant + ESM' followed by 'ESM' (27%) and 'grafting + ESM' (22%). Out of the fourteen AOs evaluated by Touton agronomists or coaches, farmers were receiving a score of 'good' for about 71 percent of them (or 10 out of the 14 AOs). At the diagnostic phase, the AOs most receiving a score of 'good' were organic matter, physical soil condition, free of debilitating disease, harvesting and tree health. At the monitoring phase, the AOs most receiving a score of 'good' were organic matter, physical soil condition, harvesting, free of debilitating disease and weeding. Weeding as a practice experienced the greatest improvement for both male and female farmers. While there was important progress being made on the AOs, 93 percent of the monitored plots received a 'fail' score, meaning the farmer had not achieved agreed-upon progress. Lack of finances as the primary reason given by the farmers for failure. Qualitatively, farmers also reported experiencing financial and emotional difficulty of cutting down their trees or applying the recommended amounts of fertilizer. These are the most expensive recommendations to follow, which most of the farmers (90%) received.

While there were improvements in self-reported GAP adoption rates seen in both the treatment and comparison groups according to the UofG data, the AO scores from the Touton managers or coaches were much more conservative, suggesting that farmers were likely to over-report their actual practices. Two different regression analyses hint at the factors that influence GAP adoption or positive AO scores. According to analysis conducted using the FarmGrow data, farmer *attitudes towards farming, sex of the farmer, farm age, and cocoa productivity, number of family members, plot area, and whether the farmer hired labor predicted positive AO scores. According to the UofG data, <i>access to agricultural extension, being a male, household size, cocoa farming income per capita, and land* 

*ownership* predict GAP adoption. While there is not one-to-one overlap between the two regression analyses in terms of same variables being studied as well as the data source (how they were collected), both analyses suggest the sex of the farmer and household size influence farmer practice.

#### Farm and Farmer Outcomes

According to UofG data, both the comparison and treatment groups reported receiving some form of agricultural extension support, with a notable increase of extension received by government officers for both groups, which was not anticipated. The proportion of FarmGrow beneficiaries successfully accessing farm credit significantly increased from 14 percent to 28 percent, but the comparison group had similar increases. Cocoa purchasing clerks are the most commonly used source for day-to-day credit needs and ironically are not often used for farm investment.

As noted earlier, short-term changes in agricultural yields and cocoa income were not anticipated; however, these were evaluated to help understand a farming household's capacity to invest. Accounting for inflation between 2018 and 2021, the treatment group saw a nominal increase in average household income (GHS +1,298, or a 9% increase, which is likely driven by outliers), but a decrease in median household income (GHS -236, or 2% decrease) while the comparison group saw a nominal decrease in mean (GHS -1,921, or an 11% decrease) and median (GHS -856, 9% decrease) real annual household income. Both the treatment and comparison groups saw marginal increases in average and median cocoa output, yield, income, and farm income per hectare. The treatment group's average income per hectare of cocoa increased significantly by 23 percent from GHS 2,811 to GHS 3,453 compared to just a one percent increase in the comparison group, from GHS 2,767 to GHS 2,797. While the treatment group experienced an increase in farm size between baseline and endline, which is most likely due to a similar increase in land purchases among treatment group farmers, the comparison group did not, which largely explains the difference in income per hectare of cocoa between the groups. By the endline, the treatment and comparison groups had similar amounts of land under cocoa production. While most farmers rely on cocoa, it may not be the highest-paying income source; in fact, if a farmer reported other income sources, the sources were often providing double the amount of income compared to cocoa. From the qualitative interviews, some farmers perceive cocoa farming as a passive income source--one that with little investment provides a modest stream of income that supplements other income generation.

#### Gender

When comparing male and female FarmGrow farmers, men started out with better performance and maintained this advantage during the project period; however, women are making important gains. Where there are improvements in practices and outcomes, women farmers appear to be equally benefiting as--if not more than--the men are from the FarmGrow support. Female farmers in the treatment group, while having less land than men, experienced greater yields and cocoa income per hectare whereas women in the comparison group continued to have less land, less yield and cocoa income per hectare compared to their male counterparts.

While a regression analysis conducted by UofG found that men were more likely to adopt GAPs compared to women, an analysis conducted by the FarmGrow team found that women were most likely among those with above-average AO scores (scoring 'good' on more than the average 10 per 14 AOs). The agronomists and farmers interviewed felt that women were more likely to trust the agronomist, influencing their decisions to improve their practices. There were mixed qualitative results in whether female spouses of the cocoa farmers supported by Touton were aware of the FarmGrow plans or whether they were present when the manager or coach visited the farm. Some women felt Touton took their needs into account and others did not. Women noted their appreciation of Touton's efforts to expand savings groups which supported women's ability to invest in non-cocoa farm or non-farm businesses.

#### Satisfaction with FarmGrow

The profit-and-loss statements generated by the Touton agronomists, the specific recommendations provided for farm improvement, and understanding soil conditions were the most valued FarmGrow services reported by FarmGrow farmers. Overall, 93 percent of the farmers were willing to recommend FarmGrow to other cocoa farmers in their communities. When farmers voiced dissatisfaction, this was due to the agronomists or coaches not making frequent enough visits to their farm.

#### Recommendations

Based on these key findings, the following are recommendations, not only for future use of FarmGrow, but for other cocoa farming support efforts as well:

- Redefine the definition of "farmer". The project's focus on onboarding land-owners or farm decision-makers excluded the participation of female and young cocoa farmers from the start as they are considered "secondary" or "workers/helpers" but not "farmers" or "decision-makers". Future programmes on cocoa productivity enhancements should intentionally design strategies to target interested youth and women for participation and/or engage female and young household members during extension visits to ensure that they are equipped with the knowledge and skills they may need if they find themselves running the farm upon inheritance, during the out-migration of the primary farmer, or in the absence of or the death of a primary farmer. This is also important to ensure household cooperation for the financial investment needed to pursue the FarmGrow plan and to mitigate the harm that could be caused by a farmer sabotaging a wife's or younger household members' own income or overburdening their income-generating activities until newly planted plots are reaching productivity expectations.
- The fear of lost income, loss of land, and the pain from simply cutting down trees has to be addressed to build farmer confidence in the benefits of replanting. This could be achieved by building in income diversification strategies, using FarmGrow data to support land rights, and intentionally acknowledging the pain of cutting down trees. More research is needed on how to improve farmer attitudes and perceptions regarding the recommendations made to improve cocoa productivity.
- Income diversification should be built into FarmGrow. Data collected by the platform, complemented with other data sources, could be used to make better data-informed recommendations on income-diversification strategies. For farmers whose land size and soil is not suitable for cocoa, they should be recommended to pursue other income-generating activities altogether.
- Creative financial arrangements have to be developed such that farmers' living costs can be covered until their new crops are economically viable, whether this comes through credit or other financial arrangements, such as through cash transfers. Enabling purchasing clerks to extend credit (like a credit officer for a financial institution) or vouch for farmers seeking credit should be explored for short- and long-term financing needs. Touton's promotion of and collaboration with savings-group support organisations should also be expanded as these groups tend to facilitate the short-term financing households most need.
- Balance self-reported and observed farm data. Given the differences in farmer practices found in the UofG (self-reported) and FarmGrow (observed) data, for any practitioner comparing the cost-benefit of data collection methodologies, balancing self-reported data with observation of some GAPs that may have the most impact on productivity, such as pruning, may be needed. While observed data is more costly, it improves data quality, accuracy, and consistency.

- Pay attention to data collection and monitoring costs and its benefits. The FarmGrow program should be integrated with cocoa certification programs to develop greater cost and time efficiencies as well as to reduce farmer fatigue with data collection; otherwise, the costs of FarmGrow may be greater than the benefit received by Touton or its farmers, particularly in the short-term.
- Developing better farmer segmentation methodologies that include farmer attitudes are needed to better identify which farmers are investment-ready, which farmers may require income diversification prior to participation, and which farmers may need a different intervention altogether. In a short period of time, farmers participating in FarmGrow have made initial improvements in their AO scores, but are failing to replant and adhere to their overall FarmGrow plans. Without external financial support, income diversification, and strategies that respond to farmer attitudes and fears, cocoa farmers find it difficult to make the hard decisions to replant but also to make significant investments on their farms.

In conclusion, given the expansion of extension support from the government of Ghana to treatment and comparison farmers during the evaluation periods, the differences detected by the UofG between the two groups are limited. This report also reveals that farmers targeted with FarmGrow are vulnerable and may have been negatively impacted by COVID despite all efforts to support them during this period. However, with the ability to compare self-reported to observed data through the Sat4Farming research agenda, this report reveals the importance of observed data and how it can be used to provide more accurate and individualised support to farmers. An important area for further research and investments is an assessment to understand the degree to which farmers might trust a person empowered with the FarmGrow technology that does not have a cocoa farming background or the use of a "light" version of FarmGrow that focuses on fewer, low-cost AOs as a starting point for identifying investment-ready farmers. This might better support organisations like Touton to identify and support different cohorts of farmers in a more cost-effective manner.

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# ACRONYMS

AO	Adoption Observation
CHED	Cocoa Health and Extension Division
COCOBOD	Ghana Cocoa Board
CSSV	Cacao swollen shoot virus
ESM	Extra Soil Management
FBO	Farmer Based Organization
FDP	Farm Development Plan (FarmGrow AKA Investment Plan AKA Profit-and-Loss)
FGD	Focus Group Discussion
G4AW	Geodata for Agriculture and Water
GAPs	Good Agricultural Practices
GHS	Ghana Cedis
ha	Hectares
IFPRI	International Food Policy Research Institute
KG	Kilograms
KIT	Royal Tropical Institute
L3F	Livelihood Funds for Family Farming
LBC	Licensed Buying Company
MAX	Maximum
MFI	Microfinance Institution
MIN	Minimum
MoA	Ministry of Food and Agriculture
MT	Metric Tons
NGO	Non-Governmental Organizations
NSO	Netherlands Space Office
ODK	Open Data Kit
OLS	Ordinary Least Square
PBC	Purchasing Buyer Company
PnL	Profit-and-Loss
PPI	Poverty Probability Index
proWEAI	project-level Women's Empowerment in Agriculture Inde
Sat4Farming	Satellite for Farming Project
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
t	Tonnes
USD	United States Dollar
UofG	University of Ghana
VSLA	Village Savings and Loan Association

# **1.0 INTRODUCTION**

# **1.1 Sat4Farming**

Satellite for Farming, or Sat4Farming, is a public-private consortium of the Rainforest Alliance, Touton, Grameen Foundation, University of Ghana, WaterWatch Projects (now AuxFin), and Satelligence and is funded by the Geodata for Agriculture and Water (G4AW) program of the Netherlands Space Office (NSO).

#### Sat4Farming Consortium

- **Rainforest Alliance:** Consortium lead, leads cocoa certification program and FarmGrow strategy
- **Touton:** Licensed Buying Company (LBC) for cocoa. Primary implementing partner
- Grameen Foundation: Technical manager of FarmGrow application
- University of Ghana: Third-party evaluation partner
- AuxFin: Satellite, drone, data science provider
- Satelligence: Satellite technology provider

The Sat4Farming project is designed to assist smallholder cocoa farmers in Ghana to increase cocoa yields from 400 kg / hectare to 1500 kg / hectares (over 300%) over an 8-to-10 year period. This is done through a strong focus on supporting farmers to renovate and rehabilitate their farms. The major vehicle through which the overarching goal will be achieved is the deployment of a digital agriculture advisory tool, known as FarmGrow, which agronomists use to provide individualized coaching support - based on insights from behavioural economics - to participating cocoa farmers. Through the Sat4Farming program, the consortium looked at leveraging geo-data and remote sensing information to improve the quality of the business plans generated by the FarmGrow tool as well as reducing the implementation costs of the FarmGrow program.

Sat4Farming also set out to achieve the following results in the long term:

- 1. Higher income and better livelihoods of cocoa farming households
- 2. Self-reliant farmers working as entrepreneurs
- 3. Sustainable cocoa production
- 4. Gender equality and women's empowerment

This theory of change is summarized below in Figure 1. Given the long-term goal is expected for an 8to 10-year period, during the 4-year project (2018-2021, 3 years of implementation) key outcomes focused on the change in adoption of good agricultural practices (GAPs) and on-farm investments to improve planting material, and farm and soil conditions (together these are considered 'adoption observations' or AOs). While a reduced usage of water was also estimated as a short-term outcome, in reality, cocoa is a rain-fed crop once it is established. New seedlings of course require watering. Therefore, through the adoption of GAPs, which promote use of organic matter for mulching, water retention reduces the need for irrigation.

#### Figure 1. Sat4Farming Theory of Change



# **1.2 FarmGrow**

Although the FarmGrow concept is owned by Rainforest Alliance and the IT is provided by Grameen Foundation, both organizations are not directly implementing FarmGrow with farmers. Rainforest Alliance and Grameen Foundation enable cocoa traders such as Touton to implement FarmGrow with their farmers. Touton is implementing the FarmGrow program because of a demand from their clients. Rainforest Alliance and Grameen Foundation train Touton's staff on the FarmGrow program, including the Adoption Observations, non-violent communication and behavioural economics as well as the use of the tool. Once these trainings have been given, Touton is ready for implementation.

Using the FarmGrow tool, agronomists first engage cocoa farmers in a profiling exercise that covers basic household demographics. During the diagnostic phase, agronomists observe and document 14 AOs that assess plant material genetics; farm conditions which include tree age, density, health and the presence of diseases; soil fertility management which includes soil condition and health, fertilizer formulation and application; and standard GAPs which include pruning, pest, disease and sanitation practices, weeding, harvesting and shade management. Each of the fourteen AOs are scored as 'good', 'medium' or 'bad' based on predetermined criteria. What constitutes satisfactory behavior related to these GAPs is covered in the Annex 2. These scores, when combined with farmer profile data such as household income, expenditures, and labor sources, result in an 8-to-10 year investment plan outlining the profits and losses expected if the recommendations based on the AOs are followed. FarmGrow farmers can be assigned to one of eleven recommendation cohorts, depending on the status of their farm at the diagnostic stage: 'extra soil management (ESM)', 'replant', 'replant plus ESM', 'thin out', 'thin out plus ESM', 'fill in', 'fill in plus ESM', 'grafting', 'grafting plus ESM',

'maintenance GAPs', or 'no farm development plan (FDP)'. Descriptions of these categories are provided below:

- Replant (cut down old trees or diseased trees and replant with new planting material)
- Extra Soil Management (increase use of organic matter, proper application and formulation of fertilizer)
- Grafting (graft old trees with new planting material)
- Maintenance GAPs (follow basic GAPs such as weeding, harvesting, etc.)
- Thinning Out (remove some trees to meet recommended distance among trees)
- Filling In (plant new trees to maximize plot space and meet the recommended distances among trees)
- No FDP (tree health and soil condition are both bad and it is not ideal for a farmer to plant cocoa on the plot).

Any farmer can receive a combination of these recommendations, resulting in no more than one recommendation per plot. Extra Soil Management is the only recommendation that is coupled with other recommendations. Once recommendations are made and farmers agree upon a plan with the agronomist, they are then monitored at agreed-upon intervals with the agronomist. If the plan recommended is not one a farmer feels confident in achieving during a specific time frame, the farmer and the agronomist together can push out certain activities to a date aligned with the farmer's ability to complete certain activities. For example, if a farmer receives a recommendation to replant, this will likely assume this should be completed in Year 1. However, the farmer may decide this is not feasible to do until after harvest. The farmer and the agronomist can agree that the replant will be pushed out to year 2. With these adjustments, the FarmGrow plan and adjustments to the financial plan will also be made. For this reason, the farmer and the agronomist will also determine when the right time is to conduct a monitoring visit.

During a monitoring visit, farmers are assessed on the AOs as well as their achievement of their targets per the recommendations provided by FarmGrow. They are questioned for the reasons of any non-adoption during this visit. An agronomist visit (known as a "manager" visit) is an official monitoring visit. A "coach" visit can be more frequent and conducted by a less-skilled person who is trained on FarmGrow. A manager visit results in a plot "score" where a plot is scored as "pass" (farmer overall is showing progress per the investment plan), "non-critical fail" (farmer does not show progress yet, but the visit may have occurred at a time when a practice cannot be observed, i.e. harvest), or 'fail" (farmer is not making progress as expected).

#### Key Terms

#### **FarmGrow Phases**

- Profiling: Agronomist or coach captures basic farmer sociodemographic data
- **Diagnostic:** Agronomist or coach evaluates adoption observations of GAPs, soil condition, planting material, and farm conditions
- Agree with Plan: Agronomist or coach classifies farmers who agree to follow FarmGrow investment plan
- **Monitoring:** Agronomist or coach observes changes in farmer practices and farm conditions at an agreed-upon time interval aligned with FarmGrow investment plan

#### FarmGrow Manager: Trained agronomist

**FarmGrow Coach:** Person trained on FarmGrow data collection and evaluation of AOs. Note: Not all FarmGrow users may use different people to conduct the visits. Touton did given the need to

scale FarmGrow during the project period and therefore engaged some external teams to help onboard and monitor farmers.

**Good Agricultural Practices (GAPs):** A set of agreed upon practices that, when followed as prescribed, are believed to improve agricultural outputs. GAPs include practices such as applying the correct quantities of fertilizer and pesticide at the right time, weeding, pruning, etc.

**Adoption Observations (AOs):** For the purposes of FarmGrow, AOs include GAPs, but instead of relying on self-reported practices, an agronomist or coach observes the impact of these practices, such as observing whether pests are present and destroying the plant. AOs also assess the planting material, the farm condition, and the soil quality.

It is worth noting that a key constraint to the FarmGrow process is that the financial data does not yet get adjusted during the monitoring visits; therefore, the financial data collected at the diagnostic phase is not updated when monitoring visits happen. Subsequently, the financial data collected during the diagnostic visit is used primarily to help the farmer understand when he or she might run a deficit, might break even, or see a profit based on current financial status during an 8-to-10 year period. Incorporating updates to the financial status at monitoring visits was still part of the product roadmap as this report was being finalized.

During the project period, while technologies such as satellite and drones were assessed for their viability to support the advisory services to farmers, they were not integrated into the FarmGrow tool due to various reasons such as a limited value proposition and cost. Therefore, this report will cover only the lessons learned regarding the use of the FarmGrow tool alone.

# **2.0 METHODOLOGY**

Four main sources of data underpin the lessons gathered from implementing FarmGrow:

- A third-party quasi-experimental, mixed-methods evaluation conducted by researchers from the University of Ghana (UofG) with Touton cocoa farmers that relies on farmer self-reported information.
- Table 1 below outlines the timelines for conducting both the quantitative and qualitative interviews between 2018 and 2021.
- Diagnostic and monitoring data collected through observations made by Touton agronomists or coaches and captured by the FarmGrow tool, in addition to some regression analysis conducted with FarmGrow data as analysed by Grameen Foundation.
- Qualitative midline assessment leveraging initial FarmGrow diagnostic data and qualitative interviews conducted with farming households and Touton agronomists. This assessment was led by Grameen Foundation with support from all consortium members.
- While not part of the original research and evaluation design, Grameen Foundation conducted final qualitative interviews with a select number of Touton farmers originally interviewed during the midline qualitative interviews to understand reasons for adoption or non-adoption of the promoted practices as well as to assist in interpreting all quantitative data sources.

	2018	2019	2020	2021	2022
Quantitative and Qualitative	November-				
Baseline (UofG)	December				

#### Table 1. FarmGrow Research Methodologies and Schedule

Qualitative Midline (Led by Grameen with Sat4Farming consortium)	November			
FarmGrow Diagnostics	December 2	2018-Decembe	r 2021	
Quantitative Midline (UofG)		January		
Quantitative and Qualitative Endline			January-	
(UofG)			February	
Qualitative Endline Interviews				January
(Grameen)				

Each of these methods are described greater in depth below.

# 2.1 Third-party evaluation (self-reported data) led by University of Ghana

The third-party evaluation conducted by the UofG consisted of baseline, midline, and endline quantitative surveys among treatment (participated in the Sat4Farming project) and comparison group (did not participate in the Sat4Farming project) cocoa farmers. Table 2 highlights the schedule and descriptions of the methodologies follow.

#### **Baseline Assessment**

The baseline occurred between November and December 2018. The midline occurred January 2020 and the endline survey January 2021. Both the baseline and endline quantitative surveys were complemented with some qualitative interviews.

During the 2018 baseline survey, 564 cocoa farmers/respondents were randomly sampled: 252 were Touton-affiliated farmers located in Kasapin and Sunyani cocoa districts (comprising 14 communities) and considered as the treatment group while 312 cocoa farmers were from Goaso cocoa district (comprising 9 communities) and considered as the comparison group. In all, 23 communities were sampled.

In addition, 49 cocoa farming households were also assessed using the project-level Women's Empowerment in Agriculture Index (pro-WEAI). The Touton farmer plus his/her spouse or supporting farmer were interviewed.

The baseline report<sup>1</sup> and proWEAI assessment report<sup>2</sup> can be found elsewhere.

#### **Midline Assessment**

The midline survey conducted in January 2020 encountered major operational challenges in the communities where Touton operated. For some reasons, Touton's operations were no longer needed in some communities and therefore had to pull out. This drastically affected the sampling design for the midline survey. With this operational challenge in mind, the midline survey consists of 14 randomly sampled communities: 9 baseline communities (8 treatment group communities and 1 comparison group community) and 5 newly introduced communities (2 new communities where Touton was implementing FarmGrow and 3 new comparison communities). Thus, the midline survey randomly sampled 266 respondents (141 as treatment group and 125 as comparison group respondents). It must be noted that the introduction of new communities during the midline survey would not, and did not, allow for proper tracking of progress in project indicators over the implementation period and was considered a cross-sectional assessment. The midline report can be found elsewhere.<sup>3</sup>

#### **Endline Assessment**

The endline survey conducted in January 2021 originally followed up on 354 baseline respondents from 14 communities. They comprised 189 treatment-group farmers from 10 communities and 165 comparison-group farmers from 4 communities. In addition, 6 life histories (similar to those collected

at baseline) with 2 female and 4 male farmers, interviews with two agronomists (the same ones interviewed at midline), and 2 key informant interviews with a school headmaster and a purchasing clerk were also completed.

Touton pulling out of some communities presented a major challenge to the methodological design of the project, which affected the ability to track the same respondents over time, from baseline to endline. As noted earlier, the need for reliable and consistent data for a sound analysis required that the data be limited to only respondents (both treatment and comparison farmers) who could be tracked throughout the three years of data collection. As such, the endline data cleaning process resulted in the selection of a consistent dataset of 246 cocoa farmers from 14 communities who participated in both the baseline survey in 2018 and the endline survey in 2021. They comprise 120 treatment group farmers (49% of the sample) and 126 comparison-group farmers (51% of the sample). The breakdown of the distribution in communities and number of sampled farmers is presented in Table 2. The endline accounted for 65.2 percent of all the farmers interviewed at baseline.

	Endline (2021)		Baseline (2018)		Baseline (2018)		Percent of
Cocoa District	Community	Freq.	Community	Freq.	Endline to Baseline		
Kasapin	Abidjan	7	Abidjan	11	63.6		
(TREATED	Adiemera	12	Adiemera	15	80.0		
COMMUNITIES)	Mansrokwa	2	Mansrokwa	2	100.0		
	Oppong Kwasi	22	Oppong Kwasi	31	66.7		
	Wam B	7	Wam B	9	77.8		
	Total	50	Total	68	73.5		
Sunyani	Antwikrom	12	Antwikrom	18	66.7		
(TREATED	Daadom	15	Daadom	29	51.7		
COMMUNITIES)	Dwenase	11	Dwenase	20	55.0		
	Mangoase	24	Mangoase	29	82.8		
	Nsoatre	8	Nsoatre	20	40.0		
	Total	70	Total	116	60.3		
Goaso	Akrodie	33	Akrodie	55	60.0		
(COMPARISON	Fawohoyeden	64	Fawohoyeden	89	71.9		
COMMUNITIES)	Kwamedonkorkrom	28	Kwamedonkorkrom	52	53.8		
	Morta	1	Morta	10	10.0		
	Total	126	Total	206	61.2		

	<b>Fable 2. Distribution of Farmers in San</b>	npled Communities: Endline Surve	y vs Baseline Survey
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Source: UofG field data, 2018 & 2021

Given budgetary constraints, the full pro-WEAI survey was not conducted among farmers at endline. Instead, key questions associated with indicators that were found at baseline to be areas of importance to farmer success were integrated into the primary survey instrument. Only the proWEAI questions were asked of the supporting farmer. Thirty primary farmers and their spouses (of the original 49 farmers interviewed at baseline) were both interviewed at endline.

#### **Survey Instruments**

The baseline and endline surveys contained questions regarding socioeconomic data on the farmer and his or her household, food security and poverty status, estimated household income and expenditures, farm characteristics, self-reported adoption of GAPs, access to extension services and credit, and questions related to women's empowerment. For the purposes of evaluating farm size, cocoa output, and cocoa yield, the following definitions explain how these were evaluated:

- Farm size: this is measured in hectares (ha). It is the total land area put under cocoa production as reported by the respondent. This area could comprise one or several different plots. Hence, several plots or areas devoted to cocoa farming constitutes a cocoa farm.
- Cocoa output: this is measured in metric tonnes (MT). It is the total tonnage of dried cocoa beans produced by the respondent as reported by the farmer. This output is what the farmer reports as harvested from his/her cocoa farm.
- Cocoa yield: this is measured in tonnes per hectare (t/ha). It is the cocoa output produced divided by the cocoa farm size.

The baseline proWEAI assessment leveraged a questionnaire that was developed by the <u>International</u> <u>Food Policy Research Institute (IFPRI)</u>, the <u>Oxford Poverty and Human Development Initiative</u>, and thirteen partner projects in <u>the Gender</u>, <u>Agriculture</u>, <u>and Assets Project</u>, <u>Phase 2 portfolio</u>, of which Grameen Foundation was a participant. The instruments and analysis protocols can be found elsewhere.<sup>4</sup> At the endline, as was noted above, a sub-set of the proWEAI questions was integrated into the full endline survey, such as questions related to decision-making power, self-efficacy and access to productive capital.

#### Data Collection and Analysis

The survey questionnaire was developed and programmed onto the Open Data Kit (ODK) software and deployed on android tablets for mobile data collection. Also, the Statistical Package for Social Sciences (SPSS 25), and STATA 16 were used in cleaning, processing, and analyzing both the baseline and endline datasets. The analyses in this report are disaggregated by farmer category (treatment or comparison) and gender, where applicable. Basic descriptive statistics of key baseline and endline indicators/variables of interest are presented and compared between farmer categories and across two time periods (i.e., baseline and endline). Finally, statistical significance is indicated in the write-up only when the p-values of the relevant variables are confirmed to be statistically significant (<0.10).

#### Influence of COVID-19 Pandemic on Data Collection Approach

The endline data collection was conducted in January 2021, a period that was characterised by the threat of the COVID-19 pandemic that started in March 2020. In view of this, the enumeration team ensured that all the COVID-19 protocols proposed by the Ghana Health Service and the Ministry of Health were carefully observed during the face-to-face household questionnaire administration and focus group discussions (FGDs). As these project locations were not identified as COVID-19 pandemic hotspots in Ghana, the communities visited and the farmers/respondents were generally not adhering to any of the protocols put in place. As observed in the field, business was as-usual (with or without the pandemic) as no one was restricted or deprived from visiting their farms. However, the UofG team could not deduce to what extent economic activities with the major cities in the country with hot spots (Accra, Kumasi) were impacting households. The pandemic, however, did not interfere with the team's field data collection in any way, and neither did it affect the quality of the data collected by the enumeration team.

Moreover, when the Touton agronomists were consulted for their perspectives of COVID-19's impact on farmers, they said they initially restricted their engagements with farmers during the pandemic and Touton closed its offices for about two weeks. During this time, farmers lacked access to advisory services and farm inputs. Farmers also feared attending meetings if they were being organized by anyone from Accra or COVID-prone areas, but the situation has been normalizing. However, Touton felt that COVID-19 offered them a chance to intensify their hygiene and sanitation practices across their operational areas. More of COVID-19's impact is explored, where appropriate, throughout the report.

# **2.2 FarmGrow Assessment (observed practices and farm conditions) led by** Grameen

Unlike the surveys completed by UofG, which relied on self-reported behaviors by the cocoa farmers, FarmGrow assessment data relies on observation (and some self-reported data) of either an agronomist or a coach.

Grameen Foundation conducted a diagnostic analysis using data from the FarmGrow PowerBI dashboards which are designed to reflect real-time status of events and progress at both the midline and the endline. A regression analysis, conducted by a consultant, is also included in this report and seeks to determine which farmer characteristics most determine adoption of the GAPs. The regression analysis builds not only on the collection of data related to the AOs, but also on farmer attitudinal questions as proposed by the Bill and Melinda Gates Foundation that have been found to predict farmer success.<sup>5</sup> Specific analyses are noted in the section related to this data.

# 2.3 Qualitative Midline Interviews

To support the midline FarmGrow Assessment, Grameen Foundation led qualitative interviews with support for the Sat4Farming consortium in November 2019. Ten husband and wife pairs (or male and female farming teams) and 10 individual farmers were interviewed. Thirty farmers in total were interviewed (16 women and 14 men). Two agronomists from ECOM and two from Touton were also interviewed for the study. Farmers were interviewed with two different questionnaires depending on whether they had only participated in the meeting with the agronomist regarding their investment plan ("investment plan group") or whether they had received a monitoring visit to follow-up with the farmer on their implementation of that investment plan ("monitoring visit group"). The key questions of the investment plan group explored: household's primary income sources, in addition to cocoa, and the degree to which they actively sought to diversify their income; how the household expected to achieve the steps in the plan and the challenges they expected; whether there was coordination between spouses in decisions related to the cocoa farm and the FarmGrow investment plan; men's and women's degree of satisfaction with FarmGrow, and the support received from Touton and their satisfaction with those services as well as the degree to which women feel supported by Touton. The key questions of the monitoring group explored all questions above, plus the actions the household had already taken towards achievement of the investment plan and any challenges they faced in implementing the plan. The midline report can be found elsewhere.<sup>6</sup>

# 2.4 Qualitative Endline Interviews

While not part of the original evaluation design, a modest set of qualitative interviews were completed by Grameen Foundation after the endline survey had been completed by the UofG to help explain some of the results from the quantitative survey but to also follow a number of farmers overtime to understand the experience with FarmGrow and their perceived benefits of FarmGrow. The program team from Grameen Foundation travelled to Brong Ahafo in January 2022 and completed in-depth interviews with 10 primary farmers and 6 of their spouses along with 2 agronomists who were involved in the program. The qualitative interviews posed questions related to reasons for becoming a cocoa farmer, experiences with COVID-19 in the prior two years, experiences with cocoa farming such as changes in yield and perceptions behind this, and experiences with the FarmGrow plan and support from Touton. Where spouses were interviewed, they were asked to reflect on the degree to which they were consulted or involved in the FarmGrow plan and female farmers were asked the degree to which they feel supported by agricultural extension activities. Findings from those interviews are integrated through-out.

### **3.0 RESULTS**

### 3.1 How to Read the Results Section

This section is broken up into two main sections. The first section provides the data captured and analyzed by the UofG team. It represents an independent view and analysis of the experiences and behaviors of cocoa farmers participating in FarmGrow with Touton as self-reported by the cocoa farmers and compares their experiences to a comparison group not participating in FarmGrow. The second section presents data on cocoa farmers participating in FarmGrow with Touton as observed by agronomists or coaches. This data does not include any comparison data. The primary overlap in the sections is the evaluation of farmer practices, broadly called GAPS in the UofG data and AOs in the FarmGrow data. Much of the UofG data describes the characteristics of cocoa farming households and is used to help interpret the factors that likely influenced their farming practices. Given the inclusion of a comparison group, it also helps identify what other external factors may have influenced farmer success, or lack thereof, and to estimate what would have occurred in absence of the intervention. In the Discussion, the implications of the conclusions in each section will be compared and contrasted.

#### 3.2 Quasi-experimental, Mixed-Method Results

This section presents and discusses respondents' socio-economic profile, household health and food security status, their poverty level, impact of COVID-19 on their households, household income and expenditure patterns, farm characteristics, sustainable cocoa production practices, access to agricultural extension and financial services, household dynamics with an emphasis on decision-making power within the household, their satisfaction with as well as challenges faced and benefits derived from the promoted FarmGrow innovation and satisfaction with Touton. In addition, this section captures the satisfaction of Touton agronomists with the service and their perceptions of the farmer's experiences with FarmGrow.

#### Socioeconomic Characteristics

This sub-section describes the trends in respondents' demographic profiles over the past three years. It highlights changes in their age profile, dependency ratio, marital status, education, and literacy levels.

#### Age distribution of respondents

There has been growing concern about a potentially ageing cocoa farmer population and their growing reluctance to adopt modern production technologies to increase productivity of their farmlands. This has influenced the implementation of several initiatives and programmes aimed at motivating more youth to venture into cocoa farming and to ensure long-term sustainability of the sector.<sup>7</sup>

The average age of the respondents increased from 53 years at baseline to 55 years at endline, which is to be expected. The data also indicate that only 13 (5%) baseline respondents, with an average age of 32 years, could be categorized as youthful (15 to 35 years); this declined at the endline, where only 4 respondents (2%) were 35 years or younger.

This is consistent with other studies conducted in Ghana with cocoa farmers where the age of the cocoa farmer was between 48 and 55 years of age. As the Royal Tropical Institute (KIT) pointed out in their study conducted in Ghana and Cote d'Ivoire with cocoa farming households, this age is more representative of the age of the male head of household, which tends to be considered as the head "farmer" and does not represent the average age of those that support the farming household.<sup>8</sup> It is also worth noting that primary farmers, who were recruited by Touton, are generally the land-owners. While young people may inherit land, this generally does not occur until their 30s. Younger farmers

may also tend to be sharecroppers until they inherit land or can purchase their own. Therefore, while head or primary farmers may be ageing, this is not indicative of the younger family members who may be supporting the farmer.

#### Household dynamics and dependency ratio

The average household size was reduced from 5.1 members (baseline) to 4.5 members (endline). For FarmGrow households, the number also reduced from 4.7 (baseline) to 4.4 members (endline), suggesting a fairly stable household size over the period. The dependency ratio was estimated to identify the proportion of economically-active individuals in farming households. The dependency ratio is measured as the number of dependents (aged 0 to 14 and 65 years and over) to the number of working-age population (aged 15 to 64 years). This ratio attempts to measure or gauge the pressure on the productive population. Overall, the dependency ratio of all farming households increased from 16 percent (baseline) to 26 percent (endline) with that of the treatment group increasing from 11 percent (baseline) to 25 percent (endline), suggesting an increase in financial stress on farming households. The higher dependency ratio may be due to death, disability, or marriage of working-age members who leave the household.

#### **Education and literacy levels**

The ability to make simple arithmetic calculations, write, understand, and read short statements determine a smallholder farmer's efficiency in record keeping, optimal input use, and their implementation of recommended climate-smart cocoa production practices. At endline, only 45 percent of the treatment group indicated their ability to either read or write in English, compared to 54 percent for the comparison group (data not shown). At baseline, 73 percent of respondents had indicated the level of education they had reached including basic, secondary, vocational, technical, and tertiary levels. A similar proportion was observed during the endline (which was to be expected).

#### Household Food Security and Health Status

This sub-section describes changes in respondents' food security status, perception of their household health, resilience to household medical shocks, and sources of emergency medical funds over the 3-year period.

#### **Food Security**

Respondents were asked to describe their household food availability and their experience with hunger over the past year. Using the procedure employed by Grameen Foundation<sup>9</sup>, respondents were made to choose, among the four statements below, which best describes availability of food in their households:

- A. Have enough food and of the kinds of nutritious foods we want to eat
- B. Have enough food but not always nutritious food
- C. Sometimes not enough food to eat and was sometimes hungry
- D. Often not enough food to eat, was often hungry

Respondents who respond in the affirmative to Statement **A** are considered food secure while those who respond positively to statements **B**, **C** or **D** are considered food insecure with low severity, moderate severity, and high severity, respectively. The difference between answers A and B may be minimal given the interpretation of "nutritious food" can be subjective; however, it signals when a household is having to choose foods that may not be preferred.

As indicated in Table 3, the proportion of food secure farmers declined for the treatment group from 48 percent (baseline) to 29 percent (endline) and the comparison group, from 41 percent (baseline) to 35 percent (endline). Most food secure households at the endline had slipped into food insecurity

with low severity. The percentage of low-severity food insecure farmers in the treatment group increased from baseline (44%) to endline (68%). No respondent experienced severe hunger at endline. As will be noted later, this slight decline in food security may have been due to the hardships some families may have faced due to Covid-19.

#### Table 3. Food Security Status

	Baseline (2018)		Endline (2021)	
	Treatment (%)	Comparison (%)	Treatment (%)	Comparison (%)
Food secure	48.33	41.27	29.17	34.92
Food insecure with low severity	44.17	52.38	68.33	61.90
Food insecure with moderate severity	6.67	6.35	2.5	3.18
Food insecure with high severity	0.83	0	0	0

Source: UofG field data, 2018 & 2021

#### **Resilience to Health Shocks and Sources of Payment for Medical Treatments**

Despite the COVID-19 pandemic, respondents' perception of their household's health status showed marginal improvement between baseline and endline. **Error! Reference source not found.** shows that both the treatment and comparison groups' perception of their health improved between the baseline and endline; however, both groups were more likely to report delaying medical treatment due to cost. While the treatment group reported more diagnoses of chronic illnesses between baseline and endline, diagnoses for the comparison group marginally decreased between the two time periods. There is no clear explanation for the positive perception of improved health, particularly during a time that COVID-19 cases were increasing and an increased reporting of a chronic illness diagnosis among the treatment group; however, a study conducted in India suggests that COVID-19 might have induced positive behaviour changes due to people trying to boost their immunity, resulting in perceptions of improved health.<sup>10</sup>

	Baseline (2018)		Endlin	e (2021)
	Treatment (%)	Comparison (%)	Treatment (%)	Comparison (%)
% that feel health situation in household was excellent, very good, or good	92.5	94.44	96.67	99.21
% that delayed medical treatment in last year due to cost	5.83	8.73	8.33	14.29
% that have been diagnosed with a chronic illness	15.00	28.00	23.00	18.25

#### Table 4. Perception of Household Health Status over the Past Year

Source: Field data, 2019 & 2021

The proportion of respondents who felt capable of raising funds for any health emergency increased over the period for both treatment and comparison groups. The various sources of funds meant for any health emergency are highlighted in Table 5. Respondents mainly depend on 2 sources, namely, personal savings and close relations (family, friends, and relatives). The proportion of the treatment group who indicated their dependence on their personal savings for medical emergencies increased from 27% (baseline) to 35% (endline) while their dependency on loans from their work or employer for health emergencies declined over the same period.

Table 6 also reveals that the proportion of women farmers in the treatment group who rely on informal sources, such as the cocoa purchasing clerks, increased from 26 percent (baseline) to 34 percent (endline) while the dependency of women farmers in the comparison group on informal sources rather declined. This observation may be attributed to the increased rapport or relationship

that women FarmGrow farmers have with their purchasing clerks, compared to their male counterparts.

	Baseline (2018)		Endline (	2021)
	Treatment	Comparison	Treatment	Comparison
	(%)	(%)	(%)	(%)
% that felt it was at least	66.67	54.76	70.00	60.32
somewhat possible to raise funds				
for a health emergency				
Source of emergency medical func	ls			
Personal savings	26.67	12.7	35.00	22.22
Family, relatives, friends	18.33	19.84	17.5	31.75
Money from working or loan	6.67	16.67	1.67	3.17
from employer				
Financial institution	2.5	5.56	2.5	2.38
Informal lender (purchasing	30.83	26.98	30.84	26.98
clerks)				
Some other source	3.33	3.17	0.83	3.97
Do not know	11.67	13.49	8.33	8.73

#### **Table 5. Sources of Emergency Medical Funds**

#### Table 6. Sources of Emergency Medical Funds by Sex

	Baseline (2018)				Endline (2021)			
	Treatm	nent (%)	Comparison (%)		Treatm	nent (%)	Comparison (%)	
	Men	Women	Men	Women	Men	Women	Men	Women
Personal savings	32.58	9.68	16.44	7.55	38.64	25.00	30.14	11.32
Family, relatives, friends	14.61	29.03	24.66	13.21	17.05	18.75	21.92	45.28
Money from working or loan from employer	5.62	9.68	20.55	11.32	2.27	0.00	4.11	1.89
Financial institution	3.37	0.00	2.74	9.43	2.27	3.13	4.11	0.00
Informal lender (purchasing clerk)	32.58	25.80	21.91	33.96	29.54	34.36	30.13	22.64
Some other source	3.37	3.23	4.11	1.89	3.41	3.13	5.48	3.78
Do not know	7.87	22.58	9.59	22.64	6.82	15.63	4.11	15.09

Source: UofG field data, 2018 & 2021

#### Impact of COVID-19

For more than half (54%) of the respondents interviewed at endline, the outbreak of the COVID-19 pandemic had no significant impact on their households or families (Figure 2). However, almost half (45%) of the respondents indicated experiencing some negative impacts of the pandemic. The proportion of males who reported experiencing negative impacts was higher than females in the treatment group but in the comparison group, male and female farmers had similar perceived impacts (Table 7). The major reason reported by both groups was the loss of income, followed by the inability to travel freely (Table 8). In both groups, female farmers were more likely to indicate they were positively impacted.

Six out of the nine farmers interviewed by Grameen in 2022 shared they were not negatively impacted by COVID-19, except for not receiving intense support on their farm, not receiving financial support or experiencing difficulty in movement or access to inputs. Among those who noted the negative impact of COVID-19, a divorced mother shared how her children were unable to attend school and her food-selling business was negatively impacted, *"with my beans, I made money, but the market was difficult to access. Money was also not paid on time."* 

News regarding the impact of COVID-19 on cocoa productivity, input availability and prices correspond to the feelings of the farmers. Despite a surplus of cocoa during the 2020-2021 season<sup>11</sup>, backlogs of cocoa at the Ghanaian ports with destinations to Europe and North America<sup>12</sup>, backlogs of inputs from international ports into Ghana<sup>13</sup>, and delayed payments to farmers<sup>14</sup> resulted in dissatisfaction where farmers were directly impacted by these challenges.





Source: UofG field data 2021

Table	7.	Impact	of	cov	'ID-19	by	Sex
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		Endline (2021)							
Extent of COVID-19 Impact		Treatment				Comparison			
	Male (%)	N	Female (%)	N	Male (%)	N	Female (%)	N	
Very Negatively	13.64	12	9.38	3	16.44	12	16.98	9	
Somewhat negatively	29.54	26	-	-	28.77	21	-	-	
No impact	55.68	49	34.37	11	53.42	39	30.19	16	
Somewhat positive impact	1.14	1	56.25	18	1.37	1	52.83	28	
	100.00	88	100.00	32	100.00	73	100.00	53	

Source: UofG field data, 2018 & 2021

#### Table 8. Reasons for Negative Impact of COVID-19

	Endline (2021)			
Reason	Treatment (%)	Comparison (%)		
Loss of income	29.17	33.33		
Loss of income earner	0.83	3.97		
Death in family	0.00	0.00		
Pulled children out of school				
Children not allowed to go to school	2.50	7.14		
Health expenses to seek treatment	0.00	0.79		
Health expenses to invest in gloves, masks, etc.	0.00	0.00		
Inability to travel freely	22.50	11.11		
Difficulty accessing products needed for the farm	8.33	3.17		
Difficulty accessing products needed for other income generating activities	10.00	3.97		

Endline (2021)		
Treatment (%)	Comparison (%)	
0.00	0.79	
0.83	1.59	
	Endline ( Treatment (%) 0.00 0.83	

Source: UofG field data 2021

#### Household poverty status

Through use of the Poverty Probability Index (PPI)<sup>15</sup>, the proportion of all respondents living below the USD 3.1 poverty line stayed fairly stable at 13 percent (see Table 9, test a). Similarly, there was no statistical significance between the treatment and comparison groups at endline (Table 9, test b), nor was there statistically significant change for either the comparison and treatment groups from baseline and endline (Table 9, tests c and d). This suggests the treatment and comparison groups were quite comparable. The lack of change in poverty status is to be expected given the PPI focuses on asset-based poverty measures that are not extremely sensitive to changes that may be driven by short-term fluctuations in income.

Table 9. Housellolu Pove	erty Status Usi	ng PPI		
a: T-test: Household pove	erty status for al	ll: pooled (baseline versu	s endline)	
PPI	Obs.	% living below poverty line	p-value	Interpretation
Baseline	246	13.37	0.9	Not Significant
Endline	246	13.24		
b: T-test: Endline househ	old poverty stat	us (treatment versus con	nparison)	
Category	Obs	% living below poverty line	p-value	Interpretation
Treatment	120	13.54	0.69	Not Significant
Comparison	126	12.96		
c: T-test: Comparison gro	up household p	overty status (baseline v	ersus endline)	
Category	Obs	% living below poverty line	p-value	Interpretation
Baseline	126	14.38	0.34	Not Significant
Endline	126	12.96		
d: T-test: Treatment grou	ip household po	verty status (baseline ve	rsus endline)	
Category	Obs	% living below poverty line	p-value	Interpretation
Baseline	120	12.31	0.35	Not Significant
Endline	120	13.54		

#### Table 9. Household Poverty Status Using PPI

Source: UofG field data, 2018 & 2021

#### Household Income and Expenditure

The endline evaluation assessed respondents' income and expenditure trends over the project lifespan. Respondents were asked to identify the sources of income generated by all household members. The reported figures on income from various sources were aggregated and deflated by the 2020 Consumer Price Index for the Brong Ahafo Region (115.06), using 2018 as the base year (100.0). In simple terms, 2020 prices in the Brong Ahafo Region relative to 2018 prices had increased by 15.06 percent. The average and median values of real income and real expenditures for both the treatment and comparison groups were contrasted in the two rounds of assessment.

#### Household income sources and amounts

The study estimated the annual household income of cocoa farmers over the project period. Although not statistically significant, the average annual household income for all respondents marginally decreased from GHS 16,470 to GHS 15,807 as shown in Table 10. Median income similarly decreased.

Still accounting for inflation, the treatment group observed an increase in their mean annual household income from a baseline average of GHS 14,004 to an endline average of GHS 15,302 (a 9% increase) but experienced a decrease in their median income (2% decrease). The increase in the mean income is likely driven by outliers; for example, the maximum income at the baseline was 49,425 GHS but was 163,810 GHS at the endline. The comparison group saw a decrease in both their mean (11% decrease) and median incomes (7% decrease).

		Baseline (2018)		Endline (2020)			
Category	Treatment	Comparison	Pooled	Treatment	Comparison	Pooled	
Mean	14,003.83	18,223.84	16,470.46	15,302.46	16,302.94	15,806.87	
Median	10,125.00	12,275.00	11,800.00	9,889.10	11,419.43	10,794.51	
SD	11,820.01	19,943.59	17,121.33	19,195.76	18,748.57	18,938.51	
Min	1,925.00	950.00	950.00	893.31	893.31	893.31	
Max	49,425.00	101,450.00	101,450.00	163,810.20	114,361.20	163,810.20	
Ν	59	83	142	119	121	240	

#### Table 10. Real Annual Income (GHS)

Source: UofG field data, 2018 & 2021

When evaluating the sources of income (Table 11), the majority of the farmers noted cocoa farming as an income source with a few of them not noting cocoa farming an income source. Despite the treatment group's involvement in the Sat4Farming program, it is not clear why cocoa farming would not be noted as an income source. Salary earnings declined for the treatment group at endline with 2 out the 3 persons no longer earning a salary at endline compared to baseline; however, there was an uptick in those reporting agricultural wage earnings. The number of farmers in the treatment group engaged in trading (sale of goods) doubled (from 9 to 18 persons) over the project period.

The treatment group nominally increased its real income (accounts for their real purchasing power) from cocoa farming (from GHS 7,703 to GHS 10,435), non-cocoa farming (from GHS 12,479 to GHS 13,603), animal rearing (from GHS 5,500 to GHS 6,925) and trading (from GHS 17,642 to GHS 28,910) over the three-year period. Additionally, the treatment group diversified into agro-processing and non-agricultural wage employment during the endline, observing average annual real earnings of GHS 6,918 and GHS 38,430, respectively.

Although not statistically significant, differences were observed between the real annual household incomes for both sexes at endline. Male farmers from the treatment group realized a higher real household income compared to their female counterparts (Annex Table 1). However, both sexes in the treatment group increased their real household earnings over the project period; females experienced an 11 percent increase (from GHS 10,052 at baseline to GHS 11,119 at endline) while males experienced an 8 percent increase (from GHS 15,474 at baseline to GHS 16,776 at endline).

A similar increasing trend was found for the comparison group where the proportion that earned from non-cocoa farming over the period increased from 29% to 34% with their average real earnings from non-cocoa farming declined over the period from GHS 18,379.44 to GHS 13,980.55 (Table 11).

These findings imply that cocoa farming is possibly not the main income source for the cocoa farmers in Kasapin, Sunyani and Goaso as other diversified income sources seem to provide larger earnings

compared to cocoa farming, on average. While it is well-known that estimating income without recordkeeping or income records is difficult, during the FarmGrow baseline study, incomes were compared to estimates provided by the Royal Tropical Institute (KIT) in their *Demystifying the Cocoa Sector* research series and the estimates were found to be comparable to their self-reported data, adding some degree of comparability and confidence.<sup>16</sup>

Treatment Group								
TREATMENT		Baseline (202	18)		Endline (202	21)		
Income Sources	Ν	Mean	Median	Ν	Mean	Median		
Cocoa farming	120	7,703.41	6,191.63	119	10,434.97	6,698.95		
Non-cocoa farming	30	12,479.00	10,387.50	45	13,603.31	9,889.10		
Animal production	3	5,550.00	6,925.00	6	11,581.85	11,119.07		
Artisanship				6	26,248.29	14,638.62		
Salaried work	3	23,448.67	25,425.00	1	8,264.21	8,264.21		
Trading	9	17,641.67	11,200.00	18	28,909.61	16,043.11		
Other	14	14,720.36	10,265.00	3	15,738.57	11,916.70		
Agro processing				3	6,917.94	6,873.63		
Agricultural wage				1	38,430.04	38,430.04		
		Comparis	son group					
COMPARISON		Baseline (202	18)	Endline (2021)				
Income Sources	N	Mean	Median	Ν	Mean	Median		
Cocoa farming	126	9,837.80	6,191.63	123	10,807.27	8,038.74		
Non-cocoa farming (food								
crop)	36	18,379.44	11,712.50	43	13,980.55	10,869.32		
Animal production	6	11,042.17	10,375.00	4	27,248.76	11,775.07		
Artisanship	4	27,382.50	20,537.50	7	12,269.35	11,840.78		
Salaried work	2	18,848.00	18,848.00	2	21,906.90	21,906.90		
Trading	7	14,158.57	18,450.00	19	29,183.30	15,426.53		
Other	28	19,226.07	13,727.50	4	21,140.76	21,937.77		
Agro processing				1	26,315.32	26,315.32		
Agricultural wage				3	127,309.40	18,397.64		

Table 11. Income Sources and Amounts (Real Annual Household Income in GHS)

Source: UofG field data, 2018 & 2021

Note: Multiple response table

Six out of the 9 farming households interviewed by Grameen in 2022 were satisfied with their income as it was helping them meet their household needs. A female farmer shared, *"I was satisfied because I made enough funds for household expenses and school. Cocoa funds for school and income from my trading business is used for the household."* Three did not agree. One shared, *"income keeps decreasing because of the erratic rainfall patterns we are seeing now. In 2020, I did 30 bags but could only do 20 bags in 2021. Lack of access to fertilizer is another factor. The agronomist says my trees are ageing and therefore he declines to give me fertilizer. I can only purchase a few quantities of fertilizer and it is not enough to cover my whole farm."* 

#### Household expenditure outlays and amounts

Food consumption, social responsibilities, and frequent travels were the most dominant household expenditure items during the baseline and endline periods. Expenditure on rent/housing was the lowest expenditure item in both rounds of the assessment.

Expenditure sources	Baseline	(2018)	Endline (2021)		
	Frequency	Percent	Frequency	Percent	
Food	120	48.78	119	48.37	
Water	83	33.74	74	30.08	
Health	101	41.06	114	46.34	
Education (books & stationery)	90	36.59	79	32.11	
Education (feeding & transportation)	98	39.84	93	37.80	
Electricity	77	31.30	90	36.59	
Clothing	103	41.87	115	46.75	
Travels	108	43.90	119	48.37	
Social responsibility	115	46.75	119	48.37	
Rent & Housing	24	9.76	9	3.66	
Crop production costs	43	17.48	50	20.33	
Animal production costs	42	17.07	36	14.63	
Other expenditure	120	48.78	120	48.78	



Source: UofG field data, 2018 & 2021

As indicated in Table 13, there was a general increase in the estimated average annual household expenditure for both the treatment and comparison groups from GHS 16,868 (baseline) to GHS 20,628 (endline) over these two time periods. Specifically, expenditures on food, children's education, and transportation/travels were the highest outlays for both groups at both time periods. The treatment group's mean annual expenditure on food increased from a baseline average of GHS 4,615 to an endline value of GHS 6,838, representing a 48-percent increase while that of the comparison group increased by 42 percent.

Group	Statistic	Baseline (2018)	Endline (2021)
Treatment	Median	11,369.00	13,605.00
	Mean	13,180.87	18,260.25
	SD	9,091.16	21,270.02
	Minimum	609	2,170.00
	Maximum	42,836.00	205,300.00
	Ν	39	120
Comparison	Median	15,022.50	18,134.00
	Mean	19,767.13	22,883.90
	SD	24,052.10	18,189.91
	Minimum	1,844.00	2,182.50
	Maximum	228,004.00	118,975.00
	Ν	126	126
Pooled	Median	12,372.00	15,766.25
	Mean	16,867.83	20,628.46
	SD	19,357.72	19,847.41
	Minimum	622.00	2,170.00
	Maximum	228,004.00	205,300.00
	Ν	246	246

Source: UofG field data, 2018 & 2021

In general, household expenditures on all items increased for all farmers over the period (with the exception of health expenditures for the treatment group). Furthermore, the treatment group's financial commitment to agricultural production operations more than doubled. A finding worth noting is that the average annual crop production costs (including expenditures on cocoa production)

and animal production costs (poultry and livestock) of the treatment group substantially increased over the period by 108 percent and 212 percent, respectively. Could expenditures required for the implementation of the FarmGrow plan by the treatment group contribute to this hike in crop production expenses or is it an increase in the general price levels of agricultural production inputs? An assessment of the crop and animal production costs of the comparison group rather indicated declines in these two expenditure items, by 17.96 percent (crop production costs) and 30.21 percent (animal production costs). These results suggest that the treatment group was spending more on crop and animal production, both a sign of increased investment which could be related to the FarmGrow plans as well as the farmers' attempts to diversify their income streams. Animal production can often be used as a "savings account on legs"<sup>17</sup> and integral to farming household ecosystems, which may be a sign of increase to build household resilience as household income was being channelled to investments on the cocoa farm.

	Treatment Group								
Household expenditure items		Baseline (2	018)		Endline (20	21)			
Food		Mean	Median	Ν	Mean	Median			
Food	120	4,614.95	3,650.00	119	6,838.49	5 <i>,</i> 475.00			
Water	83	594.33	365.00	74	605.13	365.00			
Health	101	1,227.75	200.00	114	584.53	270.00			
Education (books & stationery)	90	2,759.18	650.00	79	4,523.63	800.00			
Education (feeding & transportation)	98	2,911.78	2,190.00	93	3,736.94	2,920.00			
Electricity	77	463.25	240.00	90	612.56	260.00			
Clothing	103	386.70	300.00	115	567.91	360.00			
Travels	108	1,261.66	570.00	119	1,494.59	600.00			
Social responsibility	115	605.91	480.00	119	1,054.64	520.00			
Rent & Housing	24	420.83	100.00	9	440.00	360.00			
Crop production costs	43	701.33	500.00	50	1,460.40	1,000.00			
Animal production costs	42	405.45	190.00	36	1,265.39	372.00			
Other expenditure	120	494.13	-	120	123.33	-			
	Comparison Group								
			companise		4P				
Household expenditure items		Baseline (2	018)		Endline (20	21)			
Household expenditure items	N	Baseline (2 Mean	018) Median	N	Endline (20 Mean	21) Median			
Household expenditure items Food	<b>N</b> 126	<b>Baseline (2</b> <b>Mean</b> 6,938.66	018) Median 5,475.00	N 124	Endline (20 Mean 9,856.42	<b>21)</b> Median 9,125.00			
Household expenditure items Food Water	N 126 112	<b>Baseline (2</b> <b>Mean</b> 6,938.66 495.15	018) Median 5,475.00 365.00	<b>N</b> 124 114	Endline (20 Mean 9,856.42 790.18	<b>21)</b> Median 9,125.00 660.00			
Household expenditure items Food Water Health	N 126 112 105	Baseline (2 Mean 6,938.66 495.15 566.77	018) Median 5,475.00 365.00 360.00	N 124 114 124	Endline (20 Mean 9,856.42 790.18 761.10	<b>21)</b> 9,125.00 660.00 335.00			
Household expenditure items Food Water Health Education (books & stationary)	N 126 112 105 105	Baseline (2) Mean 6,938.66 495.15 566.77 2,329.40	018) Median 5,475.00 365.00 360.00 800.00	N 124 114 124 85	Endline (20 Mean 9,856.42 790.18 761.10 3,976.24	<b>Median</b> 9,125.00 660.00 335.00 1,200.00			
Household expenditure items Food Water Health Education (books & stationary) Education (feeding & transportation)	N 126 112 105 105 107	Baseline (2 Mean 6,938.66 495.15 566.77 2,329.40 3,869.31	018) Median 5,475.00 365.00 360.00 800.00 2,920.00	N 124 114 124 85 97	Endline (20 Mean 9,856.42 790.18 761.10 3,976.24 5,405.16	21) Median 9,125.00 660.00 335.00 1,200.00 3,650.00			
Household expenditure items Food Water Health Education (books & stationary) Education (feeding & transportation) Electricity	N 126 112 105 105 107 100	Baseline (2) Mean 6,938.66 495.15 566.77 2,329.40 3,869.31 558.20	018) Median 5,475.00 365.00 360.00 800.00 2,920.00 360.00	N 124 114 124 85 97 108	Endline (20 Mean 9,856.42 790.18 761.10 3,976.24 5,405.16 780.02	21) Median 9,125.00 660.00 335.00 1,200.00 3,650.00 480.00			
Household expenditure items Food Water Health Education (books & stationary) Education (feeding & transportation) Electricity Clothing	N 126 112 105 105 107 100 111	Baseline (2) Mean 6,938.66 495.15 566.77 2,329.40 3,869.31 558.20 2,051.80	018) Median 5,475.00 365.00 360.00 2,920.00 360.00 300.00	N 124 114 124 85 97 108 110	Endline (20 Mean 9,856.42 790.18 761.10 3,976.24 5,405.16 780.02 604.36	21) Median 9,125.00 660.00 335.00 1,200.00 3,650.00 480.00 355.00			
Household expenditure items Food Water Health Education (books & stationary) Education (feeding & transportation) Electricity Clothing Travels	N 126 112 105 105 107 100 111 116	Baseline (2) Mean 6,938.66 495.15 2,329.40 3,869.31 3,869.31 2,051.80 1,421.16	Median           5,475.00           365.00           360.00           2,920.00           360.00           360.00           2,920.00           360.00           360.00	N 124 114 124 85 97 108 110 123	Endline (20 Mean 9,856.42 790.18 761.10 3,976.24 5,405.16 780.02 604.36 1,552.20	21) Median 9,125.00 660.00 335.00 1,200.00 3,650.00 480.00 355.00 600.00			
Household expenditure items Food Water Health Education (books & stationary) Education (feeding & transportation) Electricity Clothing Travels Social responsibility	N 126 112 105 105 107 100 111 116 117	Baseline (2) Mean 6,938.66 495.15 566.77 2,329.40 3,869.31 558.20 2,051.80 1,421.16 838.29	Median           5,475.00           365.00           360.00           2,920.00           360.00           360.00           400.00           360.00           360.00           360.00           360.00           360.00           360.00           360.00           360.00           360.00	N 124 114 124 85 97 108 110 123 121	Endline (20 Mean 9,856.42 790.18 761.10 3,976.24 5,405.16 780.02 604.36 1,552.20 1,413.39	21) Median 9,125.00 660.00 335.00 1,200.00 3,650.00 480.00 355.00 600.00			
Household expenditure items Food Water Health Education (books & stationary) Education (feeding & transportation) Electricity Clothing Travels Social responsibility Rent & Housing	N 126 112 105 105 107 100 111 116 117 20	Baseline (2) Mean 6,938.66 495.15 2,329.40 3,869.31 558.20 2,051.80 1,421.16 838.29 199.95	018) Median 5,475.00 365.00 360.00 2,920.00 360.00 360.00 300.00 600.00 480.00 122.00	N 124 114 124 85 97 108 110 123 121 14	Endline (20 Mean 9,856.42 790.18 761.10 3,976.24 5,405.16 780.02 604.36 1,552.20 1,413.39 427.14	21) Median 9,125.00 660.00 335.00 1,200.00 3,650.00 480.00 355.00 600.00 600.00 360.00			
Household expenditure items Food Water Health Education (books & stationary) Education (feeding & transportation) Electricity Clothing Travels Social responsibility Rent & Housing Crop production costs	N 126 112 105 105 107 100 111 116 117 20 42	Baseline (2) Mean 6,938.66 495.15 2,329.40 3,869.31 3,869.31 2,051.80 1,421.16 838.29 199.95 1,639.76	018) Median 5,475.00 365.00 360.00 2,920.00 360.00 300.00 600.00 480.00 122.00 500.00	N 124 114 124 85 97 108 110 123 121 14 51	Endline (20 Mean 9,856.42 790.18 761.10 3,976.24 5,405.16 780.02 604.36 1,552.20 1,413.39 427.14 1,345.20	21) Median 9,125.00 660.00 335.00 1,200.00 3,650.00 480.00 355.00 600.00 600.00 360.00 720.00			
Household expenditure items Food Water Health Education (books & stationary) Education (feeding & transportation) Electricity Clothing Travels Social responsibility Rent & Housing Crop production costs Animal production costs	N 126 112 105 105 107 100 111 116 117 20 42 25	Baseline (2) Mean 6,938.66 495.15 2,329.40 3,869.31 3,869.31 2,051.80 1,421.16 838.29 1,421.16 1,639.76 1,639.76	Median           5,475.00           365.00           360.00           2,920.00           360.00           360.00           480.00           122.00           500.00	N 124 114 124 85 97 108 110 123 121 14 51 22	Endline (20 Mean 9,856.42 790.18 761.10 3,976.24 5,405.16 780.02 604.36 1,552.20 1,413.39 427.14 1,345.20 839.55	21) Median 9,125.00 660.00 335.00 1,200.00 3,650.00 480.00 355.00 600.00 600.00 360.00 720.00 320.00			

Table 14. A	nnual Expend	liture Outlay	/ bv Ex	penditure Item
			~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	

Source: UofG field data, 2018 & 2021

#### **Cocoa Production**

Land rights and tenure security are major determinants of long-term farm investment. Farmers with full ownership rights to their farmlands are more likely to make long term investments in rehabilitating low productive farms and incorporating shade trees on their cocoa farms.<sup>18</sup> This is also the reason why

Touton originally recruited farmers who were the landowners to participate in FarmGrow as they would have the ultimate decision-making power regarding the cocoa farm.

#### Cocoa farm ownership status

As shown in Figure 3, land inheritance remained the dominant form of cocoa land acquisition during both time periods. Despite a reduction from the baseline figure of 46 percent, the majority of the cocoa farms cultivated at endline were inherited (37%). The second most common forms of land acquisition included sharecropping<sup>a</sup> which was more common at baseline whereas rented/leased land was more common at endline. This might suggest that renting and leasing land may be growing in popularity as farmers may prefer full accrual of benefits from their investment efforts instead of the sharing of profits.



**Figure 3. Land Tenure Arrangements** 

When disaggregated by sex, and as shown in Table 15, the majority of treatment group male and female farmers acquired their farmlands via inheritance.

		Baseline (2018)							
		Trea	tment		Comparison				
	Male (%)	No.	Female (%)	No.	Male (%)	No.	Female (%)	No.	
Purchased	10.11	9	3.23	1	21.91	16	3.78	2	
Leased/Rented	1.12	1	0.00	0	0.00	0	1.89	1	
Sharecropping	34.83	31	32.26	10	10.96	8	3.77	2	
Family Land	11.24	10	9.68	3	23.29	17	24.53	13	
Inheritance	39.33	35	51.60	16	41.10	30	62.26	33	
Other	3.37	3	3.23	1	2.74	2	3.77	2	
Total	100.00	89	100.00	31	100.00	73	100.00	53	
		Endline (2020)							
		Trea	tment			Compa	arison		

Table	15.	Farmland	Ownershi	o Status	by Sex
labic	тэ.	rarmana	Ownersing	Julius	by JCA

	Endline (2020)								
		Treatment				Comparison			
	Male (%)	No.	Female (%)	No.	Male (%)	No.	Female (%)	No.	
Purchased	15.91	14	18.75	6	34.25	25	16.98	9	

<sup>&</sup>lt;sup>a</sup> In the interview with the purchasing clerk conducted by the University of Ghana, he shared that when farmers sharecrop, the "caretaker" will agree with the farm owner that he or she may agree on a ten-year plan, whereby the caretaker weeds, takes care of the farm, helps plant cocoa, harvest it, etc. and after the ten years, the farm will be split in two, and the caretaker becomes owner of half of the farm. During the ten years, the caretaker and the farm owner are dividing the harvest and income.

Source: UofG field data, 2018 & 2021

Leased/Rented	2.27	2	0.00	0	1.37	1	0.00	0
Sharecropping	28.41	25	15.62	5	12.32	9	5.66	3
Family Land	14.77	13	18.75	6	13.70	10	28.30	15
Inheritance	31.82	28	40.63	13	36.99	27	45.29	24
Other	6.82	6	6.25	2	1.37	1	3.77	2
Total	100.00	88	100.00	32	100.00	73	100.00	53

Source: UofG field data, 2018 & 2021

The endline condition registered a decline for both females (41% from 52% at baseline) and males (32% from 39% at baseline) in the inheritance mode of land ownership. This decline in inheritance of land appears to have been compensated by increased land purchases, which showed an increase from baseline figure of 3 percent to 19 percent for female farmers in the treatment group and from 10 percent to 16 percent for males. In general, more female farmers in the treatment group appear to have acquired additional cocoa farms through land purchases over the period compared to male farmers. This increasing trend of land purchases by respondents over the project period appears to be the general trend among the comparison group farmers as well.

Among the ten farmers interviewed qualitatively by Grameen in 2022, all but one had either inherited the land or was working family land. The one outlier farmer had purchased all of his own land, of which he owned three different farms consisting of 10, 16, and 4 acres. Most felt stability of their land ownership as it had been passed down and they held land ownership papers; however, the one farmer who had purchased his land shared, *"The chiefs and elders mostly decide but the truth is that lands are generally not available for farming these days and it is difficult accessing additional lands for farming."* Joyce, a farmer that was interviewed at midline, had originally shared the story of how her husband was the farmer, but upon his death, his family took the land back and gave her a very small portion of land, which she considered the worst part of the farm. And the endline, when she was asked about her rights to her farm, she shared that *"the land is family land and I have been given my share by my husband's family, hence I have access to the land. Traditionally, what I do to continue holding onto the land, is I often provide drinks (schnapps) to my husband's family as custom demands." This illustrates the tenuous "ownership" some farmers have to their land and how local customs will often dictate land ownership.* 

#### Perception of changes in cocoa yields

As shown in Table 16, among the treatment group, there was an increase in those who reported perceptions of declining cocoa yields compared to the prior year, from 42 percent at baseline to 52 percent at endline whereas the comparison group reported that yields were generally greater than the prior year.

	Treatme	ent (%)	Compari	son (%)	Pooled (%)		
	Baseline	Endline	Baseline	Endline	Baseline	Endline	
Same as last year	8.33	3.67	11.90	12.07	10.16	8.00	
Greater than last year	50.00	44.04	34.13	43.10	41.87	43.56	
Less than last year	41.67	52.29	53.97	44.83	47.97	48.44	
Total	100	100	100	100	100	100	

#### Table 16. Perceptions of Changes in Cocoa Yields and Reasons

Source: UofG field data, 2018 & 2021

The treatment group primarily explained the decrease in yield due to less rain received than the prior year whereas the comparison group explained that less rain and decreased fertilizer were equally causing decreases in yield.

	Treatme	ent (%)	Compa	rison (%)
	Baseline	Endline	Baseline	Endline
Good Agricultural Practices (GAPs)	0.00	0.00	0.00	3.85
More Rain	8.16	0.00	19.70	0.00
Less Rain	6.12	77.19	1.52	48.08
Poor Soil Quality	12.24	3.51	12.12	1.92
Better Soil Quality	0.00	0.00	1.52	0.00
Increase In Fertilizer	4.08	0.00	3.03	1.92
Decrease In Fertilizer Use	30.61	14.04	30.30	42.31
Improved Seeds	0.00	0.00	0.00	0.00
Lower Farm-Gate Prices	0.00	0.00	0.00	0.00
Higher Farm-Gate Prices	0.00	0.00	3.03	0.00
High Cost of Inputs	8.16	0.00	10.61	3.85
Low Cost of Inputs	0.00	0.00	0.00	0.00
Other	53.06	17.54	57.58	23.08

#### Table 17. Reasons for Perceived Declining Cocoa Yields Compared to Previous Year

Source: UofG field data, 2018 & 2021

For the farmers interviewed in 2022, the perceptions were mixed as well. Four out of the nine were satisfied. As one farmer put it, *"In 2020, it was 14 bags and 12 bags in 2021. The harvesting for 2021 is still on-going and I am confident I will get more bags."* Another shared, *"I was quite satisfied but I know I could have made more if I had applied fertilizer to my farm."* In fact, the application of fertilizer was mentioned as a key attribute for productivity, *"I was not satisfied at all given I had a reduction from 30 bags in 2020 to 20 bags in 2021. This is a result of inadequate application of fertilizer and the erratic rainfall pattern we are experiencing these days. It can get really warm and this is not good for cocoa production. When we do not expect rain, it rains and sometimes the period of drying our beans in the sun is affected. In fact, sometimes, too, we have excessive rains which cause soil erosion on our farms." Another farmer concurred with the weather challenges, <i>"I was nuch rain and it affected productivity."* 

This data conflicts with the reported income increases documented earlier. For this reason, the farmers interviewed in 2022 were interviewed about their perspective on this disparity. Several farmers felt this could be explained by the fact expenses were higher in the prior year, which offset any increases in earnings. A few farmers explained that a farmer would not perceive a decrease in income if they followed good practices, *"with cocoa, I can't say much for now, but with my plantation farm, I make enough income which reflects my income and [it] keeps rising every year with best practices. I think people don't invest much into their farms and hence, their low returns."* Several farmers concurred, *"For me, my income is inconsistent for every year depending on the investment I made in that year. For others, it all boils down to the investment and adhering to proper practices."* Another noted, *"Yes, to me, I can confirm my income has increased because prior to joining the plan, there were a lot of activities I carried out wrongly and it cost me money. All these activities are being done correctly [now], which saves money."* 

#### Farm size, yield, and farm income

The reported farm size (in hectares [ha]) among the treatment group increased from a baseline value of 3.91 ha to an endline value of 4.16 ha. At endline, males in the treatment group, on average, cultivated larger farm sizes than female beneficiaries (Males=4.68 ha, Females=2.69 ha) and this difference was statistically significant at the 1% level of significance (Annex Table 4). The comparison group's farm sizes declined from 5.5 ha at baseline to 4.35 ha at endline, a decline of about 21 percent.

Category	Stat.	Farm si	ze (ha)	Yield (to	ns/ha)	Farm inco	me per ha	Output (tons)	
		Baseline	Endline	Baseline	Endline	Baseline	Endline	Baseline	Endline
	Median	3.20	3.24	0.30	0.32	1,425.00	1,842.45	0.97	0.96
	Mean	3.91	4.16	0.35	0.39	2,811.14	3,453.46	1.20	1.50
Treatm	SD	2.71	3.45	0.24	0.25	4,021.68	5,010.03	1.06	1.89
ent	Min	0.60	0.81	0.04	0.04	118.75	127.6154	2	0.13
	Max	12.00	21.46	1.40	1.58	28,500	38,858.89	5.61	16.00
	N	120	119	120	119	115	118	120	119
	Median	4.00	3.24	0.24	0.29	1,583.33	1,931.78	0.97	1.15
	Mean	5.50	4.35	0.31	0.36	2,767.40	2,797.08	1.54	1.55
Compar	SD	5.92	3.58	0.22	0.25	4,425.95	3,001.95	1.95	1.82
ison	Min	0.40	0.40	0.02	0.04	118.75	173.70	0.06	0.10
	Max	40.00	28.74	1.35	1.58	26,600.00	17,866.16	13.55	12.80
	N	126	125	126	122	121	120	126	123
	Median	3.66	3.24	0.27	0.32	1,551.67	1,898.28	0.97	1.09
	Mean	4.73	4.26	0.33	0.38	2,788.72	3,122.51	1.37	1.52
Pooled	SD	4.70	3.51	0.23	0.25	4,224.86	4,126.06	1.58	1.85
rooleu	Min	0.40	0.40	0.02	0.04	118.75	127.62	0.06	0.10
	Max	40.00	28.74	1.40	1.58	28,500.00	38,858.89	13.55	16.00
	N	246	244	246	241	236	238	246	242

Table 18. Cocoa Farm Size, Yield, and Farm Income

Source: UofG field data, 2018 & 2021

In terms of farm production, cocoa output (in tons) was estimated by multiplying the number of bags produced by the standard weight of a cocoa bag (64kg). The average output of the treatment group increased by 25 percent, from 1.20 tons (baseline) to 1.50 tons (endline) compared to a 6 percent increase by the comparison group, from 1.54 tons (baseline) to 1.55 tons (endline). However, it is noteworthy that from the onset of the project, the comparison group reported producing higher cocoa production than the treatment group. At endline, males in the treatment group produced, on average, 60 percent more cocoa beans than their female counterparts (Males=1.66 tons, Females=1.04 tons). Also, a point that will be noted later, very few farmers started replanting efforts, which would have resulted in a reduction in productivity among the treatment group may have been implementing all other recommendations, such as improving their GAPs, which might have influenced these short-term improvements. As indicated earlier, farmers in the treatment group reported double expenditures on crop and animal production, which might also influence these improvements in yield.

Farm yields were estimated by dividing the tonnage of cocoa produced by each farmer by their respective reported farm sizes. Average farm yields for the treatment group increased by 11 percent, from 0.35 tons/ha to 0.39 tons/ha compared to a 16 percent rise by the comparison group (from 0.31tons/ha to 0.36 tons/ha), although cocoa yields of the treatment group are higher than the comparison group. The analyses further show that females in the treatment group, at the endline, had slightly higher yields than males (Males=0.39 tons/ha, Females=0.40 tons/ha) but with no statistically significant difference (Annex Table 5).

The average cocoa income per hectare was estimated by dividing the total income earned from cocoa farming by the land size cropped per farmer. For the treatment group, the average income per hectare increased significantly by 23 percent from GHS 2,811 to GHS 3,453 compared to just a one percent increase in the comparison group, from GHS 2,767 to GHS 2,797. Females in the treatment group realised a marginal increase in income per hectare compared to their male counterparts (Males=GHS 2,726, Females=GHS 2,827), even though this difference did not prove to be statistically significant.

In summary, the data indicates that the treatment group observed greater increases in average cocoa farm sizes, cocoa outputs and yields, and average cocoa income per hectare over the project implementation period compared to the comparison group. While many factors can influence

outputs, yields and income, FarmGrow may have also contributed to these improvements. Female farmers in the treatment group, while still having less land, experienced greater yields and income per hectare than their male counterparts whereas females in the comparison group continued to experience less land, yield, and income per hectare compared to their male counterparts and their female counterparts in the treatment group (Annex Table 10).

#### Adoption of Good Agricultural Practices (GAPs)<sup>b</sup>

#### GAPs

As shown in Table 19, self-reported application of fertilizer and fungicides is lower than adoption of the other GAPs. On average, there were generally increases in a farmers' self-reported adherence related to pruning practices, shade tree incorporation, and application of agrochemicals such as fertilizer, pesticides, and fungicides. The greatest increase across the treatment and comparison groups was found in fertilizer application where both groups reported large, statistically significant increases in fertilizer application. While the treatment group reported a decline in fungicide application and the comparison group reported a slight increase in fungicide application, these differences were not statistically significant, nor were the increases statistically significant in use of insecticides in both groups.

Practices	Category	Baseline (%)	Endline (%)
Pruning	Comparison	89.68	96.83
	Treatment	92.50	96.67
	Pooled	91.06	96.75
Mistletoe removal	Comparison	91.27	94.44
	Treatment	89.17	95.00
	Pooled	90.24	94.72
Weeding	Comparison	100.00	99.21
	Treatment	100.00	99.17
	Pooled	100.00	99.19
Chupon removal	Comparison	92.06	96.83
	Treatment	95.00	94.17
	Pooled	93.50	95.53
Shade tree incorporation	Comparison	82.54	84.92
	Treatment	89.17	89.17
	Pooled	85.77	86.99
Chemical fertilizer use	Comparison	8.73	60.32
	Treatment	35.90	58.33
	Pooled	22.32	59.35
Insecticide use	Comparison	92.06	94.44
	Treatment	96.67	98.33
	Pooled	94.31	96.34
Fungicide use	Comparison	69.05	73.02
	Treatment	70.00	66.67
	Pooled	69.51	69.92

**Table 19. Application of Key Farm Sanitation Practices** 

Source: UofG field data, 2018 & 2021

<sup>&</sup>lt;sup>b</sup> As will be noted elsewhere in the report, what FarmGrow promoted as GAPs or AOs (Annex 1) relies on the data captured by UofG, but it is also different. In particular, the UofG survey did not ask about soil quality, harvesting practices, or planting material which make up the 14 FarmGrow AOs used to assess a farmer's cocoa farm. The data reported here is self-reported data for practices completed in the last year whereas FarmGrow visually observes the result of the practice during a monitoring visit, except for Fertilizer Formulation and Application, and this relies on self-reported data as well.

For the respondents who did not apply an agrochemical, the major reason reported was due to having no need for the agrochemical. Other reasons cited included high cost and unavailability of the input in their community. Constraints for access to inputs were noted by the farmers interviewed in 2022 due to both their cost and their lack of availability to purchase. As one farmer with 10 hectares of land shared, *"I was able to only afford 20 bags of fertilizer on my own but this quantity was woefully inadequate for my farm. I need to travel to Kasapin to buy these inputs which comes at a cost (transportation). It will be good if these farm inputs are delivered at the farm gate. I did not get any support from the government in 2021 with subsidized fertilizer so it was very difficult for me. No wonder I moved from 30 bags to 20 in 2021." Another farmer noted he was able to access seeds and pesticides, but fertilizer was unavailable. Instead of purchasing fertilizer due to its cost, two farmers instead opted to use animal or poultry "droppings." Two farmers noted easy access to inputs as they were government supported, <i>"I had access to all inputs I needed, especially government inputs such as fertilizer, weedicide, etc."* 

Dessens	Fertil	izer (%)	Insecti	cide (%)	Fungicide (%)	
RedSUIIS	Treatment	Comparison	Treatment	Comparison	Treatment	Comparison
Because of its high cost	4.00	18.00	4.00	18.00	4.00	18.00
Non availability of product in the community	34.00	16.00	34.00	16.00	34.00	16.00
Labour not available		2.00		2.00		2.00
Not needed	40.00	28.00	40.00	28.00	40.00	28.00
Other	22.00	36.00	22.00	36.00	22.00	36.00

Table 20. Reasons for Non-Use of Agrochemicals at Endline

Source: UofG field data 2021

#### Farm record keeping

In addition to practices related to farming, maintaining good farm records helps farmers plan and make realistic forecasts on future production. In some cases, it is required by lenders and government agencies in giving loans to farmers. During the baseline and endline surveys, respondents were asked whether they keep any kind of records on their cocoa farming enterprise. The treatment group reported a decline (18% to 17%) in keeping farm records whereas the comparison group reported an increase. The reason for low recordkeeping by the treatment group is uncertain and requires further interrogation in future studies.

#### **Table 21. Recordkeeping Practices**

Category	Baseline (%)	Endline (%)
Comparison	10.32	14.29
Treatment	18.33	16.67
Pooled	14.23	15.45

Source: UofG field data, 2018 & 2021

#### Access to Extension Services

Transfer of knowledge on modern production practices in the cocoa sector has been promoted by various government agencies, LBCs like Touton, and non-governmental organizations (NGOs). These institutions are continuously finding ways of providing efficient and cost-effective extension service to help cocoa farmers increase productivity on their farms. In both rounds of the assessment, respondents were asked to indicate whether they had received knowledge/advice or for cocoa production and related activities.

Overall, there was a 5.3 percent increase in the proportion of all project participants accessing agricultural extension services in their various communities (Table 22). The treatment group experienced a decline in access to agricultural extension services (93% to 88%) whereas the comparison group experienced an increase in access to extension services (69% to 84%), which is likely due to an increase in extension services by Ghana Cocoa Board (COCOBOD), which will be shown later in the report.

Category	Baseline (%)	Endline (%)
Comparison	69.05	83.33
Treatment	92.50	88.33
Pooled	80.49	85.77

Table 22. Proportion of Respondents Accessing Extension Services

Source: UofG field data, 2018 & 2021

Table 23 shows that for the treatment group, Touton remains the major extension service provider to the treatment group at both points of time (80% to 90%). For the comparison group, the Ministry of Food and Agriculture (MoFA) and COCOBOD are the major extension service providers, but the treatment group also reported an increase in their access to extension services provided by MoFA and COCOBOD. Dependence on family and friends for extension advice declined over the project period for both the treatment (from 6% to 2%) and the comparison groups (5% to 0%).

Source of extension service	Category	Baseline (%)	Endline (%)
MoFA/COCOBOD	Comparison	77.01	75.24
	Treatment	50.45	79.25
	Pooled	62.12	77.25
Touton	Comparison	12.64	5.71
	Treatment	80.18	89.62
	Pooled	50.51	47.87
Other LBCs	Comparison	4.6	8.57
	Treatment	0.9	3.77
	Pooled	2.53	6.16
NGO	Comparison	5.75	12.38
	Treatment	2.7	9.43
	Pooled	4.04	10.9
Friends/Family	Comparison	4.6	0
	Treatment	5.41	1.89
	Pooled	5.05	0.95

#### Table 23. Sources of Extension Services

Source: UofG field data, 2018 & 2021

Note: Multiple response table

#### Access to Credit

#### Request and receipt of credit

Access to farm credit can enable cocoa farmers the ability to intensify investments on their farms. Generally, smallholder farmers face difficulty in accessing loans for production activities since most of them are unbanked and are perceived by financial institutions, including banks, as unreliable borrowers. The study assessed the trends in successful loan applications by respondents over the project period.

For the treatment group, there was a modest increase in farmers requesting credit (24% to 28%), and receiving credit between baseline and endline (14% to 28%). At endline, those who requested credit reported receiving credit (28% and 28%, respectively). The comparison group similarly were more
likely to request credit and receive it, but there was a small portion at endline who requested but did not receive credit. At all points of time, no more than 32 percent of farmers were receiving credit. This percent use of credit is consistent with prior studies showing 30 percent of a population is likely to take up credit.<sup>19</sup>

	Baseli	ne (%)	Endlin	e (%)
Category	<b>Requested Credit</b>	Accessed Credit	<b>Requested Credit</b>	Accessed Credit
Comparison	23.81	15.08	32.54	31.75
Treatment	24.17	14.16	28.33	28.33
Pooled	23.98	23.98 14.63		30.08

# Table 24. Credit Requested and Accessed

Source: UofG field data, 2018 & 2021

# Amounts of credit requested and received

The average amount of credit requested by all respondents (pooled) significantly increased from GHS 1,614 to GHS 2,442, representing an increase of about 51 percent over the 3-year period (Table 25) while the average amount successfully accessed significantly increased from GHS 1,467 to GHS 2,076 (Table 26), a 42 percent rise over the same period. Despite these general increases over the project period, the average amount of credit requested by the treatment group decreased from GHS 1,877 to GHS 1,482 (representing a 21% decline) with the average amount received also decreasing from GHS 1,800 to GHS 1,297, representing a 28 percent decline from baseline to endline period. The amount received by the comparison group, on the other hand, increased but the comparison group also requested greater amounts at endline as well. This may suggest that the increased number of treatment group farmers requesting credit at smaller amounts skews the average downward or that they were approaching credit more conservatively than the comparison group.

## Table 25. Amount of Credit Requested

Statistic		Baseline (GHS)										
	Comparison	Treatment	Pooled	Comparison	Treatment	Pooled						
Median	1,000.00	1,000.00	1,000.00	2,500.00	1,150.00	1,850.00						
Mean	1,378.95	1,876.47	1,613.89	3,257.50	1,482.35	2,441.89						
SD	1,229.53	2,927.14	2,181.24	3,530.45	1,133.91	2,834.33						
Min	100.00	100.00	100.00	100.00	200.00	100.00						
Max	5,000.00	12,000.00	12,000.00	20,000.00	5,000.00	20,000.00						
N	19	17	36	40	34	74						

Source: UofG field data, 2018 & 2021

#### Table 26. Amount of Credit Successfully Received

Statistic	Baseline (GHS)					
	Comparison	Treatment	Pooled	Comparison	Treatment	Pooled
Median	1,000.00	1,000.00	1,000.00	2,000.00	1,000.00	1,500.00
Mean	1,168.42	1,800.00	1,466.67	2,737.50	1,297.06	2,075.68
SD	1,077.58	2,953.81	2,165.18	3,398.09	1,132.30	2,696.46
Min	100.00	100.00	100.00	100.00	200.00	100.00
Max	5,000.00	12,000.00	12,000.00	20,000.00	5,000.00	20,000.00
N	19	17	36	40	34	74

Source: UofG field data, 2018 & 2021

Disaggregating the data by sex, the average credit amount requested by both males (from GHS 1,804 to GHS 2,823) and females (from GHS 1,277 to GHS 1,913) increased over the period, likewise the average amounts of credit successfully received by both groups increased as well (Table 27). As indicated in Annex Tables 12-16, the credit amounts requested for and received by males and females did not show any statistically significant differences, either at baseline or endline.

When disaggregated by age (data not shown), there were only 3 young farmers at baseline and 1 at endline who had received credit, making comparisons with adult farmers limited due to the sample size.

Category	Stat.	Credit requ	uested (GHS)	Credit recei	ved (GHS)
	Baseline		Endline	Baseline	Endline
Male	Median	1,000.00	2,000.00	1,000.00	1,500.00
	Mean	1,804.35	2,823.26	1,673.91	2,367.44
	SD	2,479.46	3,330.15	2,451.20	3,159.17
	Min	100.00	100.00	100.00	100.00
	Max	12,000.00	20,000.00	12,000.00	20,000.00
	Ν	23	43	23	43
Female	Median	1,000.00	1,500.00	500.00	1,000.00
	Mean	1,276.92	1,912.90	1,100.00	1,670.97
	SD	1,553.57	1,877.36	1,558.85	1,851.70
	Min	100.00 200.00		100.00	200.00
	Max	6,000.00	10,000.00	6,000.00	10,000.00
	N	13	31	13	31
Pooled	Median	1,000.00	1,850.00	1,000.00	1,500.00
	Mean	1,613.89	2,441.89	1,466.67	2,075.68
	SD	2,181.24	2,834.33	2,165.18	2,696.46
	Min	100.00	100.00	100.00	100.00
	Max	12,000.00	20,000.00	12,000.00	20,000.00
	Ν	36	74	36	74

Table 27. Amount of Credit Requested and Received, by Sex

Source: UofG field data, 2018 & 2021

For the farmers interviewed in 2022, four out of the nine felt they could repay a credit due to the investment they would make on their farm eventually paying off (and repaying the credit); the remaining five farmers were not particularly comfortable taking credit due to the risk. One farmer shared that they only take credit when *"it is extremely critical."* A farmer worried about credit shared, *"I am very confident I will pay my credit if offered but I believe that if I pay I can access bigger credit to expand my farmer business. If I am faithful with smaller loans, it could open doors for bigger credit for me so I will surely pay. Above all, I am a hardworking farmer and the record shows. It is ok to have debt, the important thing here is how you use that debt to increase your fortune and be able to settle the debt when the time is due." Jokingly he says "the Government of Ghana even keeps debt, how much more a farmer like me."* 

# **Farmer Attitudes**

At baseline a small sample of treatment-group farmers and their spouses participated in the selfefficacy questions found in the proWEAI survey instrument. Self-efficacy, or the confidence and belief in oneself and one's capabilities, was found to be a contributor to disempowerment for men and women. This means for those who were classified by the proWEAI as disempowered farmers, their lack of self-efficacy was a strong predictor of their disempowerment. For this reason, this set of questions was added to the endline survey for *all* farmers to determine whether the one-on-one support from Touton agronomists would improve their self-efficacy (Table 28). It is hypothesized that this support would improve self-efficacy if farmers' improved practices were validated from an agronomist or coach and/or they experienced improved outcomes from this support. Assessing the self-efficacy questions from the endline, men have more self-efficacy than women for all indicators in the treatment group (more than ten percentage-points for all indicators), as one might expect given the social and gender norms that subordinate women, broadly. In the comparison group, women come close to men's self-efficacy with less than a 10 percentage-point difference for five of the seven indicators. Women in the comparison group also have higher self-efficacy than women in the treatment group except for one indicator. As will be seen later in the section assessing intrahousehold dynamics, where the primary farmer and his spouse were asked these same questions in a small sub-sample, while the primary farmer appears to have benefited from extension support, this does not automatically positively influence the spouse's belief in her own capabilities.

One reason that may explain the difference in the numbers for women is that the sample size for women in the comparison group is almost double the sample size for women in the treatment group. This alone can influence the numbers. Why there are more women in the comparison group may have to do with who could be found to be interviewed at endline and a more flexible definition of "farmer" might have been used by the research teams in the comparison group. Alternatively, and most concerning, might be that participation in FarmGrow for women identified weaknesses on their farms that deflated confidence; however, this is hardly likely, as other data will show that women were adopting GAPs at rates equal to or higher than men (particularly when using the observation data from FarmGrow compared to the self-reported data from the UofG dataset) and as noted above, women in the treatment group experienced greater yields and income per hectare than their male counterparts whereas females in the comparison group continued to experience less land, yield, and income per hectare compared to their male counterparts and their female counterparts in the treatment group.

		itment	Comparison					
	Male (%)	N	Female (%)	N	Male (%)	N	Female (%)	N
I will be able to achieve most goals								
I set for myself	95.46	84	75.00	24	97.26	71	24.00	52
When facing difficult tasks, I will								
accomplish them	88.64	78	59.38	19	83.56	61	83.02	44
In general, I can obtain outcomes								
important to me	90.91	80	71.88	23	94.52	69	88.68	47
I can succeed in endeavors I set my								
mind to	90.91	80	75.01	24	84.93	62	90.56	48
I will be successful in overcoming								
challenges	86.36	76	68.75	22	79.45	58	81.13	43
I am confident I can perform many								
different tasks	84.09	74	75.00	24	76.71	56	75.47	40
I can do most tasks well	86.37	76	65.63	21	84.93	62	76.47	40
Even when tough, I can perform								
quite well	87.50	77	75.00	24	87.67	64	77.35	41

#### Table 28. Farmer Self-Efficacy, Endline Only

Source: UofG field data 2021

When assessing farmer attitudes related to farming, using the farmer segmentation tool developed by the Bill and Melinda Gates Foundation, while a majority of farmers are proud to be farmers and feel they should make personal sacrifices to improve their farms, they are less likely to prefer that their children work as farmers (Table 29). Men in the comparison group are more likely to feel hopeless than men in the treatment group, which may speak to strengths of FarmGrow providing farmers a plan and a vision for improving their income and future. Men and women in the treatment and comparison groups tend to have similar attitudes; however, women are more likely to be proud to be a farmer than men in the comparison group. The reason for this is unclear.

		tment	Comparison					
	Male (%)	N	Female (%)	Ν	Male (%)	N	Female (%)	Ν
I would prefer my children not work as farmers	51.13	45	50.00	16	60.28	44	43.39	23
There is no hope for poor farmers like me to improve	22.73	20	31.26	10	53.99	29	29.19	16
If I had a choice, I would not be a farmer	30.68	27	50.01	13	34.23	25	35.85	19
There is no better investment than farming	45.46	40	37.51	12	52.06	38	56.60	30
God meant for me to be a farmer	53.41	47	59.38	19	58.91	43	45.29	24
I am proud to be a farmer	84.09	74	71.88	23	84.93	62	92.45	49
We should regularly make personal sacrifices to improve our farms	89.77	79	80.25	26	90.41	66	94.34	50
There is no need to take account of other farmers' opinions to make changes on my farm	18.19	79	31.26	26	17.81	66	16.98	50

#### Table 29. Farmer Farming Attitudes

Source: UofG field data, 2018 & 2021

Many of the farmers interviewed at midline and at endline shared they had dreams other than cocoa, but could not pursue these dreams due to lack of money, which suggests some farmers fall into cocoa farming by default or as a back-up and not by choice. One wanted to be a footballer, another a fashion designer, and one an international business woman. Many of them inherited land from family or took over the farm at the death of a spouse. Only a couple of male farmers shared they always wanted to be cocoa farmers. A 31-year-old farmer has been a farmer for 10 years. He chose to become a cocoa farmer because *"the security of income from farming cocoa and my passion for farming, in general. Anything agriculture works for me."* 

A male farmer, who is a pastor, indicated he took over his parents' cocoa farm and it is just another source of income for his family. Another male farmer shared, *"I wanted to become a banker but I didn't have the financial support to further my education after completing middle school, although I was a good and hardworking student."* He is a cocoa farmer and bee keeper and sees his children eventually taking over the farm. A female farmer shared she wanted to become a cocoa farmer, and this is what she has become. Her husband was a cocoa farmer and used to take decisions about the farm; however, upon his death, she had taken over the role as the decision-maker. Farming is a secondary income source for her family as she focuses on her petty trading business. Due to her health and age (64 years), she employs a caretaker who oversees the activities on her farm. Another widowed farmer shared that she wanted to become a nurse, but her grandfather with whom she and her twin sister lived, felt the doctor in the next town under whom she'd train would take advantage of them. Not fulfilling this dream has always worried her as the land that she currently farms on she cannot claim inheritance.

These qualitative insights align with the quantitative farmer attitude data presented above where, in some cases, half of the farmers hold negative attitudes towards farming as a professional choice. Moreover, the insights reveal the importance of understanding farmer motivations and attitudes towards cocoa farming as well as the importance of using this information to help segment farmers for programmatic support.

When asked whether they felt cocoa farming is worth the investment, nine out of the ten farming households interviewed said yes. For the one who disagreed, it had more to do with the fact the

farmer had multiple income streams, and cocoa was not his primary income-generating activity; however, he also acknowledged that his cocoa farms were young.

A 72-year-old farmer who owns 10 hectares of land shared, "I have been doing cocoa for more than 40 years and on the average, I always profit from investing in my cocoa farm. If you do it right, you will surely reap the benefit. I think it is worth investing in cocoa and also benefiting from the premium payment sometimes. There is an opportunity to intercrop and benefit from selling other crops. I farm other food crops but access to land is challenging to expand that type of farming (referencing other crops)."

Other farmers noted the sure return of cocoa farming, "Investing in cocoa is worthwhile as I do invest in farm inputs and labor to get enough yield. Investing at over 400 GHS will pay off with increased yield when you apply the right practices;" "Investing in my cocoa farm is a high priority for me because it generates almost 80 percent of my income that feeds my family. It is possible to make over 250 percent of your invested capital when following the best practices;" "Investing in cocoa is very unlikely to go wrong. The risk I think is low and therefore I invest in my cocoa farm."

# **Determinants of GAP Adoption**

In order to empirically assess the factors that influence the adoption of GAPs by cocoa farmers, a regression analysis was conducted by UofG, based on the hypothesis that participation in FarmGrow results in improved application of GAPs. The study estimated a score, using the number of key practices/activities implemented on cocoa farms as a proportion of the number of total GAPs to be implemented, including participation in FarmGrow (Table 30). These activities are pruning, fertilizer use, insecticide use, fungicide use, chupon removal, mistletoe control, weeding, and shade tree incorporation on cocoa farms. It is assumed that each GAP is equally important. The scores ranged from 0 to 1. The GAP score was used as dependent variable and regressed on FarmGrow participation (treatment group), access to extension, access to credit, sex (male and female), household size, income from cocoa farming, land ownership, and membership of a farmer-based organization. Using an Ordinary Least Square (OLS) regression, the results are presented in Table 31.

Generally, most farmers report adopting most of the GAPs.



# Figure 4. Number of GAPs Applied by Farmers

Source: UofG field data 2021

## Table 30. Description of Regression Variables

Variable	Description	Measurement
GAP score	Number of key GAPs implemented by farmer as a	Number (between 0 and 1)
	proportion of the total number of GAPs (8 in total)	

FarmGrow	This variable indicates whether the farmer is part of	Dummy;
participation	the treatment group or not	FarmGrow member=1
		Otherwise=0
Access to extension	This indicates whether or not a farmer has access	Dummy;
	to extension service or information in the last	Access to extension=1
	cropping season	Otherwise=0
Access to credit	This variable indicates whether or not a farmer	Dummy;
	successfully accessed credit in the last cropping	Access to credit=1
	season	Otherwise=0
Sex (Male)	This represents the sex of the respondent	Dummy;
		Males=1
		Females=0
Household size	This represents the number of people living in the	Number
	respondent's household	
Cocoa farming	This refers to the per capita amount of money	Ghana Cedis (GHS)
income per capita	earned from cocoa farming in the last cropping	
	season	
Land ownership	This variable describes respondents farm	Dummy;
	ownership status	Own farmland=1
		Otherwise=0
FBO membership	This indicates whether the respondent is a member	Dummy;
	of a Farmer Based Organization (FBO) or not	FBO membership=1
		Otherwise=0

The analysis suggests that access to extension, being a male, household size, cocoa farming income per capita, and land ownership significantly influence the adoption of GAPs (Table 31). Overall, the regression model is statistically significant at 1 percent (Prob>F=0.00) with 39 percent of the variation in the proportion of GAPs adopted being explained by the explanatory variables used in the model. The regression results are explained below:

## Access to extension

Holding all other variables constant, farmers who access extension services increase their GAPs adoption by 53 percent more than farmers without access to extension service or advice. This is statistically significant at 10 percent.

# Male

Male cocoa farmers adopt 77 percent more GAPs than their female counterparts, ceteris paribus. This is statistically significant at 1 percent.

## Household size

An increase in a farmer's household size by one person increases the farmer's adoption of GAPs by 20 percent, holding all other variables constant. This is statistically significant at 1 percent. A larger household size can increase the amount of family labour available for GAPs implementation and can reduce the total cost of hired labour for farm services.

## Cocoa farming income per capita

Holding all other factors constant, an increase in a farmer's per capita cocoa farming income by a cedi, significantly increases their GAP adoption by 0.009 percent. Although statistically significant at the 5 percent level of significance, the effect of this variable on GAPs is negligible.

## Land ownership

Holding all other factors constant, farmers who fully own their farmlands significantly increase their adoption of GAPs by 54 percent more than those who do not fully own farmlands.

Variable	Coefficient	p-value
Dependent variable: GAPs score		
Explanatory variables		
FarmGrow participation	-0.26	0.21
Access to extension	0.53*	0.08
Access to credit	-0.10	0.91
Sex (Male)	0.77***	0.00
Household size	0.20***	0.00
Cocoa farm income per capita	0.000093**	0.01
Land ownership	0.54**	0.01
FBO membership	-0.13	0.74

#### Table 31. Factors that Influence the Adoption of GAPs by Cocoa Farmers

Prob>F=0.00, R<sup>2</sup>=0.46 Adjusted R<sup>2</sup>= 0.39; \* significant at 10%; \*\* Significant at 5%; \*\*\* Significant at 1%

# Household Dynamics – Couple's Assessment (pro-WEAI data)

Despite Sat4Farming not having specific activities designed to support women's empowerment, research conducted throughout the project period has provided important insights into household and farm decision-making opportunities that can be used in future replications of FarmGrow or similar interventions. FarmGrow is designed to engage the primary farmer and his or her spouse and/or supporting farmers to ensure there is buy-in from all decision-makers in the investment plan. A key concern noted early in the project was related to women's involvement in the decision-making process regarding the farm investment plan and activities given a woman's own income-generating activities could be impacted by a spouse's decisions, if she were not involved.

A good or cordial household relationship among farmers and their spouses may be an indicator of how collaboratively household decisions are made in the mutual interest of a husband or wife or other decision-maker. Such good spousal relationships, amongst others such as their shared belief system, may also be extended to the decisions made on the adoption of FarmGrow recommendations for increased cocoa productivity. This section provides basic background information on farmers in the treatment group, their access to information, agricultural extension services, and productive assets, and their self-efficacy and intra-household decision-making.

While some statistical differences between male and female farmers were identified earlier in the report, women and men seemed to fare similarly as primary decision-makers on cocoa farming operations. Most women interviewed were female-headed households or the landowners. Female farmers, when taking credit, appeared to request and receive smaller amounts of credit when compared to their male colleagues. Women also reported increases in household income compared to that of male farmers and experienced similar yield increases (even though they still produced less in absolute terms) as men did.

This sub-study, comparing the answers of spouses from 30 treatment group farming couples provides some insights into household dynamics.

## **Basic background information of respondents**

Sixty (60) treatment group farmers were involved in an assessment that repeated questions from the original proWEAI assessment and was equally split into 30 males and 30 females (representing 30 couples). All the respondents are married, with a small percent engaged in polygamous marriages. Most of the females (about 93%) mentioned they are wives to the primary Touton Farmer.

	Male	%	Female	%	Pooled	%						
Marital status of respondent												
Single	0	0.0	0	0.0	0	0.0						
Married (monogamous)	29	96.6	28	93.3	57	95.0						
Married (polygamous)	1	3.4	2	6.7	3	5.0						
Divorced	0	0.0	0	0.0	0	0.0						
Separated	0	0.0	0	0.0	0	0.0						
Widowed	0	0.0	0	0.0	0	0.0						
Cohabitating	0	0.0	0	0.0	0	0.0						
Total	30	100	30	100	60	100.0						
Relationship with primary Touton farmer	r											
Spouse/Partner	7	23.3	22	73.3	29	48.3						
Daughter/son	0	0.0	0	0.0	0	0.0						
Other family	0	0.0	0	0.0	0	0.0						
Caretaker	0	0.0	0	0.0	0	0.0						
Other person	23	76.7	8	26.7	31	51.7						
Total	30	100	30	100	60	100						

#### Table 32. Marital Status of Touton Farmer

Source: UofG field data, 2018 & 2021

## Role in household decision-making around production and income

As shown in Table 33, all male and female respondents participated in both farming and non-farming income generating activities, except for large livestock rearing, such as cattle rearing. Cocoa farming is the dominant income generating activity undertaken by 100 percent of the farmers and this is closely followed by grain production, which is used primarily for food consumption. Women reported being more involved in staple grain farming, non-farm economic activities, and poultry raising.

Income generating activities*	Male	%	Female	%	Pooled	%
Cocoa farming	30	100.0	27	90.0	57	95.0
Staple grain farming and processing of the harvest: grown primarily for food consumption	15	50.0	18	60.0	33	55.0
Horticultural or high value crop farming and processing of the harvest	3	10.0	2	6.7	5	8.3
Non-farm economic activities	6	20.0	8	26.7	14	23.3
Wage and salary employment	2	6.7	3	10.0	5	8.3
Large livestock raising	0	0.0	0	0.0	0	0.0
Small livestock raising	8	26.7	7	23.3	15	25.0
Poultry and other small animals raising	2	6.7	5	16.7	7	11.7
Other	3	10.0	2	6.7	5	8.3
Total	30		30		30	

#### Table 33. Income-generating Activities over Last 12 Months

Source: UofG field data, 2018 & 2021, \*multiple answers allowed

All of the men indicated cocoa farming was the major activity that provides the majority of household income while four of the women reported other income sources, such as non-farm income generating activities and horticulture (Table 34).

#### Table 34. Income-generating Activities that Generate Most Income

Income generating activities	Male	%	Female	%	Pooled	%
Cocoa farming	30	100	26	86.7	56	93.3

Income generating activities	Male	%	Female	%	Pooled	%
Staple grain farming and processing of the	0	0.0	0	0.0	0	0.0
harvest: grown primarily for food						
consumption						
Horticultural or high value crop farming and	0	0.0	1	3.3	1	1.7
processing of the harvest						
Non-farm economic activities	0	0.0	2	6.7	2	3.3
Wage and salary employment	0	0.0	0	0.0	0	0.0
Large livestock raising	0	0.0	0	0.0	0	0.0
Small livestock raising	0	0.0	0	0.0	0	0.0
Poultry and other small animals raising	0	0.0	0	0.0	0	0.0
Other economic ventures	0	0.0	1	3,3	1	1.7
Total	30	100.0	30	100.0	60	100.0

Source: UofG field data, 2018 & 2021

# Access to information and agricultural extension

About 92 percent of 60 proWEAI respondents were aware of programmes or services that support cocoa farming activities within their catchment area. The remaining 8 percent who were unaware of such support to cocoa farmers were all women. The majority (54%) of the respondents mentioned the activities of Touton, followed by Cocoa Health and Extension Division (CHED)/COCOBOD, and the government-run Purchasing Buyer Company (PBC).

Within the past 12 months, the majority of the Pro-WEAI respondents (83%) claim they have met with their respective agricultural extension officers, although more males (93%) had contacts with their respective agricultural extension officers compared to females (73%). Both males and female respondents mentioned they have met with the agricultural extension officer 5 times in the past twelve months and all respondents also indicated that the services received were free of charge (data not shown). Most of the respondents (82%) indicated they were contacted by male extension agents; however, women were more likely to report to have been with a female extension officer compared to men.

	Male	%	Female	%	Pooled	%
Awareness of any programs, companies,	or services	that work	to support	cocoa farn	ners in your	
community						
Yes	30	100.0	25	83.3	55	91.7
No	0	0.0	4	13.4	4	6.6
Don't know	0	0.0	1	3.3	1	1.7
Total	30	100.0	30	100.0	60	100.0
Name of programme or service*						
MOFA	2	6.7	2	6.7	4	6.7
CHED (COCOBOD)	9	30.0	9	30.0	18	30.0
Touton	29	96.7	24	83.3	53	88.3
Olam	0	0.0	0	0.0	0	0.0
Ecom	0	0.0	0	0.0	0	0.0
PBC	9	30.0	5	16.7	14	23.3
Solidaridad	1	3.3	1	3.3	2	3.3
Rainforest Alliance	0	0.0	0	0.0	0	0.0
World Cocoa Foundation	3	10.0	3	10.0	6	10.0
Forestry Commission	0	0.0	0	0.0	0	0.0
Other (Specify): Cocoa life	0	0.0	1	3.3	1	1.6
Total	30		30		60	

#### Table 35. Awareness of Cocoa Services Providers

	Male	%	Female	%	Pooled	%			
Met with an agricultural officer or techno	logist in p	ast 12 mor	ths regardin	ng your coo	coa farm				
Yes	28	93.3	22	73.3	50	83.3			
No	2	6.7	7	23.3	9	15.0			
Don't know	0	0.0	1	3.4	1	1.7			
Total	30	100.0	30	100.0	60	100.0			
Sex of agricultural officer or technologist	Sex of agricultural officer or technologist you met with the last time								
Male	28	93.3	21	70.0	49	81.7			
Female	2	6.7	9	30.0	11	18.3			
Total	30	100.0	30	100.0	60	100.0			

Source: UofG field data 2021, \*multiple answers allowed

As indicated in Table 36, the majority (85%) mentioned receiving agricultural extension advisory services from agricultural extension officers. In addition, spraying, pruning, and harvesting services as well as financial literacy were also extended to these project beneficiaries. Men were slightly more likely to report receiving extension support with their spouse present (90%) compared to their wives' answers (80%); men were consistently more likely to report receiving any form of extension compared to their wives, except for extension support for farm rehabilitation.

	Male	%	Female	%	Pooled	%
Extension Services*						
Not applicable	1	3.3	6	20.0	7	11.7
Extension Advisory Services	27	90.0	24	80.0	51	85.0
Spraying Services	18	60.0	12	40.0	30	50.0
Pruning Services	17	56.7	13	43.3	30	50.0
Harvesting Services	11	36.7	5	16.7	16	26.7
Availability of Planting Materials	1	3.3	0	0.0	1	1.7
Extension Support for Farm Rehabilitation	3	10.0	4	13.3	7	11.7
Facilitate Access to Finance	3	10.0	1	3.3	4	6.7
Financial Literacy	5	16.7	3	10.0	8	13.3
Intensification for Increased Productivity	4	13.3	3	10.0	7	11.7
Provision of Additional Income or Livelihood	0	0.0	0	0.0	0	0
Diversification						
Other	0	0.0	0	0.0	0	0
Total	30		30		60	
Spouse and others who support in decisions o	n cocoa fa	rms prese	nt when ag	ric. officer	visited the	last
time						
Yes, Spouse present	18	60.0	16	53.3	34	56.7
Yes, other support present	6	20.0	6	20.0	12	20.0
No one else was present	6	20.0	8	26.7	14	23.3
Total	30	100.0	30	100.0	60	100.0

## Table 36. Agricultural Extension Services Received in Last 12 Months

Source: UofG field data 2021 \*Note: Multiple response table

However, not all of the farmers (all assumed to be FarmGrow beneficiaries) were aware of FarmGrow being provided by Touton. One male and 33 percent of women were not aware of the implementation of FarmGrow (Table 37).

Among the farmers who were aware of FarmGrow, all of the males (100%) mentioned their participation in the Touton's agronomists coaching visits on FarmGrow while 75 percent (15 females) participated. In the interviews with the farming couples in 2022, among the women whose spouses were considered the primary farmers, one woman was not aware of FarmGrow, two were generally aware of it and that it was *"an educational program which teaches us how to take care of the farm"*,

and two had more details of their engagement, "Yes, my husband shared the investment plan with me and on top of my head, I remember three key activities in the plan which are pruning, weeding and removal of mistletoe." "Yes, FDP<sup>20</sup> is a plan on how we can apply GAPs to have increased yield. That is how to conduct weeding three times a year and pruning."

The majority (86% males and 70% females) were generally satisfied with FarmGrow. While no female reported ever arguing over any decision related to FarmGrow, three of the male farmers did report arguing. Interestingly, over half of the farmers expressed their desire to have more say in taking decisions related to FarmGrow: more male spouses (59%) than female spouses (40%) wished to have more say in taking decisions on FDP/FarmGrow. For men, this may have to do with others, such as the farm owner or other family members, making decisions regarding the farm.

For the women interviewed in 2022, one spouse shared she wished to have more decision-making power on specific decisions, "Intercropping in the farm. With this decision, I cultivate cassava, palm fruit, tomatoes and peppers. In terms of hiring labour, due to ill-health and heavy nature of weeding, I did advise for hiring of labor and my husband sides with me. I also advise on how to conduct prompt pruning as we have been taught that such practices help cocoa yield." Another wished to have more say on how income is allocated "for reinvestment in the cocoa farming business and how much is allocated for household expenses." Given the impact the FarmGrow plan could have on a secondary farmers' own income, they were asked whether they felt they could be impacted if not included in the discussion. Most noted the cross-subsidization of income, "We both have planned to dedicate one-third of the total household income for investment on the farm, so when that allocation becomes insufficient, then I sometimes would have to support the household expense with my personal income from trading. This will allow my spouse to allocate more than one-third to the farm investment."

	Male	%	Female	%	Pooled	%
Aware of the FarmGrow service Touto	n provides					
Yes	29	96.7	20	66.7	49	81.7
No	1	3.3	10	33.3	11	18.3
Total	30	100.0	30	100.0	60	100.0
Participated in any Touton visits regar	ding FarmG	row				
Yes	29	100.0	15	75.0	44	89.8
No	0	0.0	5	25.0	5	10.2
Total	29	100.0	20	100.0	49	100.0
Satisfaction with your household's en	gagement w	ith FarmGro	w			
Very dissatisfied	2	6.9	0	0.0	2	4.0
Dissatisfied	1	3.5	1	5.0	2	4.0
Neither	1	3.5	5	25.0	6	12.4
Satisfied	17	58.5	5	25.0	22	44.9
Very satisfied	8	27.6	9	45.0	17	34.7
Total	29	100.0	20	100.0	49	100.0
My spouse and I ever argue over decis	ions related	l to the FDP				
Yes	3	10.3	0	0.0	3	6.1
No	26	89.7	20	100.0	46	93.9
Total	29	100.0	20	100.0	49	100.0
Wish to have more say regarding decis	sions made	related to th	e FDP			
Yes	17	58.6	8	40.0	25	51.0
No	12	41.4	12	60.0	24	49.0
Total	29	100.0	20	100.0	49	100.0

Table 37. Awareness and Decision-Making Regarding FarmGrov	able 37. <i>I</i>	. Awareness and	Decision-Making	Regarding	FarmGrow
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Source: UofG field data 2021

# Access to land

Approximately 75 percent of the respondents, together with other household members, own or cultivate land (Table 38). The majority (49%) of these cultivated lands are jointly owned, but men were more likely to report they solely owned the land. Six women and one man reported the household did not own any land. The fact that the women seemed to have a different impression of household ownership of land indicates their likely lack of understanding of land ownership status held by their spouse or other family members.

In terms of decision-making relating to what to cultivate on the land, more females (86%) than males (50%) mentioned their spouses as those who generally take such decisions. This has more to do with the fact that the other 50 percent of men indicated that someone other than their spouse or family members make decisions about what is cultivated on the land. In addition, cultivation of these lands is jointly undertaken by the spouses, as indicated by approximately 78 percent of the respondents.

	Male	%	Female	%	Pooled	%
Any household member currently own or o	ultivate lan	d?				
Yes	24	80.0	21	70.0	45	75.0
No	6	20.0	9	30.0	15	25.0
Total	30	100.0	30	100.0	60	100.0
Own any of the land owned or cultivated b	y your hous	sehold?				
Yes, solely	10	41.6	6	28.6	16	35.6
Yes, jointly	13	54.2	9	42.8	22	48.8
Yes, Solely and Jointly	0	0.0	0	0.0	0	0.0
No	1	4.2	6	28.6	7	15.6
	24	100.0	21	100.0	45	100.0
Who generally makes decisions about what	t to plant o	n this land	?			
Spouse/Partner	12	50.0	18	85.7	30	66.7
Daughter/son	0	0.0	0	0.0	0	0.0
Other family	0	0.0	0	0.0	0	0.0
Caretaker	0	0.0	0	0.0	0	0.0
Other person	12	50.0	3	14.3	15	33.3
Not applicable	0	0.0	0	0.0	0	0.0
Total	24	100.0	21	100.0	45	100.0
Does your spouse [or other person] cultiva	te this land	solely or jo	pintly with y	vou?		
Yes, solely	3	12.5	2	9.5	5	11.1
Yes, jointly	19	79.2	16	76.2	35	77.7
Yes, Solely and Jointly	2	8.3	2	9.5	4	9.0
No	0	0.0	1	4.8	1	2.2
Total	24	100.0	21	100.0	45	100.0
Who generally makes decisions about what	t to plant o	n the land	that you you	urself culti	vate?	
Spouse/Partner	12	50.0	15	71.4	27	60.0
Daughter/son	0	0.0	0	0.0	0	0.0
Other family	0	0.0	0	0.0	0	0.0
Caretaker	0	0.0	0	0.0	0	0.0
Other person	12	50.0	6	28.6	18	40.0
Not applicable	0	0.0	0	0.0	0	0.0
Total	24	100.0	21	100.0	45	100.0

	Table 38. Access to and	Decision-maker	on Productive	Land
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Source: UofG field data 2021

# **Asset Ownership**

As shown in Table 39, cell phone ownership is the major asset owned by approximately 95 percent of the respondents, followed by non-mechanised farm equipment (47%). The data suggest that males

and females appear to equally own these items, with slightly more females (50%) owning more of the non-mechanised farm equipment than males (43%).

Among the 30 couples, the majority (67%) either personally or jointly, own a bank account, with more males (77%) than females (57%) owning accounts in a bank or other formal institutions.

About 60 percent of these respondents have saved some cash to either start, operate, or grow (farm) business over the past year, with more females (70%) than males (50%) having saved for such purposes. In terms of saving cash for reasons other than farming, again more females (77%) than males (60%) have made such preparations. Fifty-seven percent (57%) of males and females have personally received money via a mobile money transaction in the prior year.

	Male	%	Female	%	Pooled	%
Type of asset personally owned or by anyou	ne househol	d member				
Non-mechanized farm equipment	13	43.3	15	50.0	28	46.7
Mechanized farm equipment	5	16.7	3	10.0	8	13.3
Non-farm business equipment	3	10.0	4	13.3	7	11.7
Cell phone	29	96.7	28	93.3	57	95.0
Means of transportation	19	63.3	17	56.7	36	60.0
Total*	30		30		60	
Current bank account ownership (personal	or joint)					
Yes	23	76.7	17	56.7	40	66.7
No	7	23.3	13	43.3	20	33.3
Don't know	0	0.0	0	0.0	0	0.0
Total	30	100.0	30	100.0	60	100.0
Have personally saved or set aside some me	oney to star	t, operate,	or grow a b	usiness o	r farm in pa	st 12
months						
Yes	15	50.0	21	70.0	36	60.0
No	14	46.7	9	30.0	23	38.3
Don't know	1	3.3	0	0.0	1	1.7
Total	30	100.0	30	100.0	60	100.0
Have personally saved or set aside some me	oney for any	reason in	past 12 mo	nths		
Yes	18	60.0	23	76.7	41	68.3
No	12	40.0	7	23.3	19	31.7
Total	30	100.0	30	100.0	60	100.0
Have personally received money from othe	rs (relative o	or friend, b	uyer, etc.) ເ	ising a mo	bile money	/
transfer service in past 12 months						
Yes	17	56.7	17	56.7	34	56.7
No	13	43.3	13	43.3	26	43.3
Total	30	100.0	30	100.0	60	100.0

#### Table 39. Asset Ownership

Source: UofG field data 2021. \*multiple answers allowed

## Access to and use of credit

## Decision-maker in borrowing from NGO

About 20 percent of the respondents (equally distributed among females and males) mentioned they and their household members were capable of taking a loan or borrowing cash/in-kind from any NGO, and only 3 of them (12.5%) had actually borrowed from an NGO (Table 40). As noted in Annex Table 17, spouses of respondents have the equal opportunity to make decisions on borrowing, what cash the borrowed money should be used for, and the person responsible for repaying the loans.

Table 40. Ability to Take a Loan of Dorrow		100				
	Male	%	Female	%	Pooled	%
Ability (or that of any household member)	to take a loa	n or borro	w cash/in-k	ind from	an NGO in t	he past
12 months if you wanted to						
Yes	6	20.0	5	16.7	11	18.3
No	18	60.0	18	60.0	36	60.0
Maybe	6	20.0	7	23.3	13	21.7
Total	30	100.0	30	100.0	60	100.0
Any household member taken any loans or	borrowed c	ash/in-kin	d from an N	GO in the	past 12 mo	onths
Yes, cash	3	25.0	0	0.0	3	12.5
Yes, in-kind	0	0.0	0	0.0	0	0.0
Yes, cash and in-kind	0	0.0	1	8.3	1	4.2
No/don't know	9	75.0	11	91.7	20	83.3
	12	100.0	12	100.0	24	100.0

## Table 40. Ability to Take a Loan or Borrow from an NGO

Source: UofG field data 2021

# Decision-maker in borrowing from formal lender

In the case of borrowing from formal lending/financial institutions, such as banks, 37 percent of respondents (with equal proportion of males and females) indicated their ability to borrow from such sources (Table 41) and only about 21 percent had borrowed cash from such formal lending institutions.

As in the case of borrowing from an NGO, Annex Table 18 also suggests that men and women equally reported taking decisions related to the borrowing of funds, its repayments, and what the borrowed funds should be used for.

#### Table 41. Ability to Take a Loan from Formal Lender

Ability (or that of any hous (bank/financial institution	sehold member) t ) in the past 12 m	o take a loar onths if we v	n or borrow o vanted to	ash/in-kind	from a form	nal lender
	Male	%	Female	%	Pooled	%
Yes	11	36.7	11	36.7	22	36.7
No	13	43.3	13	43.3	26	43.3
Maybe	6	20.0	6	20.0	12	20.0
Total	30	100.0	30	100.0	60	100.0
Any household member ta	ken any loans or	borrowed ca	sh/in-kind fı	om a forma	l lender in th	ne past 12
months						
	Male	%	Female	%	Pooled	%
Yes, cash	4	23.5	3	17.6	7	20.6
			-		•	
Yes, in-kind	0	0.0	0	0.0	0	0.0
Yes, in-kind Yes, cash and in-kind	0	0.0	0	0.0	0	0.0

100.0

17

100.0

34

100.0

Source: UofG field data 2021

Total

## Decision-maker in borrowing from group-based lenders

17

While men and women both mentioned their ability to borrow from a microfinance institution (MFI), 10 percent and 20 percent, respectively, only women reported having borrowed from an MFI in the prior 12 months (Table 42). Females/wives take their own decisions in borrowing from MFIs and are in charge of loan repayments and the uses of such borrowed funds (Annex Table 19).

Similarly, approximately 27 percent of men and women reported borrowing from savings groups (like village savings and loan associations or VSLAs). Women were only slightly more likely to borrow from

savings groups; however, in this category, men and women were likely to indicate their spouse was in charge of repayment, which suggests that a husband's/wife's membership in the group was on behalf of a spouse (Annex Table 20).

ala /tao lata al fara

microfinance in the past	<b>12 months</b> i	if we wanted	to			
	Male	%	Female	%	Pooled	%
Yes	3	10.0	6	20.0	9	15.0
No	20	66.7	18	60.0	38	63.3
Maybe	7	23.3	6	20.0	13	21.7
Total	30	100.0	30	100.0	60	100.0
Any household member	taken any lo	oans or borrov	ved cash/in-k	ind from grou	p-based microfi	nance in
the past 12 months						
	Malo	0/				
	Iviale	70	Female	%	Pooled	%
Yes, cash	0	% 0.0	Female 2	% 16.7	Pooled 2	% 9.1
Yes, cash Yes, in-kind	0	0.0 0.0	Female 2 0	% 16.7 0.0	Pooled 2 0	% 9.1 0.0
Yes, cash Yes, in-kind Yes, cash and in-kind	0 0 0	%           0.0           0.0           0.0	Pemale 2 0 0	% 16.7 0.0 0.0	Pooled 2 0 0	% 9.1 0.0 0.0
Yes, cash Yes, in-kind Yes, cash and in-kind No/don't know	0 0 0 10	0.0 0.0 0.0 100.0	Female 2 0 0 10	% 16.7 0.0 0.0 83.3	Pooled 2 0 0 20	% 9.1 0.0 0.0 90.9

#### Table 42. Ability to Borrow from Group-based Microfinance

Al-224 - Annah - Annah

Source: UofG field data 2021

#### Table 43. Ability to Borrow from an Informal Credit/Savings Group

Ability (or that of any household member) to take a loan or borrow cash/in-kind from informal credit/savings group in the past 12 months if we wanted to										
	Male	%	Female	%	Pooled	%				
Yes	7	23.3	9	30.0	16	26.7				
No	16	53.4	16	53.3	32	53.3				
Maybe	7	23.3	5	16.7	12	20.0				
Total	30	100.0	30	100.0	60	100.0				
Has anyone in your household taken any loans or borrowed cash/in-kind from informal credit / savings groups in the past 12 months										
	Male	%	Female	%	Pooled	%				
Yes, cash	5	22.2	5	25.7	10					
		55.5		55.7	10	34.5				
Yes, in-kind	0	0.0	0	0.0	0	34.5				
Yes, in-kind Yes, cash and in-kind	0	0.0	0	0.0	0	34.5 0.0 0.0				
Yes, in-kind Yes, cash and in-kind No/don't know	0 0 10	0.0 0.0 66.7	0 0 9	0.0 0.0 64.3	0 0 19	34.5 0.0 0.0 65.5				

Source: UofG field data 2021

## Decision-maker in borrowing from informal lenders

Borrowing from informal lenders was the most common source for both men and women. Approximately 35 percent of men and women indicated they could borrow from an informal lender but only 4 men and 4 women had done so (Table 44). Approximately 38 percent of men and women indicated they could borrow from friends and family, with women slightly more likely to report this (Table 45). Only three women had borrowed from friends and family.

With respect to decisions made on loans from informal lenders, both men and women reported to have a say on borrowing funds, its repayments and how the funds are used as related to the informal lenders such as a purchasing clerk (Annex Table 21). However, women were most likely to report they had the decision-making power over funds borrowed from friends and family (Annex Table 22).

#### Table 44. Ability to Take a Loan from an Informal Lender

Ability (or that of any household member) to take a loan or borrow cash/in-kind from an informal lender											
in the past 12 months if we wanted to											
	Male	%	Female	%	Pooled	%					
Yes	10	33.3	11	36.7	21	35.0					
No	14	46.7	13	43.3	27	45.0					
Maybe	6	20.0	6	20.0	12	20.0					
Total	30	100.0	30	100.0	60	100.0					
Any household member taken any loans or borrowed cash/in-kind from an informal lender in the past											
Any household member ta	aken any loa	ns or borrow	ed cash/in-k	ind from an in	formal lender	r in the past					
Any household member ta 12 months	aken any loa	ns or borrow	ed cash/in-k	ind from an in	formal lender	r in the past					
Any household member ta 12 months	aken any loa Male	ns or borrowo %	ed cash/in-ki Female	ind from an in %	formal lender Pooled	r in the past %					
Any household member to 12 months Yes, cash	aken any loa Male 4	ns or borrowo % 25.0	ed cash/in-ki Female 4	ind from an in % 23.5	formal lender Pooled 8	r in the past % 38.1					
Any household member to 12 months Yes, cash Yes, in-kind	aken any loa Male 4 0	ns or borrowo % 25.0 0.0	ed cash/in-ki Female 4 0	ind from an in % 23.5 0.0	formal lender Pooled 8 0	r in the past % 38.1 0.0					
Any household member to 12 months Yes, cash Yes, in-kind Yes, cash and in-kind	Aken any loa Male 4 0 0	ns or borrowe % 25.0 0.0 0.0	ed cash/in-ki Female 4 0 1	ind from an in % 23.5 0.0 5.9	formal lender Pooled 8 0 1	in the past % 38.1 0.0 4.8					

100.0

12

17

100.0

21

57.1

100.0

Source: UofG field data 2021

No/don't know

Total

#### Table 45. Ability to Take a Loan from Friends or Relatives

12

16

	Male	%	%		Female		%	Pooled	%	
Ability (or that of any household member) to take a loan or borrow cash/in-kind from friends or relatives in the past 12 months if we wanted to										
relatives in the past 12 months if we wanted to										
Yes		10	33	3.3	13		43.3	23	38.3	
No		11	36	5.7	13		43.3	24	40.0	
Maybe	Maybe		30	).0	4		13.4	13	21.7	
Total		30	10	0.0	30		100.0	60	100.0	
Any household	d member ta	iken any loa	ins or b	orrow	ed cash/i	n-kin	d from frien	ds or relatives	in the past	
12 months										
Yes, cash		0	0.	.0	3		17.6	3	8.3	
Yes, in-kind		0	0.	.0	0		0.0	0	0.0	
Yes, cash and i	n-kind	0	0.	.0	1		5.9	1	2.8	
No/don't know	V	19	10	0.0	13		76.5	32	88.9	
Total		19	10	0.0	17		100.0	36	100.0	

Source: UofG field data 2021

## Behaviors and perceptions of credit use

Women are less likely than men (40% compared to 60%) to report having access to credit for investments in their crops and are less likely to report having greater access to credit than their spouse (10% women compared to 60% men believing they have more credit access) (Table 46). While the majority do not currently owe money to anyone (87%), women are more likely to owe smaller amounts (13% own between 1-999 GHS) where some men owe more than 2,000 GHS.

Have access to credit to use for investments on my crops										
	Male	%	Female	%	Pooled	%				
Yes	18	60.0	12	40.0	30	50.0				
No	12	40.0	18	60.0	30	50.0				
Total	30	100.0	30	100.0	60	100.0				
Have more access to credit compared to my spouse										
	Male	%	Female	%	Pooled	%				
¥										
res	18	60.0	3	10.0	21	35.0				
No	18 2	60.0 6.3	3 19	10.0 63.3	21 21	35.0 35.0				

## Table 46. Access to and Use of Credit

Total	30	100.0	30	100.0	60	100.0				
Total amount of money currently owed anyone (from all sources)										
GHS	Male	%	Female	%	Pooled	%				
0	27	90.0	25	83.3	52	86.7				
1 - 999	1	3.3	4	13.4	5	8.3				
1,000 - 2,000	0	0.0	1	3.3	1	1.7				
> 2,000	2	6.7	0	0.0	2	3.3				
Total	30	100.0	30	100.0	60	100.0				

Source: UofG field data 2021

#### **General self-efficacy of respondents**

Like the farmer attitudes assessed earlier, the proWEAI does not assess "farmer" attitudes so much as general attitudes about one's capabilities to achieve goals and dreams. A person with low esteem might equally struggle to achieve goals and dreams, and vice-versa. For the forty-nine couples interviewed at baseline with the proWEAI assessment, self-efficacy was one of the greater contributors to disempowerment for both men and women. At the endline, a smaller sub-sample of farmers was followed due to budgetary constraints. While the differences between the baseline and endline are not a perfect comparison, the levels of self-efficacy hint at potential change, or lack thereof. Table 47 below shows the percentages of agreement with the statement presented (the farmer agreed or strongly agreed with the statement). Among treatment group males, there is some indication that men's self-efficacy improved over time for all indicators but two. In contrast, women's self-efficacy appears to have decreased for most indicators (6) and increased for two. Triangulating this data with the measures of self-efficacy for all primary farmers documented for the full sample noted earlier in the report, farmers directly participating in FarmGrow may have experienced improvements in self-efficacy, but the changes were not always trending in a positive direction nor were they necessarily experienced by other members of the household (spouses). Generally, more males than females believe that they will successfully overcome all challenges, can do most tasks very well, and also perform them very well when situations get tougher. The two indicators where there were more disagreements with the statements, among men and women, related to their ability to achieve goals, accomplishing different or difficult tasks, and overcoming challenges.

Treatment Only										
	Male %	Male %	Female %	Female %						
	(Baseline, n=49)	(Endline, n=30)	(Baseline, n=49)	(Endline, n=30)						
I will be able to achieve most goals I										
set for myself	89.90	93.4	75.51	96.7						
When facing difficult tasks, I will										
accomplish them	83.67	80.0	83.76	73.3						
In general, I can obtain outcomes										
important to me	87.76	93.3	85.71	93.4						
I can succeed in endeavors I set my										
mind to	85.72	83.3	87.73	86.7						
I will be successful in overcoming										
challenges	77.55	90.0	87.76	70.8						
I am confident I can perform many										
different tasks	59.18	83.4	85.71	76.7						
l can do most tasks well	75.51	90.0	87.76	66.7						
Even when tough, I can perform quite										
well	89.79	90.0	85.72	76.7						

#### Table 47. Farmer Self-Efficacy, Treatment Group Only

Source: UofG field data, 2018 & 2021

# Intra-household relationships

The relationship among spouses, as expressed in Table 48, revealed interesting findings. While males (i.e., husbands) indicated they mostly or sometimes respect their wives, 2 females (i.e., wives) reported they never respect their husbands. When asked if their spouses also respected them, 2 females (i.e., wives) affirmed that their husbands rarely or never respect them. It may be deduced that FarmGrow beneficiaries largely (about 96.67%) exhibit mutual respect for their spouses. Again, while all males/husbands trust that their wives will most of the time or sometimes do things/take decisions in their mutual/best interests, 3 females/wives rarely or never trust their husbands in doing things that are in their best interest. In terms of expressing oneself to the spouse should there be any form of disagreement between them, the majority (96.67%) are able to do so. However, 2 females/wives (6.67%) are unable to freely express their disagreements to their husbands.

	Male	%	Female	%	Pooled	%
Do you respect your husband or wife	e?					
Most of the time	26	86.7	28	93.3	54	90.0
Sometimes	4	13.3	0	0.0	4	6.7
Rarely	0	0.0	0	0.0	0	0.0
Never	0	0.0	2	6.7	2	3.3
	30	100.0	30	100.0	60	100.0
Does your husband or wife respect y	/ou?					
Most of the time	24	80.0	27	90.1	51	85.0
Sometimes	6	20.0	1	3.3	7	11.6
Rarely	0	0.0	1	3.3	1	1.7
Never	0	0.0	1	3.3	1	1.7
	30	100.0	30	100.0	60	100.0
Do you trust your husband or wife to	o do things	that are in your	best intere	st		
Most of the time	25	83.3	24	80.0	49	81.7
Sometimes	5	16.7	3	10.0	8	13.3
Rarely	0	0.0	2	6.7	2	3.3
Never	0	0.0	1	3.3	1	1.7
	30	100.0	30	100.0	60	100.0
When you disagree with your spouse	e do you fe	el comfortable t	elling him/h	ner that yo	u disagree?	
Most of the time	18	60.0	16	53.3	34	56.7
Sometimes	12	40.0	12	40.0	24	40.0
Rarely	0	0.0	2	6.7	2	3.3
Never	0	0.0	0	0.0	0	0.0
	30	100.0	30	100.0	60	100.0

# Table 48. Relationship between Spouses

Source: UofG field data 2021

# Farmer Satisfaction of FarmGrow

## Willingness to recommend FarmGrow innovation

FarmGrow beneficiaries were asked to rate their satisfaction with their FarmGrow experience. Overall, 93 percent of the treatment group indicated their willingness to recommend the innovation to other cocoa farmers in their communities.

## Farmer perception of FarmGrow innovation adoption and outcomes

The study further assessed the treatment group's perception of the extent to which FarmGrow has influenced their adoption of the promoted sustainable agronomic practices and their resultant impact on yield and farm income. A 5-point Likert scale rating was used to elicit responses as either *very high, high, moderate, low,* or *very low* (Table 49).

The treatment group provided fairly high ratings on the effect of the intervention on their effective use of insecticides, quality seedlings, fertilizer, insecticides, and fungicides, as well as providing high ratings on the effect of FarmGrow on their farm yields and farm income. The ratings on these perceptions are provided in Table 46. In general, on all indicators, at least 76 percent of the treatment group rated the impact of FarmGrow as "high"; the highest rating received was 88 percent of the treatment group rating FarmGrow as high for effective use of insecticides followed by effective use of fertilizer. Given the low usage of fertilizers, it is difficult to reconcile farmers' high satisfaction with the impact of FarmGrow on their use of fertilizers; however, farmers could be responding positively to the questions given these answers may be perceived as more socially acceptable. Other research has shown that a person's reported satisfaction level may not always be associated with the outcomes they are experiencing.<sup>21</sup> However, other studies conducted with cocoa farmers in Ghana suggest the farmers will be honest about their satisfaction if they are dissatisfied.<sup>22</sup> The one-on-one support provided by Touton might be the real value they are assessing, whether outcomes have been achieved or not.

	Very High	High	Moderate	Low	Very Low	Total
Impact of FarmGrov	v on the effective	use of fertilize	r			
Frequency	31	68	17	2	2	120
Percentage	25.83	56.67	14.17	1.67	1.67	100
Total	99		17		4	120
%	82.5	0	14.17		100	
Impact of FarmGrov	v on the effective	use of cocoa s	eedlings			
Frequency	21	70	22	5	2	120
Percentage	17.5	58.33	18.33	4.17	1.67	100
Total	91		22		7	120
%	75.8	3	18.33		5.84	100
Impact of FarmGrov	v on the effective	use of insectic	ides			
Frequency	29	77	9	2	3	120
Percentage	24.17	64.17	7.5	1.67	2.5	100
Total	106		9		5	120
%	88.3	4	7.5		4.17	100
Impact of FarmGrov	v on the effective	use of fungicid	es			
Frequency	19	74	17	7	3	120
Percentage	15.83	61.67	14.17	5.83	2.5	100
Total	93		17		10	120
%	77.5	0	14.17		8.33	100

#### Table 49. Impact of FarmGrow on Effective Use of Selected Inputs

Source: UofG field data 2021

The majority, 85 percent and 78 percent respectively, rated the impact of the FarmGrow project on their cocoa yields and cocoa farm income as high (Table 50).

Table 50. Perceived Im	pact of FarmGrow on Cocoa	a Yields and Farm Income

	Very High	High	Moderate	Low	Very Low	Total				
Impact of FarmGrow on your cocoa yields										
Frequency	29	73	14	2	2	120				
Percentage	24.17	60.83	.83 11.66 1.6		1.67	100				

Total	102	2	14	4		120				
%	85.00		11.66	3.34		100				
Impact of FarmGrow on your cocoa farming income										
Frequency	19 74		23	2	2	120				
Percentage	15.83	61.67	19.16	1.67	1.67	100				
Total	93		23		4	120				
%	77.5	50	19.16		3.34	100				

Source: UofG field data 2021

#### Farmer perception on performance of Touton agronomist

The farmers also rated their relationships with FarmGrow/Touton agronomists as high. More than 79 percent of the beneficiaries rated their relationship with their agronomist as high (Table 51). About 67 percent and 75 percent of male and female respondents, respectively, rated their relationship with these agronomists as good or very good.

		Very High	Hi	gh	Мо	oderate	L	ow	Very L	ow		Total		
Farmer ratin	ngs on re	elationships	with To	uton ag	grono	mists								
Frequency		20	7	'5		21		2 2		2				120
Percentage		16.67	62	2.5		17.5	1	.67	1.67	,		100		
Total		95	5			21		4 1		120				
%		79.	17			17.5		3.34				100		
Farmer ratir	ng (by se	x) on relation	onship w	vith Tou	uton a	agronom	nists							
	Vei	ry Good	C	Good		Ne	utral	E	Bad		Very Bad			
	Male	Female	Male	Fema	ale	Male	Female	Male	Female	Male		Female		
Frequency	11	4	48	20		18	8	9	0	2		0		
Percentage	12.5	12.5	54.54	62.5	5	20.45	25.00	10.23	0.00	2.27	T	0.00		

#### Table 51. Farmer Ratings on Relationships with Touton Agronomists

Source: UofG field data 2021

The performance of these agronomists was generally rated as good, with the lowest rating being 69 percent for the frequency of their visits, and a highest rating of 89 percent for the kind of information delivered to the farmers. In general, FarmGrow farmers appreciated the services provided by these agronomists as reflected by the generally high ratings. Qualitatively farmers noted having a "very cordial relationship" and a relationship built on trust. *"I trust the advice because in times past, similar advice on adopting GAPs have yielded positive outcomes and the agronomists appear very knowledgeable." "The relationship with the agronomist is very cordial and we are able to even discuss off-farm issues and seek guidance from them."* 

	Very Good	Good	Neutral	Bad	Very Bad	Total
Farmer rating th	he frequency of	visits of the T	outon agronomis	t	-	
Frequency	15	68	26	9	2	120
Percentage	12.50	56.67	21.66	7.50	1.67	100
Total	83		26		11	120
%	69.1	7	21.66	9	.17	100
Farmer rating o	n the informatio	n provided b	y Touton agronor	nists		
Frequency	27	80	11	2	0	120
Percentage	22.50	66.67	9.16	1.67	0,00	100
Total	107	,	11		2	120
%	89.1	7	9.16	1	.67	100
Farmer rating o	on advice and pro	esentation of	profit/loss stater	nent		
Frequency	15	78	23	1	3	120
Percentage	12.5	65.00	19.17	0.83	2.50	100
Total	93		23	4		120
	77.5	0	19.17	3	.33	100
<b>Farmer rating</b>	on amount of	data collecte	ed by the agrono	omist		
Frequency	7	79	31	1	2	120
Percentage	5.83	65.83	25.83	0.83	1.67	100
Total	86		31		3	120
	71.6	6	25.83	2	.50	100
<b>Farmer rating</b>	on level of pee	r support (f	rom other farme	ers)		
Frequency	22	79	16	1	2	120
Percentage	18.33	65.83	13.34	0.83	1.67	100
Total	101		16		3	
%	84.1	6	13.34	2.50		100

# Table 52. Farmer Ratings on Performance of Touton Agronomists

Source: UofG field data 2021

Farmers in 2022 were asked to reflect on the moment they joined FarmGrow. If they could go back in time, what would they change about the experience? The farmers noting wishing for more:

- visits from Touton field agents. "I will appreciate more visits from the field agents and a mechanism to tie adherence to the plan to some incentives to motivate us from investing in the farm on an ongoing basis. For example, if I do pruning correctly, I could buy fertilizer at a subsidized rate." "Sometimes when you need [the field agents] the most, they are not available."
- access to credit. "I did not know the plan involved a lot of financial investment. I would have changed the process by telling them to provide loans during the planning stages." "Frequent visits from the field agent and an avenue to leverage our data to access finance from more formal financial service providers." "We want credit to support other household expenses. This is what the PBC Purchasing Clerk (PC) does to attract more farmers to sell cocoa to them. Support from a PC like this will force a farmer to sell to the PC to pay off the credit.
- access to inputs. "With FDP, Touton in 2020 provided farm inputs but the support ceased in 2021. Touton should continue to provide farm inputs."

## Farmer Drop-out

As was noted earlier, Touton had pulled out of some communities, resulting in the need for the research to modify the analysis to ensure a clean comparison between those who were interviewed at both baseline and endline. During the final qualitative efforts, one farmer who was interviewed at midline was found at the endline, but between these two time periods, he had dropped out of the FarmGrow program. He was a 49-year-old married farmer who had been farming for 20 years. He shares his experience and reasons for dropping out:

I started working with Touton since 2013 and I was the lead farmer who supplied them with a lot of cocoa beans. When FDP started, I dedicated an acre for the program but the agent failed to help me in implementing the recommendation. The key recommendation was grafting which I am still managing. I agreed to cut down my cocoa tree and after they assisted me to graft. So far my yield is around 25 bags compared to the previous yield of 40 bags. But I think my yield will increase overtime. After the grafting, the agent did not visit again till date and therefore I have to handle my own farm till now. Several calls to the agent proved futile and I heard the agent who assisted me has been transferred. With efforts from some of the agents I have personal relations with, they assisted me to manage the farm. This development made me stop the FDP. Due to the problem I had with Touton, I will be reluctant to recommend FDP to any farmer because if another farmer goes through this, the farmer will hold me responsible and I may end up in prison.

In addition, the other farmers who have stayed in the program were asked about their perceptions of why they think farmers might have or would drop-out. Six of the nine were not aware of any farmers dropping out. Among those six, one shared that, *"it has never crossed my mind to drop out. The benefit for me is overwhelming."* The other one noted, *"No drop-out. The majority of the farmers in the community have rather joined the program because of the training we get to improve our farms."* Of those who are aware of people dropping out:

- *"A lot of them [drop out] due to promises that never get fulfilled by Touton."* Female farmer, 39 years old
- "Many farmers in my community have dropped out of the program as a result of Touton stopping support to farmers with farm inputs. However, I decided not to drop out."—Male farmer, 49 years old

# Serving female farmers

Given Sat4Farming sought to build the body of research regarding women's participation in services like FarmGrow, the farmers were asked about their perspectives of Touton meeting female farmers' needs. The spouses of primary farmers were also interviewed with this question in addition to the female primary farmers. Even among the three primary female farmers interviewed, two of them felt they did not receive the same level of support as men. *"For me, I think they do, but not as much as male farmers. They should support us more and have more time for us as we need more guidance and financial support than males." "Most training excludes us. The focus is more on the men. Touton can also help training women in life skills and entrepreneurship so we can engage in other livelihood activities to support our spouses." The one female farmer who felt the support was the same shared, <i>"Touton helps women a lot as in this community they have established women's savings groups which is helping women with credit and savings. They know women lack funds and hence savings schemes. Also they know due to time women cannot participate in all farmer trainings hence the one-on-one coach of FDP."* 

During the qualitative interviews, the Touton agronomists shared that they did approach male and female farmers differently since "male farmers do not easily accept recommendations compared to female farmers." When women are engaged during FarmGrow visits, particularly when their income information is required to develop a comprehensive profit-and-loss statement, they generally share their information without hesitation because "they believe we as agents are coming to help them" and "because they know how family finances are spent." But there is shared belief among the agronomists that women should be engaged more during the process, even though they are not always available when they visit (if the primary farmer is the husband), since "women have more sources of income to invest on their farms compared to the men. They [also] intend to invest in their farms more." Also, the agronomists feel women's engagement is important since, "they can support their husbands (in any

way possible) when the need arises. Frequent visits to them and discussions can also help their decision-making."

One female farmer interviewed shared that she felt female farmers do not face any greater obstacles than male farmers do, "There are no gender restrictions here. Presently, females are performing tasks such as weeding, using the knapsack, spraying, hand pollination, etc. They are tasks that are seen as men's jobs. During meetings, I am also able to express my views. I am a member of a child labor group, when we find out a child is being treated badly, we advise the guardian and when we see no improvement, we report the case to the elders of this community for appropriate measures." She also shared, "I am a cocoa farmer and a petty trader, and I take care of the farm and family. When it comes to development in this community, I am part of the females that undertake such actions." Another female farmer shared, "there are no gender restrictions here in this community" but she also admits this comes with age (she is 64), "I command respect in the community due to my age as an adult". I feel part of this community and am not neglected or side-lined." One male farmer held the same impression, "There are no constraints that limit the activities and movements of males and females. Even certain things that were initially seen as a man's job are being undertaken by women such as pollination, weeding, etc." However, not all male farmers felt the same. One male farmer shared, "Because I am a man, I am unable to undertake household chores. Because I am a man, I am not restricted in the things I can do. I can go anywhere alone."

## Most significant change

Of the 9<sup>c</sup> farmers interviewed in 2022, only two did not mention the most significant change for their household was an increase in productivity and revenue. One farmer was not clearly part of FarmGrow yet and the other noted, *"I have not been experiencing any significant change apart from building my skills in GAPs."* 

Those experiencing a positive change noted:

- "Prior to FDP, I did not adhere to all the practices and my yield was around 4 bags per season. However, the FDP has taught me that all practices collectively contribute to crop yield and hence now my yield is over 14 bags." This same farmer noted that the other community members are taking notice, "A woman closer to my farm has often been observing my farm practices and applying to hers. She has informed me she wants to join FDP."
- "Pruning has led to increased crop yields. Though the number of bags harvested has reduced, it would have been much more severe if these farm management activities were not done as captured in the plan. Erratic rainfall patterns and global warming would have exacerbated the situation."

## **Touton Agronomist Perceptions of FarmGrow**

In addition to gathering farmer feedback, Touton agronomists were questioned about their own experiences and perceptions regarding FarmGrow. Two agronomists were interviewed by UofG staff during the 2021 endline and two by Grameen staff in January 2022. The two interviewed by Grameen were asked different questions given the benefit of already having the endline quantitative data to inform gaps in information.

## Perception of Farmer Experience with FarmGrow

When asked about how they would explain FarmGrow, two of the agronomists in 2021 referenced the investment plan and/or helping farmers understand the financial resources they would need to implement the GAPs. Given the midline found that farmers might not be able to differentiate the FarmGrow intervention from the simple promotion of GAP adoption, in 2022, the agronomists were asked how they differentiate FarmGrow from their other extension support. One agronomist shared,

<sup>&</sup>lt;sup>c</sup> Reminder: Ten were interviewed, but one farmer appears to have been interviewed by mistake as he had no knowledge about FarmGrow. For this reason, his responses were not included here.

"FarmGrow focuses effort on individual coaching versus group training approaches of other sustainability programs. FarmGrow has the financial investment plan that can support access to finance for farmers." The other agronomist noted that the paper manual shared by Touton that is handed over to the farmer makes the farmer differentiate between FarmGrow and other programs. During one of the initial visits with farmers, the financial plan is shared with the farmers. Given it is a distinct activity that builds on the farmer data, the agronomists were asked how this financial information is shared along with the specific recommendations (i.e. replant, replant plus extra soil management, etc.). To explain how this occurs in practice, one agronomist shared, "We print out the recommendation and the monthly activities. We go around the farm with the farmer and explain the challenges and monthly activities. Also based on the [investment plan] and the recommendations for each farmer, it is also advised to either stagger some of the recommendations or implement all simultaneously." The other agronomist agreed. To explain any confusion a farmer might have regarding distinguishing FarmGrow from other extension services offered by the cocoa buying company, with particular focus on the investment plan, the agronomist shared, "you should go beyond telling the farmers the cost of the activities/recommendations to tell them how to finance the activities. Also, [farmers should be advised how they] can smartly do other crops to get more income to crosssubsidize cocoa farming. Additional livelihood modules should be added to FarmGrow."

# **Perceived Farmer Benefits and Challenges**

When asked what they felt the farmers most valued or the most significant change farmers experienced, one agronomist shared it was the "ability to tell the amount of investment required to attain maximum yield and also [to learn] the condition of the soil on their farm." One agronomist indicated that what he personally liked about FarmGrow was "the ability to analyse farm soil for farmers, because farmers are willing to know the efficacy of their soil for cocoa." Another favourite FarmGrow service was the investment plan. According to one agronomist, some farmers like FarmGrow because "it tells the farmers the areas they must pay attention to, to invest". Another agronomist shared that "the profit and loss component [of the investment plant] informs farmers about the profitability of their farm business and gives them an overview of the amount to be invested and expected returns."

Agronomists felt that weeding as a GAP was fairly easy for farmers to implement, as it is low cost. Farmers prune as well, as they see the benefit of this quickly in terms of the number of pods they see on the tree. Pest control is also prioritized and farmers have options for the type of chemical they can use. Also soil fertility management is easy as they can use the cocoa husks and poultry droppings. However, fertilizer application, tree density, and rehabilitation or replanting of trees are challenging to put into practice as the farmers *"fear the loss of productive trees."* Also, *"due to climate change, farmers feel threatened to cut down some of the trees, as such may expose other trees to the climate and may die."* The agronomists also shared that the most difficult aspect of FarmGrow for farmers was *"the huge amounts of capital required for farm investment"* due to the *"financial constraints"* they experienced. According to them, *"Farmers are happy with the recommendations but lack the financial strength to implement most of it".* Also, farmers do *"not have patience and want to see results quickly."* Another agronomist added, *"Most farmers are risk averse and may not be that patient to wait for those recommendations that yield results in the long term."* 

Is there anything Touton can do to help farmers see benefits in the short-run while they wait for change over time? The agronomists suggest continuing to provide farmers with inputs, pay for the services farmers need (such as for spraying), offering additional livelihood programs, and *"brokering soft loans with lower interest rates and flexible repayment terms for farmers using their harvest produce as guarantee."* 

# **Predicting Farmer Success**

When two of the agronomists were asked what farmer characteristics they feel might predict farmer success, they shared, *"farmers that have family support, farmers doing additional business apart from cocoa that can cross-subsidize some of the investment cost of cocoa farming, and farmers trained in financial management and are investment-ready,"* and *"farmers who record every activity conducted in the FDP manual, farmers who call the agronomist for advice, farmers prepared to invest in their farms or even prepared to go for credit to invest on the farm."* 

To help farmers on the investment front, they have promoted the use of VSLAs and partnered with other organizations and financial service providers to provide credit to farmers at a reduced rate, for example, through their partnership in the <u>Livelihood Funds for Family Farming (L3F)</u>, which is an impact investment vehicle for sustainable farming efforts. Through a partnership with Solidaridad, the agronomists noted they will be supporting farmers with credit and farm inputs at a subsidized rate. In addition, the agronomists noted that they also provide group-based training and demonstration of GAPs, input shops, social amenities for some communities (schools, sanitation facilities, boreholes, and building of schools), certification programs, provision of seedlings and shade trees free of charge.

When asked if they could tell the difference between FarmGrow farmers and other farmers they support, one agronomist had several ideas, *"FDP farmers are more organized and methodical in the way they adopt recommended GAPs. For example, they are able to tell why pruning needs to be done first before removal of mistletoe and then weeding to complete a farm maintenance process. FDP farmers are more likely to adopt good financial management practices. At least, they deliberately set aside some fraction of their cocoa money to reinvest in their farms." While evaluation data seems to suggest very little engagement of farmer spouses, he felt, <i>"FDP farming households have better intrahousehold relationships especially between the husband and wife as it is likely the farm investment plan would be discussed with the spouse because it has implications for how much is available for household expenditure. FDP farmers easily pass certification assessments given that they are already prepared and are adopting GAPs. Purchasing clerks say most of the soft loans they give out go to FDP farmers because they are more likely to sell quality beans that attract premiums." The other agronomist noted that <i>"most farmers now realize that farming is a business and they have begun to invest. With [our] constant visits, farmers have made their farms better than before."* 

## Section Summary: Key Findings from UofG Evaluation

- Cocoa farmers, even those selected to participate in FarmGrow, are vulnerable. Thirteen percent live below the USD 3.10 international poverty line, are food insecurity, and almost half felt negatively impacted by COVID, which may have impacted the benefits from the FarmGrow project in the short-term.
- Compared to the comparison group, FarmGrow farmers experienced increased household income, and cocoa income per hectare, as well as improved yields, as well as increased agricultural expenditures suggesting increased agricultural investments.
- Male farmers started out with better performance and maintained this advantage during the project period; however, women made important gains and are benefitting from FarmGrow. Female farmers in the treatment group, while having less land than men, experienced greater yields and cocoa income per hectare whereas women in the comparison group continued to have less land, less yield and cocoa income per hectare compared to their male counterparts.
- For both the treatment and comparison groups, there were increases self-reported pruning practices, shade tree incorporation, and application of agrochemicals such as fertilizer, pesticides, and fungicides. In a regression analysis, access to extension, being a male, household size, cocoa farming income per capita, and land ownership significantly influence the adoption

of GAPs.

- Despite FarmGrow's intent to include the spouse or "secondary farmer" in the profiling of the farm and were supposed to be included during the agronomist visits to ensure support for the investment plan, the results from a sub-study engaging the farmer and his spouse assessing intra-household dynamics indicated that spouses were either not aware of the program or had limited decision-making power regarding decisions made on the farm. This may limit a farmer's success if the spouse does not feel included in large economic investments or whose own income generating activities are put at risk.
- Both male and female primary farmers reported high satisfaction with the services provided by Touton and report benefiting from the program. Overall, 93 percent of the farmers were willing to recommend FarmGrow to other cocoa farmers in their communities.
- Touton agronomists were equally satisfied with program, but noted a desire to see the program provide farmers with inputs, pay for the services farmers need (such as for spraying), offer additional livelihood programs, and offering credit with flexible repayment terms for farmers *"using their harvest produce as guarantee."*
- COCOBOD appeared to increase their extension services during the project period which may have limited the distinction between the treatment and comparison groups.

# **3.3 FarmGrow Business Intelligence Data**

In addition to the quasi-experimental data collected by the UofG and the complementary qualitative data collected by Grameen Foundation at the midline and endline, Grameen Foundation leveraged the FarmGrow business intelligence platform to conduct a very simple diagnostic analysis in order to understand the progress among Touton farmers who had participated in a diagnostic visit, monitoring visit or who were assessed by an agronomist to capture changes in the AOs and reasons for non-adoption. The tables of data and the bar charts are part of the diagnostic analyses provided by FarmGrow and the data dashboards are designed to reflect real-time status of events and progress. At the time of writing this report, data as of December 31, 2021 was used. Also, a regression analysis, very similar to the analysis conducted by the UofG, was conducted, but included variables regarding soil conditions, which were not part of UofG's assessment. As a reminder, where the UofG data relied on self-reported behaviours, the FarmGrow data is based on observations by a well-trained coach or an agronomist, with a few self-reported data points.

# Dashboard Data Related to AOs

Engagement of farmers is classified in four phases: farmers profiled, farms/plots diagnosed (diagnostic phase), farmers who agree to their plan (and associated plots, on average there are no more than two plots per farm), and farms/plots monitored.

Prior to the start of the FarmGrow implementation, Touton provided the profile data of 4,242 farmers. During the four-year project period, Touton aimed to conduct farm and plot diagnostics to establish baseline farm conditions and farmer adoption of GAPs. By the end of 2021, 4,064 farmers had completed a farm diagnostic, consisting of a total of 6,518 individual plots.

Ninety-nine percent agreed with the FarmGrow investment plans for their plots and 70 percent had received a monitoring visit, either through the agronomist or coach. While approximately 551 plots had received a monitoring visit by a manager between 2018 and 2021, approximately 4,300 plots had been monitored by a coach. Some plots had received multiple visits, but this is difficult to calculate at this aggregate level given the current design.

	A. Profiled	B. Diagnostic	C. Agree with Plan (%. C/B)	D. Monitored (%. D/C)
2018	1			
Farm(er)s	4,242	39	39 (100%)	24 (62%)
Plots		39	39 (100%)	24 (62%)
2019				
Farm(er)s	0	1,450	1,435 (99%)	1,291 (90%)
Plots		2,755	2,732 (99%)	2,408 (88%)
2020				
Farm(er)s	0	1,450	1,435 (99%)	1,291 (90%)
Plots		2,755	2,732 (99%)	2,408 (88%)
2021				
Farm(er)s	0	1,548	1,548 (100%)	1,272 (82%)
Plots		2,028	2,028 (100%)	1,688 (83%)
TOTAL				
Farm(er)s	0	1,548	1,548 (100%)	1,272 (82%)
Plots		2,028	2,028 (100%)	1,688 (83%)

#### Table 53. FarmGrow Outreach for Touton Ghana

\* This will not mathematically add up since some farmers have more than 1 plot. The number of total plots will equate to the numbers presented in rows above.

Out of 4,043 farmers who agreed to follow recommendations provided by FarmGrow, 1,236 of them were female farmers, making up approximately 31 percent of the total farmers engaged. 495 of the 4,043 were under the age of 36, making up approximately 12 percent of farmers engaged. Twenty-eight percent had no education, and 19 percent had primary education or less.

As noted earlier, farmers can be assigned to one of nine recommendation cohort, depending on the status of their farm at the diagnostic (this is based on the Adoption Observations): 'Replant', 'Replant plus Extra Soil Management (ESM)', 'Extra Soil Management', 'Thin Out', 'Thin Out plus ESM', 'Fill In', 'Fill In plus ESM', 'Grafting', 'Grafting plus ESM', 'Maintenance GAPs'. Maintenance GAPs is the one cohort that assumes the farm is in good condition and the farmer simply needs to weed, apply fertilizer, apply pesticides, mulch, etc. Extra soil management is the only recommendation that can be combined with another recommendation and it relies primarily on fertilizer application. Since 2018, a little over 40 percent of all Touton's farmers in Ghana have received the recommendation to Replant plus ESM followed by ESM (27%) and Grafting + ESM (22%). Combined this is about 90% of the farmers that need to implement the recommendation of Extra Soil Management. This is an expensive recommendation to implement for which most farmers do not have the finances - which is a major reason for farmers 'failing' their FarmGrow plan. Failing means that farmers missed the agreed timing to implement the recommendation.

**Figure 5. FarmGrow Recommendation Cohorts** 



To assess change over time (comparing initial diagnostic values to the monitoring visit), only approximately 4801 plots that had been evaluated by an agronomist (versus approximately 4,000 plots that had been evaluated by a coach) were included (Table 54).

At the diagnostic phase, the AOs with the highest adoption rates (received a score of "Good") were organic matter, physical soil condition, free of debilitating disease, harvesting and tree health. At the monitoring phase, the AOs with the highest adoption rates were organic matter, physical soil condition, harvesting, free of debilitating disease and weeding. Weeding as a practice experienced the greatest increase for both male and female farmers.

When comparing men and women, men had better performance than women and made greater gains between the diagnostic and monitoring visit (received more scores of "Good") for the following AOs: free of disease, tree health and density, weeding, fertilizer application and formulation and physical soil condition. While men had better performance than women, they made fewer gains between the diagnostic and the monitoring visit for the following GAPs: planting material, organic matter and pest and disease control. Men had poorer performance than women but made greater gains between the diagnostic and monitoring visit for the following AOs: tree age, harvesting and pruning. Women performed better and made greater gains compared to men only for shade management. In summary, this means that women are generally performing better than men on tree age, harvesting, pruning and shade management and while they still lag behind men, they made greater gains between diagnostic and monitoring for planting material, organic matter and pest and disease control.

Because farmers are assessed by both coaches and managers, a quick comparison of the average scores at the diagnostic and monitoring phases was conducted (Table 55). While the sample sizes are quite different, it provides a hint of some areas where coaches and managers might score farmers differently. There could be various reasons for this. Ideally, coaches and managers/agronomists have been calibrated well in doing the AOs. That means that they give the same rating for the same plot AO in the same situation. Calibration is never 100% achieved between all coaches and all agronomists. The fact that farmers are receiving both visits from coaches and agronomists is actually a control mechanism for AO rating. It makes sure that the coaches do not - over time - rate their farmers incorrectly and to make sure farmers get the right advice.

Coaches were more likely to consistently score the farmers higher (good or medium) than the managers for planting material and pest and disease. While there are some other differences--such as

coaches being more likely to score the female farmers lower than the managers on harvesting and likely to score the male farmers lower than managers on weeding at the monitoring stage only--this suggests while there may be some differences, most scores provided by managers or coaches are within a margin of plus or minus 10 percentage points. These differences could also be driven by timing. Coaches more frequently visit farmers than managers do and therefore might score a farmer at a time when certain practices can be captured better or alternatively, not as accurately (i.e. during or prior to harvest). The fact that there is only a margin of about 10 percentage-points is a great indicator for data quality and consistency among large numbers of famers. This demonstrates the strength of an observation-based data collection methodology compared to self-reported information from farmers.

Among the 480 plots assessed by a manager, 93 percent of them received a "Fail" score, 6 percent a "non-critical fail" which means they were assessed at a time where they've yet to complete their prioritised tasks but they still have time to do so before the deadline and 0.55 percent passed (n=3 plots).

The dashboard below shows that not all failures to make improvements on the AOs have the same reasons. Figure 6 shows "lack of funds" is the key reason for not receiving a 'good' score on the AOs related to fertilizer use (which most of the farmers get recommended as shown earlier, but is also a very costly intervention) and pest, disease and sanitation and is the secondary reason for free debilitating disease, shade management, pruning and weeding (due to hired labor costs). While "other" is also a common reason provided, it often signals a lack of availability of inputs or materials to complete the task. Weather, time, lack of competency, low energy, sickness were also common reasons for poor AO scores.

#### Figure 6. Reason for Poor Scores, per AO



Tree density



Physical condition of the soil

Other	544	в
Time	7	
Funds	5	
Not comp	4	



Pruning



Weeding







Reason for failure

# Weather 25

Tree Health

Other

Not com... 53

Funds 44



Harvesting

Other		405
Weather	91	
Time	78	
Low ener	26	

#### Organic matter

112

Free debilitating disease

Pest disease and sanitation

527

627

523

Other

Not com... 13

Funds

Other

Time

Weather 65

Funds 13

Time 5

Other		534
Not com	8	
Funds	5	
Low mot	2	

#### Fertilizer application



# Table 54. FarmGrow AOs per Manager Scores

Indica tor		Male			Female			All		Differe nce betwe en Male and Femal e (B-E)	DiD betw een Male and Fema le (C-I)
N=# of plots asses sed by mana ger	A. Diagn ostic (%) n=347	B. Monito ring (%) n=341	C. Cha nge in % Goo d	D. Diagn ostic (%) n=129	E. Monito ring (%) n=128	F. Cha nge in % Goo d	G. Diagn ostic (%) n=487	H. Monito ring (%) n=479	I. Cha nge in % Goo d		
Plantin	g Materia	I									
Good	26.80	23.46	- 3.34	10.84	14.84	4.00	24.07	20.67	- 3.40	-8.62	-7.34
Medi um	11.24	9.68		8.70	8.59		10.49	9.19			
Bad	61.96	66.86		72.46	76.56		5.43	70.15			
Free of	Debilitati	ng Disease	2								
Good	93.66	96.77	3.11	87.60	87.50	- 0.10	92.18	94.36	2.18	9.27	3.21
Bad	6.34	3.23		12.40	12.50		7.82	5.64			
Tree Ag	ge										
Good	61.38	62.46	1.08	67.44	65.63	- 1.81	62.35	62.21	- 0.14	-3.17	2.89
Bad	38.62	37.54		32.56	34.38		37.65	37.79			
Tree He	ealth										
Good	74.93	83.33	8.40	74.42	75.19	0.77	73.87	80.25	6.38	8.14	7.63
Bad	25.07	16.67		25.58	24.18		26.13	19.75			
Tree De	ensity										
Good	52.45	56.60	4.15	55.81	55.47	- 0.34	52.88	55.95	3.07	1.13	4.49
Bad	47.55	43.40		44.19	44.53		47.12	44.05			
Harvest	ting										
Good	90.49	97.65	7.16	93.80	98.44	4.64	91.56	97.70	6.14	-0.79	2.52
Bad	9.51	2.35		6.20	1.56		8.44	2.30			
Organic	Matter	00 = :	0.55	05.55	00.05	2.07	00.51	00.55	2.07	0.15	4.95
Good	97.12	99.71	2.59	95.35	99.22	3.87	96.71	99.58	2.87	0.49	-1.28
Bad	2.88	0.29		4.65	0.78		3.29	0.42			
Pest &		21.00	6.50	17.05	24.04	7 7 6	22.02	20.00	7.00	6.20	1 17
Mod:	24.50	31.09	0.59	10 60	24.81 21.71	1.76	22.02	30.00	7.98	0.2ŏ	-1.1/
um	23.94	50.50		10.00	21./1		25.40	27.71			
Bad	49.57	38.42		64.34	53.49		54.53	42.29			
Pruning	8		0.55				4 5 5	4.55	0.55	0.55	0.65
Good	0.86	1.75	0.89	4.65	2.34	- 2.31	1.85	1.88	0.03	-0.59	3.20
Medi um	7.20	4.68		4.65	3.91		6.38	4.38			
Bad	91.93	93.57		90.70	93.75		91.77	93.75			

Shade I	Shade Management										
Good	36.02	40.12	-	39.35	42.19	2.84	37.04	40.87	3.83	-2.07	-6.94
Pad	62.09	50.00	4.10	60.47	57 01		62.06	50.12			
Dau	05.90	39.00		00.47	57.01		02.90	39.15			
weedir	ng										
Good	59.93	92.98	33.0 5	65.89	86.72	20.8 3	60.29	91.25	30.9 6	6.26	12.22
Bad	42.07	7.02		34.11	13.28		39.17	8.75			
Fertilize	er Applica	tion									
Good	1.15	3.52	2.37	2.33	2.34	0.01	1.44	3.13	1.69	1.18	2.36
Medi	10.09	9.97		14.73	13.28		11.11	10.65			
um											
Bad	88.76	86.51		82.95	84.38		87.45	86.22			
Fertilize	er Formula	ation									
Good	1.73	2.64	0.91	2.33	2.34	0.01	1.85	2.51	0.66	0.3	0.90
Medi	12.97	9.97		16.28	13.28		13.58	10.65			
um											
Bad	85.30	87.39		81.40	84.38		84.57	86.85			
Physica	Physical Soil Condition										
Good	94.52	99.12	4.60	98.45	97.66	-	95.68	98.75	3.07	1.46	5.39
						0.79					
Bad	5.48	0.88		1.55	2.34		4.32	1.25			

#### Table 55. Comparing Manager and Coach Scores

	Male		Fer	nale	All	
	Diagnostic	Monitoring	Diagnostic	Monitoring	Diagnostic	Monitoring
	n=1358	n=1314	n=480	n=454	n=1856	n=1786
Planting Material	c > m	c > m	c > m	c > m	c > m	c > m
Free of Debilitating						
Disease						
Tree Age						
Tree Health						
Tree Density	c > m				c > m	c > m
Harvesting			c < m	c < m		c < m
Organic Matter						
Pest and Disease		c > m	c > m	c > m	c > m	c > m
Pruning		c > m				
Shade Management				c > m		
Weeding		c < m				c < m
Fertilizer Application		c > m				c > m
Fertilizer Formulation		c > m	c < m			
Physical Condition						

c > m (dark green) = Coach scores plot higher (good or medium) than the manager; c < m (light green) = Coach scores plot lower than the manager

#### FarmGrow Plan

When asked about their FarmGrow plans at midline, the study found that very few farmers could distinguish between the 14 AOs and their specific plan. During the endline qualitative wrap-up interviews conducted in January 2022, the same question remained and as such, the farmers participating in the midline interviews were asked the question again at the endline follow-up. Table 56 compares the type of recommendation given by FarmGrow (which was cross-referenced by

Grameen using FarmGrow data on the individuals selected for the qualitative interviews at midline) and what the 8 of the 9 farmers interviewed actually reported doing, to give a sense of how farmers talked about their "FarmGrow Plan"<sup>d</sup>.

When asked if the farmer could share the details of their investment plan or anything else that reminded them of their farm priorities, two farmers noted receiving nothing, two farmers noted receiving both the Touton's paper manual (which covers all the good agricultural practices and besides a centerfold pictorial calendar showing timing of varies farm practices and estimated amounts of inputs, requires literacy) and a print out of the investment plan, and the remaining 4 farmers only received the Touton manual.

Given there are many practices a farmer could address, farmers shared that the FarmGrow plan and/or the investment plan helped them prioritize their activities and sequence activities in a methodical way, as it *"helps detail the farm activities and the associated costs which helped me decide which to prioritize given my limited resources." "The difference the investment plan makes is being able to set aside money for different activities at different times to achieve my overall objective of increasing farm productivity."* 

Farm Priorities per FarmGrow	Farmer Explanation of Plan	What Farmer Chose to Prioritise	Monitoring Visit Notes from Last Visit*
Replant + ESM	"My plan is about adopting good farm management practices: pruning, weeding, cutting of chupons, and on how to correctly apply fertiliser"	"In fact, I prioritised all of the recommendations. I, however, started with pruning, following by cutting of chupons and then weeding. Because they are less capital intensive but are high crop-productivity enhancers. As indicated all farm maintenance practices were prioritised given that they do not cost a lot to get done." What does he have left to achieve? "Nothing."	November 9, 2021 by coach/ "Farmer needs financial assistance"
Thinning Out + ESM	"How to apply good cocoa farm practice for better and improve yield. Cutting of chupons and mistletoe when detected. Proper application of fertiliser, pesticide and insecticide."	"Cutting chupons and mistletoe when detected." What does she have left to achieve? "Fertiliser application."	October 31, 2019 by coach / no notes.
ESM	"How to manage the cocoa farm. Pruning and weeding. How to utilise income generated from cocoa farm/financial management. Scouting the cocoa farm to detect early pest and disease."	"Scouting the farm to detect early pest and diseasesas this can curtail spread of disease to other trees and is a threat to the entire farm."	October 30, 2021 by coach / "farmer doing well."
Replant + ESM	"Practising good farm management; pruning, weeding, replanting, cutting of chupons and mistletoe when detected.	"I did prioritise pruning, providing shade and cutting unwanted stems to allow sunlight on the farm." What	October 30, 2021 by coach/ "Must improve upon GAPs."

Table 56. Comparison of	Farmer Priorities	per FarmGrow and	Self-reported Priorities

<sup>&</sup>lt;sup>d</sup> Please note that while 10 farming households were interviewed, one of the households did not appear to have a clear picture of FarmGrow so it is not clear if they were new or were mistakenly selected for the interview. The other farmer had not received a monitoring visit yet, which is why only 8 farmers are presented here.

	Proper application of fertiliser, pesticides, and insecticide."	does she have left to achieve? "Replanting."	
ESM	"FDP is an arrangement to support farmers to improve their farms." Other than this, she could not remember or mention specifics.	"Pruning and Spraying. Pruning helps sunlight and air to have access to the cocoa trees and this prevents stress from diseases. I spray to kill pests and diseases. To increase my yield." What does the farmer have left to achieve? "Filling in."	October 30, 2019 / "Farmer is on course."
Replant + ESM	"FDP is all about training and education on how to conduct proper farming, pruning, etc. I was tasked to conduct pruning, spraying, weeding on my farm."	"Pruning and spraying."	October 31, 2021 by coach/ "He is improving."
Thinning out + ESM	"It is a plan that helps me learn about the best cocoa practice to adhere to in order to increase my yield and revenue. Provide shade, pruning, weeding, good cocoa planting metrics."	"Pruning and Weeding. My farm was messed up and not clean. I needed to do that to allow air and cut down unwanted weed growing around the cocoa tree which shares most nutrients with the tree. Practising proper planting metrics which means I needed to cut down some trees which I did not want to do."	Date unknown by agronomist / "Non-adoption / FAIL of FDP"
Replant + ESM	"My plan is on good management practices and thinning out and spacing of the cocoa trees. My farm was simply crowded and sometimes I had incidence of pest and diseases. Pruning and weeding, removal of mummified pods and removal of mistletoe, ensuring farm has good spacing."	"In order of priority, first was pruning, followed by removal of mistletoe and mummified pods and then weeding. Second was deliberately cutting some ageing trees to ensure good spacing on the farm. Pruning helps to identify presence of mistletoes and its removal and then you finalise with weeding. I deprioritized cutting down trees. It is a tough decision to cut down some trees doing well."	Date unknown by agronomist / "Non-adoption / FAIL of FDP"

For those who have faced difficulty adhering to the plan, much of the reason is financial, but it also emotional, especially as it relates to cutting down and replanting trees. Regarding finance, the challenges mentioned related primarily to purchasing inputs such as fertilizer. The female farmers were the only ones to mention needing financing to help provide labor, such as for weeding, on their farms. One farmer noted with some frustration, "As I always say when you people talk to me is access to finance so we are able to purchase farm inputs in the right quantities and correctly apply them to increase crop production. Can some of these inputs not be provided to us on credit? Please you people should work something out for us or you do not agree with me." Some farmers have chosen not to participate in FarmGrow for lack of finance, "Lack of funds and credit to help us adhere to the plan and practices. Due to this, many farmers in the community have decided not to do FarmGrow."

One farmer rationalizes why cutting down his trees does not make sense to him, "It will take me two crop seasons to fully thin out and space my farm (about a year to complete it). I think it is best for me to gradually space the farm so as to reduce the potential loss from those trees that need to be cut down. Yes, I agree there may be long-term benefit from spacing my farm, but in the short-term, I need

to reap some benefits from these trees that need to be cut down. I hope you understand. You see, it is not just about cutting down trees, it is also about livelihoods and being able to increase your productivity in the short term, too."

# New information shared by FarmGrow

Farmers were then asked what was new or novel about the information shared by the agronomist. Many referenced practices regarding pruning (*"Pruning regularly to allow air circulation and light."*) and applying pesticides (*"How to give warnings to people by putting sign posts at the farm edges during spraying. Also proper disposal of waste pesticide containers and materials"; <i>"How to determine pests and diseases and how to address them which hitherto I didn't know."*). One mentioned fertilizer practices near bodies of water (*"There should be at least 10 feet distance from the farm that shares a boundary with a river when applying fertilizer to the farm"*). One farmer shared that *"avoiding child labor, early harvesting, and demonstration on pruning"* were new to him.

# Farm investment decisions

Given many of the AOs require out-of-pocket investments, the farmers were asked how they financed their farm practices. Out of the nine, the majority noted using the proceeds from the harvest to finance investment on the cocoa farm, or they also drew on other income-generating activities. Two farmers noted leveraging "soft loans" from the purchasing clerks. While most of the nine farmers felt satisfied with the investments they've made so far, every "extra" amount of funding they can receive they believe would amplify what they are currently doing. *"There is still room to invest in the farm. I wish to increase the investment from one-third of the farm income but that will depend on whether I am able to increase the number of bags I am able to sell during the crop season." "Though it is quite satisfactory on my side, it can be better if I am supported by loans."* 

To make investments on the farm, only three farmers noted they made no trade-offs. In fact one farmer makes sure "there is no trade-off especially for household expenditure, i.e. Food, school fees, etc. I often separate household funds from that of cocoa and other income generating activities." However, other farmers are making trade-offs to make farm investments. As one farmer shared, "The trade-offs have rather affected funds available for cocoa farming. There is increased demand for funeral expenses, extended family demands and competing demands to meet my spouse's financial needs. Well, what can I do about the situation? At the end of the day, the reality is there will always be competing demands and will require a careful balance to avoid arguments." "I had to forgo paying school fees and medical visits to invest in the cocoa farm. I was not satisfied with the trade-offs due to climatic changes in last year's productivity, the income generated was not enough."

# Predictors of 'Good" AO scores

Using FarmGrow Data collected as of May 2020, data of 311 farmers (due to farmers having all data points needed for the analysis) was used to develop a regression model that would help predict which farmers would have 'good' scores on the 14 AOs. During a Sat4Farming consortium meeting, the members of the consortium brainstormed the indicators that they felt would likely predict whether a farmer would increase investments on their farms. Variables included household size (as a predictor of labor availability within the household), income, poverty (using the PPI) or food security (using the same measure collected by UofG during the third-party assessment), farmer attitude (explained below), gender, and size of land holding. All of these variables are part of the FarmGrow data collection; however the poverty and food security indicators were dropped for the analysis given they were not consistently collected for all farmers.

To arrive at the regression analysis, the 14 AOs were consolidated into an adoption rate that could be used as a dependent variable; an attitude score was developed combining the results of seven indicators so that it could be used as one independent variable. The AO adoption rate, attitude score,

farmer gender, farm productivity, farm age, plot area, number of family members and whether the farmer hires labor were thrown into the regression model. These results are explained step-by-step below.

# **Distribution of AO Scores**

First of all, a basic histogram was developed to show the distribution of AOs. Taking the 14 AOs, each farmer was given a "score" based on the number of AOs with a score of "good" given by the coach or agronomist. The scores range from 0-100 percent based on the percentage of AOs scored as "good." Using the data of 311 farmers, 7 displays the distribution of these scores. **The data shows that the majority of the farmers fall between a 60-80 percent adoption rate** (with a mean of 71 percent, approximately 10 out of the 14 GAPs Table 57 below) **of the 14 AOs.** This is consistent with the UofG data presented earlier on the average number of GAPs adopted.




# **Farmer Attitudes**

Previous research by the Bill and Melinda Gates Foundation found that farmer attitudes were useful in identifying different farmer segments.<sup>23</sup> Using either a 7- and 15-question index, farmers could be classified as one of 6 different segments:

Segment	Description
Trapped	Doesn't enjoy farming, sees no hope in farming, doesn't want his/her children to follow him/her
Independents	Generally savvy information user, but not very engaged or experienced in farming; no excitement for farming
Traditionalists	Love the farming ethos, but is very low on information focus and doesn't look for change
Frustrated Escapists	Looking to make the best out of farming, but if a better alternative came up, would easily stop farming
Contented Dependents	Has very positive attitude towards farm but feels he/she requires the assistance of others
Competent Optimists	Seeks information and networks with others; very independent and truly enjoys farming

# Table 57. Farmer Attitude Segments

To include the farmer attitude as one variable that could be considered in a regression model, seven attitude questions were included to develop the farmer attitude score. Using the Cronbach's alpha test, internal consistency of the questions was evaluated. This required reverse-coding some of the questions (updated below in Table 58). The answers for each question were then combined into one aggregate score. The 5-point Likert scale ranged from strongly disagree (1) to strongly agree (5).

## Table 58. Descriptive Statistics of Farmer Attitude and AO Scores

Attitude   Variable	mean	sd	min	max
If I had a choice, I would not be a full-time farmer. (Reversed) (A1)	3.72	1.69	1	5
I would prefer that my children do not end up working as farmers. (Reversed) (A2)	4	1.57	1	5
I am proud to be a farmer. (A3)	2.15	1.55	1	5
We should regularly make personal sacrifices to improve our farms (personal effort in farming always pays). (A4)	4.89	0.34	2	5
God meant me to be a farmer/It is my destiny to be a farmer. (A5)	1.98	1.61	1	5
There is no better investment than farming. (A6)	4.9	0.3	4	5
There is no need to take into account the opinions of other farmers to make changes on my farm. (A7)	2.03	1.49	1	5
AO Scores	71.43	8.61	48	95
*Note: n = 311, sd=standard deviation				

Table 59, and figure 8, show that the majority of those included in the analysis were classified as Traditional, followed by Competent Optimists and Independents, suggesting limited optimism among the farmers.

Segment	Avg. Likert Score	n	% of Total
Trapped	1.0 - 2.0	12	3.9%
Independents	2.0 - 2.5	38	12.2%
Traditionalists	2.6 - 3.0	175	56.3%
Frustrated Escapists	3.1 - 3.5	7	2.3%
Contented Dependents	3.6 - 4.0	35	11.3%
Competent Optimists	4.1 - 5.0	44	14.1%

#### Table 59. Farmer Segment Distribution

# **Figure 8. Farmer Segment Distribution**



Farmer Segment Distribution

To determine whether attitudes are an important variable to predict farmer AO scores, a one-way ANOVA for each of the seven attitudes was conducted to discover any differing means between their five levels (strongly disagree to strongly agree). The results show that questions A1, A3, and A4 are most likely to predict a farmer receiving scores of "good" on the AOs –in short, the belief that farming is a destiny predicts improved farming practices.

Attitude	Р	Eta2	avg. L1	avg. L2	avg. L3	avg. L4	avg. L5
A1*	0.00	0.04	68.07	68.1	72.99	75.74	72.11
A2	0.69	0.00	72.22	67.23	64.29	75.66	71.03
A3*	0.00	0.03	72.35	75.36	88.10	68.17	70.66
A4*	0.00	0.03	88.10	NA	75.32	NA	71.14
A5	1.00	0.00	71.22	76.35	61.90	88.10	71.32
A6	0.52	0.00	72.45	67.24	54.76	72.07	72.20
A7	0.56	0.00	72.44	67.92	70.85	72.91	NA

Table 60. ANOVA	Results	for Farmer	Attitudes	and AO	Scores

Note: (\*) signifies a significant difference of means.  $H^0$ :  $\mu 1 = \mu 2 = ... = \mu n$ ;  $H^a$ :  $\mu i \neq \mu n$ 

In addition to farmer attitudes, the sex of the farmer, farm age, productivity, number of family members, plot area and whether the household hired labor were combined into a regression model to understand the variables that most predict higher AO scores. When including all AO scores (0-100

percent), the regression model only explained 4 percent of the variation in higher AO scores. When filtering out everyone below 75 percent (meaning they receiving a score of 'good' on 75 percent of the AOs or lower), which is near the average for all farmers, the model's explanatory power grew to an R2 of 0.4397. This implies that for people with low to average AO scores, the explanatory variables included have very little predictive power of their AO scores, i.e. for farmers with low AO scores, being male or female makes little difference in outcome. For those with higher AO scores, the variables explain nearly 44 percent of the variation in AO scores, which is extremely high.

Because Table 61 represents a log-linearized model, the beta estimates can be interpreted as a percentage change in Y given a 1 unit increase in X. In this case, improvements in AO scores increases by 3 percent with each point increase in a farmer's positive attitude.

The results suggest that being male has a negative 3.3 percent effect at all AO score levels above 75 (meaning women are more likely to have higher AO scores). Having hired labor increases AO scores by 3.0 percent at all levels above 75. While having less influence over AO scores, the older the farm, the less likely the farmer has high AO scores while the larger the plot area, productivity, and the greater number of family members all improve AO scores.

Variable	Beta	SE	t stat	Р		
Intercept	4.446	0.027	167.005	0.000		
Avg. Attitude	0.030	0.004	7.585	0.000		
Male	-0.033	0.011	-3.037	0.003		
Farm Age	-0.003	0.000	-4.587	0.000		
Productivity	0.000	0.000	-2.997	0.003		
Family Members	0.005	0.002	2.491	0.014		
Plot Area	0.009	0.004	2.476	0.015		
Hired Labor	0.030	0.015	1.985	0.049		

Table 61. Regression Analysis of Variables Predicting AO Scores

## Section Summary: Key Findings from FarmGrow Assessment

- By the end of the project period, 4,064 Touton farmers had completed a FarmGrow farm diagnostic, consisting of a total of 6,518 individual plots; 99 percent agreed with the FarmGrow investment plans for their plots and 70 percent had received a monitoring visit, either through the agronomist or coach.
- At the diagnostic phase, the AOs with the highest adoption rates (received a score of "Good") were organic matter, physical soil condition, free of debilitating disease, harvesting and tree health. At the monitoring phase, the AOs with the highest adoption rates were organic matter, physical soil condition, harvesting, free of debilitating disease and weeding. Weeding as a practice experienced the greatest increase for both male and female farmers. Fertilizer formulation and application were low between both phases.
- A little over 40 percent of all Touton's farmers in Ghana received the recommendation to Replant plus Extra Soil Management (ESM) followed by ESM (27%) and Graft + ESM (22%). Combined this is about 90% of the farmers that need to implement the recommendation of Extra Soil Management. Replanting, grafting, and ESM alone and combined are expensive recommendations to implement for which most farmers do not have the finances which is a

major reason for farmers 'failing' their FarmGrow plan. Failing means that farmers missed the agreed timing to implement the recommendation.

- While there was important progress being made on the AOs, 93 percent of the monitored plots
  received a 'fail' score, meaning the farmer had not achieved agreed-upon progress. Lack of
  finances as the primary reason given by the farmers for failure. Qualitatively, farmers also
  reported experiencing financial and emotional difficulty of cutting down their trees or applying
  the recommended amounts of fertilizer. When asked about their FarmGrow plans at midline
  and endline, very few farmers could distinguish between the 14 AOs and their specific plan,
  suggesting their specific farm priorities were not clear.
- According to regression analysis conducted using the FarmGrow data, farmer attitudes towards farming, sex of the farmer, farm age, productivity, number of family members, plot area, and whether the farmer hired labor predicted positive AO scores.

# 4.0 DISCUSSION AND RECOMMENDATIONS

This section compares, contrasts and synthesizes the findings from both the UofG and FarmGrow evaluations and proposes recommendations going forward to both improve FarmGrow but improve support to cocoa farmers across the sector.

# 4.1 Land Ownership and Participation

Concerns have been raised about ageing farmers and limited engagement of youth in farming. While this may be partially true, lack of young farmers in cocoa farming is most likely driven by how cocoa buyers and other farmer support organizations target farmers. Touton, for example, focuses most of its attention on landowners, as they are perceived to be the primary decision-makers. Most landowners are older and male. Youth, therefore, have to wait on inheriting land to be primary decision-makers and landowners and therefore make up a small percentage of farmers targeted for the FarmGrow intervention.

Similarly, most female farmers have inherited land from their families as well as through the death of a spouse. Until inheritance laws and social norms change, women will continue to lack land ownership until they are older and lead a household as a widowed woman. Youth will also continue to make up a small percent of cocoa farmers until they either inherit land at an earlier age or lease/rent land on their own. In fact, aside from inheritance being the dominant form of cocoa land acquisition, leased/rented cocoa land is catching up as the next most-frequent form of land acquisition. This is more likely to be where younger and female farmers are able to become land-owners aside from inheritance.

## Recommendations

- Companies and programs have to consider how their selection criteria for identifying farmers with whom to work perpetuates norms that result in them working primarily with older men.
- Until land ownership norms change, companies and programs that work with farmers need to consider the advantages of working with men and youth on the farm, even if they are not the "primary farmer". First, as women and youth may inherit land upon the death of the primary farmer or work the land while the primary farmer migrates for off-season work, they can be better informed and trained on farm practices such that the death or absence of the primary

farmer does not result in a significant learning curve for them. This will also require companies and programs to ensure that meetings with the "primary farmer" are also held at time when other family members are available and they should intentionally invite and encourage participation of those household members to participate.

# 4.2 GAP Adoption/AO Scores

Given the short-term outlook of the Sat4Farm project and the evaluation period, adoption of GAPs/AO scores were the primary measures of interest and determinants of success. It was assumed that changes in farmer practices could be detected in a shorter period of time than detecting changes in productivity and income which were assumed to improve over 8 to 10 years.

In general, the GAPs with the highest adoption/AOs with the highest scores among the cocoa farmers were those that require the least financial investment and rely primarily on labor or correct timing of practices, such as increasing the organic matter on the farm, improving soil conditions through decaying organic matter such as tree leaves and discarded cocoa pods, pruning, harvesting, weeding, and the detection of Cacao swollen shoot virus (CSSV). The GAPs/AOs with lowest adoption were those that required the greatest financial investment, such as fertilizer adoption and formulation, planting material, tree age and tree density. The last three rely on removing or replanting trees and fertilizer adoption is only encouraged for younger trees but when applied to mature trees, also requires a lot of investment. This is fairly consistent with the data collected by The Royal Tropical Institute (KIT) in their *Demystifying the Cocoa Sector* research series on cocoa farming in Ghana and Cote d'Ivoire.<sup>24</sup> Their study found that farmers reported applying granular fertiliser (39%), liquid fertiliser (53%) herbicides (51%) pesticides (88%) and fungicides (74%) at lower rates than weeding (95%) and pruning (82%)--whose averages are similar to those reported in the UofG data reported earlier but inconsistent with the observed AOs of FarmGrow. Similar to the conclusions made comparing the AOs from FarmGrow and the GAPs measured by the UoG study, these self-reported practices may overstate the effectiveness of those practices.

Given most farmers were encouraged to replant, graft and/or improve their soil management practices, as the qualitative revealed, **cutting down or replanting trees is not only a financial challenge, but an emotional one for farmers**. This likely explains the limited improvement in these GAPs and the significant levels of FarmGrow plan failures.

Moreover, comparing the self-reported data from the UofG dataset and the observation data from FarmGrow, the analysis reveals that **self-reported data likely overestimates real practice**. While farmers interviewed by UofG reported applying insecticides and pesticides at fairly high rates (98% of FarmGrow farmers reported using insecticide at endline conducted by UofG), only 30 percent of FarmGrow farmers were classified as having good practices with this AO which means they might not be spraying in the right quantity, at the right area, or at the right time. Moreover, while the UofG regression showed men adopted GAPs at a higher rate than women, the FarmGrow data showed that being a man resulted in lower AO scores, suggesting men are overstating their practices.

While self-reported data from the UofG assessment found that access to agricultural extension services, sex of farmer (male), household size, cocoa farming income per capita, and farmland ownership are the major determinants of GAPs adoption by cocoa farmers in the project region, the regression conducted with the FarmGrow data suggests that for all those farmers with the highest adoption rates (above 75%), being male negatively effects AO scores while having hired labor (somewhat consistent with household size), a positive attitude toward farming, a larger plot area, farm age, productivity, and number of family members positively impact AO scores. While these two analyses were conducted independently of each other, overall they suggest that **the gender of the farmer and the size of the household matters**, which is not entirely unexpected. What is unexpected is that depending on observation or self-reported data, **men likely overstate their adoption when relying on self-reported data and that women overall may adopt at greater rates.** This means that **self-reported versus observed practices by an agronomist can potentially lead to different conclusions** by farmer-support organizations and evaluators.

## Recommendations

- As with all evaluations, self-reported practices have to be interpreted with some caution. While it is not necessary to observe all practices at the moment they are conducted, observations on the farm itself can detect the result of some practices (i.e. pruning) and other various factors that can have a strong impact on productivity (i.e. basic farm condition. Depending on which practices may matter most to productivity, if observations cannot be applied universally, such as the current application of FarmGrow, strategic observations may be needed. For example, a regression analysis conducted at baseline assessment by UofG<sup>25</sup> found that out of all promoted GAPs, pruning was one of the most important practices a farmer could do to improve productivity. This was validated by the FarmGrow cocoa expert team members as pruning alone is important for the tree but it also reduces the amounts of pesticides and fungicides needed. If farm observations could be included in evaluations or farm monitoring that have to rely on self-reported practices, observations of pruning should likely be prioritized.
- Farmer attitudes matter, as was shown in the regression analysis as well as the qualitative demonstrating that replanting or thinning out trees is not just a financial decision but an emotional one. There are three key emotional barriers: fear of the loss of income, loss of land, and the pain from simply cutting down trees. First, while approaches such as FarmGrow may not directly be able to address land ownership issues, the data collected on the farmer potentially could be used to justify land ownership over time. Second, to address the fear of loss of income, farmer income diversification should be addressed prior to a farmer being encouraged to replant, such that the concerns about temporary income loss can already be addressed. While the FarmGrow investment plan visibly shows the potential future income gains that can come from replanting, they do not take into account the household shocks that farmers know will occur. As such, the investment plan is a theoretical picture of productivity improvement all things held constant. Financial buffers should therefore be included in the investment plan--not just as money that can be used to invest in the plan, but also money needed for an emergency fund. Access to other financial services such as insurance should also be incorporated to help farmers build financial confidence. Third, to address the sense of loss experienced from replanting trees, this has to be addressed as a barrier and not overlooked. Research from 1999<sup>26</sup>, in the United States, assessing forest management, suggests that emotion is important for engaging people: "the importance and value of emotion is so frequently underestimated or even dismissed as irrational or irrelevant...emotion plays a vital role in communication and motivation." A first step that the FarmGrow program takes in this regard is the focus in the 2-week training for coaches on behavioral economics and nonviolent communication. However, more research should be conducted on how communication between the agronomists and coaches can be improved to incorporate this concern into farmer engagement.

# **4.3 Farmer Vulnerability and Income**

In 2019, the governments of Ghana and Cote d'Ivoire introduced a premium on the export of cocoa for the 2020/21 growing season, known as the Living Wage Differential of USD 400 per ton. This is supposed to cascade down to the farmers resulting in higher wages earned upon the sale of their cocoa. The Living Income benchmark for Ghana was set at GHS 1,664 per month for a typical reference family of 2 adults and three children<sup>27</sup> (or USD 5.81 PPP per person per day<sup>28</sup>).

FarmGrow beneficiaries observed **increases in average cocoa farm sizes, cocoa outputs and yields, and average cocoa income per hectare** over the project implementation period. FarmGrow beneficiaries' average cocoa yields marginally increased from 0.35 tons/ha to 0.39 tons/ha over the project period. In addition to cocoa, FarmGrow beneficiaries have diversified income sources (cocoa production, food crop production, general trading, artisanship, salaried work, and animal production, amongst others) and **cocoa farming is not the highest income earner for all households**. Although there was a significant increase in the income earned from cocoa farming by FarmGrow farmers, no statistically significant difference was observed in their average annual household income over the period. Also, **a good majority of farmers' perceptions was that their income was down**. It is likely that as other income sources were affected by early quarantines, social distancing requirements, and disrupted supply chains, all due to COVID-19, cocoa income became critically important to the overall household income and resilience.

The evaluation also shows that **cocoa farmers are highly vulnerable**. While only 13 percent fall below the 3.10 USD international poverty line, more than half of them were slightly food insecure at endline. **Food insecurity for the FarmGrow farmers (and the comparison group) also increased between baseline and endline**. While most farmers are food insecure with low severity, this means households are making trade-offs in food consumption, such as limiting consumption of nutritious foods such as proteins. The poverty measure reflects ownership of various assets and does not change as quickly nor does it reflect the financial trade-offs household are making at the present time. Food insecurity, on the other hand, is an outcome but also reflects a coping mechanism for cash-flow constraints, as food consumption is often the most flexible "cash source" a household can draw on.

The increase in food insecurity follows a similar pattern as other measures of vulnerability. The dependency ratio of FarmGrow farmers increased over the project period, indicating an increase in financial stress on households as fewer income earners were supporting a greater number of non-income earners in the household. While there is no comparison with baseline, more than a quarter (29%) of FarmGrow farmers reported income loss due to the COVID-19 pandemic and 44 percent felt that COVID-19 negatively impacted their income in some way.

## Recommendations

- Data on farmer practices and outcomes (such as income) synthesized in this report have to be interpreted within their overall financial context. Increasing inflation, food insecurity and COVID-19 may have played an important role for farmers' abilities to invest in their farms given competing financial priorities.
- While the farmers participating in this study are cocoa farmers engaged by Touton to participate in FarmGrow, cocoa farming on small plots of land may never be sufficient to earn a living wage<sup>29</sup>. A study published in 2021 found that 30-58 percent of cocoa farming households earn a gross income below the World Bank extreme poverty line and the majority do not earn a living income.<sup>30</sup> As learned in a study led by Grameen Foundation in collaboration with The Sustainability Innovation Lab at the University of Colorado, Boulder, and the USDA Agricultural Research Service that leveraged LandPKS, a site-specific soil data mobile application, to understand soil qualities<sup>31</sup>, despite cocoa being grown on a plot, the soil may not be appropriate without significant investment to ever see expected productivity. For this reason, Touton and other cocoa farmer support organizations should have a set of recommendations for those farmers whom cocoa farming will never be a sufficient source of income, such as crop and income diversification and social support programs.
- While FarmGrow collects data on other crops grown, this data is simply description (and currently difficult to analyze given how it is input into the farmer profile data) and does not capture all income diversification strategies. As learned in the LandPKS study mentioned above, the soil data collected for select farmers suggested that some farmers will not likely experience increased cocoa productivity nor positive outcomes from the other crops they grow simply due to soil in-suitability. Combining the farmer and farm data with other open

data sources, such as soil, weather, and satellite data may provide more individualized data to farmers.

As noted above about farmers' fear of lost income during replanting, creative financial arrangements have to be developed such that farmers' living costs can be covered until their new crops are economically viable. Whether this comes in the form of grants or loans, all options should be explored. In 2016, Jason Clay of the World Wildlife Fund<sup>32</sup> recommended that cocoa buyers should develop long-term contracts with farmers to help reduce unpredictability of markets and that these long-term contracts could incentivize insurance companies to help reduce risks to investment and help farmers gain access to needed credit lines.

# **4.4 Financial Investment**

The ultimate goal of FarmGrow is to get cocoa farmers to a living income through renovation and rehabilitation of their ageing cocoa farms. While standard GAPs are promoted across the board with all farmers, each farmer's priorities are established. Farmers with ageing, low-producing trees, for example, are not encouraged to apply fertilizer as the cost-benefit of implementing this AO would be high on cost and low on benefit. Farms that have too many trees are encouraged to thin them out while those without a proper density are encouraged to plant new trees.

Replanting cocoa trees comes at a cost. For those encouraged to replant or graft, while cutting down trees and replanting materials are often supported by COCOBOD or the cocoa purchasing companies for free, it is the farmer's forgone income over a 3-5 year period that incurs the greatest financial and emotional cost until the new trees bear fruit. For those encouraged to fertilize, this is an annual investment --and the greater the size of the farm, the more expensive the investment. By their natures, these investments are different. One requires an income diversification strategy such that the forgone income can be replaced with another source and the other can be planned and budgeted for annually.

Experience and the literature show that **farmers are in constant need of credit, but this does not necessarily mean they desire credit** as it is perceived as risky and a last-resort source of financial support. The proportion of FarmGrow beneficiaries who successfully accessed farming credit significantly increased from 14 percent to 28 percent, although this benefited more adult than the young farmers. The sources of credit most used by both male and female farmers and most preferred are friends and family and the cocoa purchasing clerk. What farmers most liked about the purchasing clerk and wish was more common was an agreement whereby the purchasing clerk provides a loan in cash while the farmer repays in beans at harvest. Obviously, this agreement carries the same risk as lending to a farmer in cash and expecting repayment in cash but it aligns more with farmers' financial cycles.

Irrespective of where a credit is borrowed, men and women equally take decisions as to whom within the household borrows the funds, uses for the borrowed funds, and is responsible for loan repayments. While women do not seem to believe themselves as capable of accessing credit compared to their spouses, they do appear to make adequate preparations, especially through leveraging savings.

## Recommendations

 Creative relationships between cocoa purchasing companies and their purchasing clerks and financial institutions should be explored to enable purchasing clerks to develop contractual credit relationships with farmers. Purchasing clerks, who build the most trust with farmers due to long-term relationships they may have, can be important references for the trustworthiness of farmers. Creative incentives could also be explored, such that improvements in GAP adoption rates are incentivized with increased access to credit, cash or non-cash bonuses.

- As Touton has already started supporting farmers', especially female farmers' membership in savings groups, this membership should be expanded and encouraged. Given there are more male farmers whose wives run petty shops and small businesses, these additional income sources and investments will be important for cross-subsidizing household income, particularly when farms are being replanted.
- Through susu or savings groups or village banks, lay-away arrangements could also be explored for large input purchases, such as for fertilizer or insecticides.

# 4.5 Gender and Decision-Making

While the project did not directly have special interventions to target or include women differently, except for the inclusion of the secondary farmer (which may be a spouse) during the profiling and the agronomist visits, the research has been used to more fully understand the opportunities for serving women, either as primary decision makers or as part of the family decision-making body.

At baseline, leveraging the proWEAI with a small sample of FarmGrow beneficiaries, the study found that men and women were similarly disempowered even though women (67%) were slightly more disempowered than men (61%) across the proWEAI indicators. Sixty percent of households achieved gender parity. The main indicators contributing to disempowerment for both women and men were work balance, membership in influential groups and respect among household members. Self-efficacy, access to and decisions on financial services, control over use of income were greater contributors of disempowerment for women whereas autonomy in income and self-efficacy were greater contributors of disempowerment for men.

At endline, among a smaller subset of the original 49 households that participated in the proWEAI assessment, FarmGrow beneficiaries largely exhibited mutual respect for their spouses, agreed that household decisions were made for mutual benefit, and women/wives also appear to have quite a high decision-making autonomy in household decision-making. Both men and women had high levels of self-efficacy, suggesting that if a full pro-WEAI assessment had been completed at endline, it is highly likely that an improvement would have been detected in this indicator in the index.

When comparing male and female 'primary farmers' using the FarmGrow data, men started out with higher performance in GAP adoption than women and maintained this advantage; however, women are generally performing better than men on tree age, harvesting, pruning and shade management and while they still lag behind men, they made greater gains between diagnostic and monitoring for planting material, organic matter and pest and disease control. Given women's improvements on these particular GAPs, this suggests women are making greater gains in efforts to rehabilitate their plots and this is strengthened with finding from the UofG assessments that women realized a larger marginal increase in income per hectare compared to their male counterparts, even though this difference did not prove to be statistically significant. As the qualitative revealed, women may simply trust the agronomists' recommendations more than men. Women were more likely to report having met with a female extension officer compared to men, which may be one factor in the trust women have for the advice they receive.

When access to and decisions regarding use of financial services were assessed, the findings suggest that men and women have similar decision-making as it relates to the source from whom they borrow, who makes decisions regarding repayments, and how the loan funds should be used. Women were more likely to borrow from a microfinance institution or their associated village banks and savings

groups. Women were more likely to report, however, that their spouses were in charge of repayments from loans taken from a savings group which suggests that a wife's membership in the group may sometimes be on behalf of a spouse. Women were most likely to report they had the decision-making power over funds borrowed from friends and family, more likely to owe smaller amounts than her spouse, less likely to have credit for investments on their farm, and more likely to feel they have less access to credit than their spouses.

Given time constraints and the other non-farm income generating activities that women tend to run, the one-on-one attention provided by the agronomist are highly valued given women cannot often join group-based trainings. Female cocoa farmers were slightly more likely to report having a good or very good relationship with their agronomist compared to men, but qualitatively, some women reports feeling like they don't receive the same support as male farmers.

Despite agronomists being encouraged to engage the spouse of the primary farmer they are meeting with, about a third of the spouses were not aware of FarmGrow, and among those, a quarter had not met with the agronomist before. While these numbers are not terribly low, it does suggest that engagement of the spouse by the agronomist is not uniform and could limit the success of the investment plan if there is little support from all household decision-makers or if decisions made by the primary farmer put any other income earner's activities at risk.

# Recommendations

- Even though female farmers make up a smaller portion of the total farmers engaged through FarmGrow, they are equally benefiting--if not benefiting more--from the extension support compared to men. This may be a factor of women trusting the advice more than men or because women are traditionally left out of agricultural extension support. Even though female-farmers targeted by FarmGrow are benefiting, female spouses of male primary farmers don't appear to be sufficiently engaged --and should--to ensure that they are equipped with the knowledge and skills they may need if they find themselves running the farm upon the death of a spouse or due to off-season out-migration of the primary farmer.
- Given women's income generation often complements household income and is more constant than proceeds from harvest payments, support for women's micro and small enterprises would not only benefit the woman, but also the household income. This can help fill the gaps if recommendations are made to replant; however, they have to be seen as a critical piece of the puzzle when working with farmers to make major financial investments on the cocoa farm and should not be an afterthought. Otherwise, without promoting household collaboration and decision-making, decisions made by a male spouse may ultimately harm other members of the household if they are required to shoulder income burdens.

# 4.6 High Tech and High Touch

There are two key aspects that differentiate FarmGrow from typical agriculture extension. First, FarmGrow relies on one-on-one, individualized extension support. Second, the data collected generates an 8-to-10 year investment plan to inform farmer decisions and holds promise for more robust data-driven decision-making that has yet to be fully realized. A third aspect could differentiate FarmGrow if it were able to be fully integrated into a farmer certification program and therefore align the data collection and farmer engagement, reducing time of the farmer to participate and the costs incurred by Touton.

On the second differentiator, qualitatively it appears few farmers can distinguish between the promotion of the 14 AOs and their specific FarmGrow investment plan. This may simply be a challenge

of semantics (the difference in words used by the agronomist versus Grameen or UofG when interviewing farmers), it could be due to few farmers having the piece of paper to refer to their investment plan, it could be their actual understanding of their investment plan, or it could be that literacy and numeracy levels are not sufficient to interpret investment plan data.

Touton farmers clearly value their exchanges with the agronomist and note their appreciation for the individualized extension support (and on the other hand, when Touton agronomists do not visit, this results in their dissatisfaction with the program and attrition). Almost all farmers were willing to recommend FarmGrow to other cocoa farmers in their communities. They also value a pictorial calendar that is included in their farm development plan workbook that outlines the timing of farm activities and amount of inputs needed for each month of the year. When asked about their investment plan, many farmers referenced this pictorial calendar. This was noted at both the midline assessment and the endline assessment. However, farmers in both the treatment and comparison groups were also receiving agricultural extension support from Cocoa Health and Extension Division (CHED) of COCOBOD and therefore there were few significant differences between the two groups of farmers.

# **Recommendations:**

- Given the data showed the coaches and managers scored farmers within a margin of plus or minus ten percent, the impact of these differences should be further studied to determine whether companies like Touton could more heavily rely on a larger group of coaches than the highly-trained agronomists. Given coaches more often met with farmers than did the managers, understanding farmers' perceptions of the quality of advice and support from either should also be more deeply explored.
- The investment plan cannot be a one-time plan, but one that is updated over time to create real value. In the same way household budgets should be updated and actuals compared to the budget, so too should investment plans evolve as the assumptions that underpin them change, such as the changes in income sources, school fees, among others. While it may be used to inspire a farmer to engage with FarmGrow, its value is limited if it cannot be updated to help farmers pivot when financial assumptions evolve over time.
- One-on-one farm extension is expensive as it relies on observed farmer practices and data. To
  date, Touton has parallel systems for farmer certification and for FarmGrow and overlap exists
  among the questions posed with farmers. FarmGrow and certification should be merged, to
  the extent possible, so that data used for either can serve multiple purposes and costs could
  be reduced.
- As FarmGrow evolved, efforts were made to develop meaningful dashboards to ensure that the amount of data collected from farmers would result in something more than the sum of the parts. Feedback by FarmGrow users suggest the data monitored most was agronomists' visits to farmers and all other data was difficult to interpret without a technical background. While some of the data presented in this report was fed from the dashboards, the ability to create meaning of data that grows over time is challenging and requires a greater skillset than was available on the FarmGrow team. Efforts were made by Auxfin, but work streams between Grameen Foundation and Auxfin were not integrated. For this reason, the current business intelligence platform has room for improvement.

Given farmers are given one among eleven possible recommendations, the data was segmented such that you could compare how well farmers within the same cohort were performing. Farmers could be compared by region or village, by gender, and in Touton's case, some could be evaluated based on their attitudes. However, these individual comparisons provide limited insights and do not necessarily help predict which farmers will likely be successful. The regression analyses run by UofG and by Grameen Foundation are a starting

point for a more informed farmer segmentation exercise. This effort should continue such that companies like Touton can monitor which farmer segments are making the greatest gains, which ones are stuck, which farmers are ready for formal finance versus those that should be encouraged to join a savings groups, which farmers should be linked to social support or other services, etc.

Moreover, FarmGrow either has to improve operational efficiencies (for example, by integrating with the certification efforts, or it has to provide data insights that go beyond its current contribution and directly respond to user and management needs). Perhaps an evolution of FarmGrow can account for the fact that coaches can be trained to use the tool--or that farmers themselves can be trained to use the tool--to reduce data collection costs and improve on-demand farmer support. A FarmGrow-light version could also be pursued to focus on low-cost AOs first with the majority of farmers and then using this data to predict which farmers are investment-ready.

# **5.0 CONCLUSIONS**

In a short period of time, farmers participating in FarmGrow have made important and initial gains, but without external financial support, income diversification, and strategies that respond to farmer attitudes and fears, cocoa farmers find it difficult to make the hard decisions to replant but also to make significant investments on their farms. This hampers their ability to earn a living income (prorata based on farm size) from cocoa farming.

With the ability to compare self-reported to observed data through the Sat4Farming research agenda, this report reveals the importance of observed data and how it can be used to provide more accurate and individualized support to farmers.

The promise of novel data insights from FarmGrow has also yet to be fully realized. This is an important area for further research and investment as is an assessment to understand the degree to which farmers might trust a person empowered with the FarmGrow technology that does not have a cocoa farming background. Given the costs of data collection, cost efficiencies could be gained if a "light" version of FarmGrow focused on fewer, low-cost AOs as a starting point for identifying investment-ready farmers, if FarmGrow could be scaled among farmers themselves or through other lower-cost coaches.

# 6.0 ANNEXES

# 6.1 Adoption Observations and Rationale

Adoption Observations		Mechanism	Rationale
		to monitor	
Plant	1. Planting Material -	Interview	Plant material determines maximum yield - it
Material	Genetic Potential	and	must produce 1.5 MT/ha or more
Waterial		Observation	
	2. Tree Age	Interview	Trees over 25 yrs. old must be replaced as they
		and	are or will soon be in decline
		Observation	
Earm	3. Tree Density	Observation	We need maximum production per ha and
Condition			need between 800 - 1350 trees/ha
Condition	4. Tree Health	Observation	If many trees are in poor health, it is better to
			replace
	5. Debilitating Disease	Observation	If there is a disease such as CSSV, trees must
			be replaced
	6. Pruning	Observation	Only good pruning will ensure both energy and
			nutrient sequestration to pods
	7. Pest and Disease (P&D)	Observation	Only good P&D management will protect high
	and Sanitation		pod load
GAP	8. Weeding	Observation	Good weeding allows fertilizer uptake by trees
	9. Harvesting	Observation	Good harvesting (leave nothing on the tree) to
			reach highest production
	10. Shade Management	Observation	Light shade is wanted to allow enough
			sunlight, but also some stress protection
	11. Soil Condition (pH	Observation	Only good soil condition (not too argillic,
	separately)		sandy, rocky etc.) allows high yield
	12. Organic Matter	Observation	Organic matter supports high microbial activity
Soil	13. Fertilizer Formulation	Interview	We need all nutrients, and in the right ratios,
			whilst we avoid Urea and Ammonia
	14. Fertilizer Application	Interview	We need enough fertilizer, in the right place at
			the right time to support 1.5 MT/ha

# **6.2Adoption Observations and Assessment Summary**

Rating	Criteria
A. Plant N	laterial Genetics
Plant Mat	erial: What is the yield potential of planting material used at the farm?
Good	<ul> <li><u>Interview:</u></li> <li>&gt;80% of Plant Material sourced after 1990 from research station, extension service, accredited plant material distributor <u>OR</u></li> <li>if historical known Yield reached 1500kg/ha</li> <li><u>Field observation:</u></li> </ul>

Rating	Criteria
	Identification of clone or hybrid OR
	• If in peak season: yield on tree
Medium	Interview:
	<ul> <li>&gt;80% of Plant Material sourced before 1990 from research station, extension service,</li> </ul>
	accredited plant material distributor OR
	• if historical known Yield was between 900-1500kg/Ha
	C,
	Field observation:
	• If in peak season: vield on tree
Bad	Interview:
	<ul> <li>Plant Material source not known or taken from farms with unknown parentage OR</li> </ul>
	<ul> <li>if historical known Yield never reached 900 kg/Ha</li> </ul>
	Field observation:
	If in peak season: yield on tree OR
	• other indicators of low yield potential i.e. 70/30 yield distribution
B. Farm Co	ondition
B1: Trop o	go: Are the trees above or below the theoretical maximum production threshold?
DI: ITEE d	ge. Are the trees above or below the theoretical maximum production threshold?
Good	Interview:
	• <26 years
	Observation:
	best judgement
Bad	Interview:
	<ul> <li>26 years and older (age 25 - 30 graft or replant, &gt; 30 only replant)</li> </ul>
D2 Tree d	• best judgement
BZ. Tree d	ensity: Does the density of trees support targeted production per nectare? (i.e. spacing
between t	rees as proxy to number of trees and average density)
Good	Observation:
	<ul> <li>Farm has adequate density (800 – 1320 trees per ha)</li> </ul>
Bad	Observation:
	<ul> <li>Farm has poor density (&lt;800 trees per ha or more than 1320 tree/ha)</li> </ul>
B3. Tree h	ealth: Are the trees on a farm healthy enough to support targeted yield?
Good	Observation:
	<ul> <li>&gt;80% trees are healthy and without physical damage</li> </ul>
Bad	Observation:
	• >20% of trees look unhealthy with irreparable problems (i.e. cannot be fixed by GAP or soil
	management) OR
	•20% of trees with physical damage
B4. Debilit	ating disease: Is the farm free of any signs of major diseases that may imperil the farm?
Good	Observation
9000	No observable (SSV on the farm

Rating	Criteria
Bad	Observation:
	Evidence of CSSV on the farm
C. Good A	gricultural Practices
C1. Prunin	ng sa
Good	Observation:
	Hybrid Trees, >90% of trees must have:
	<ul> <li>Max height of the tree: &lt; 4.5 m <u>AND</u></li> </ul>
	• 3-5 main branches <u>AND</u>
	All main branches visible <u>AND</u>
	<ul> <li>&gt;50% of leaves capture direct light <u>AND</u></li> </ul>
	<ul> <li>Good aeration under and in the tree canopy <u>AND</u></li> </ul>
	• chupons on <10% of trees
	Other criteria to support positive judgement
	Height of Jorquette: <1.5m <u>AND</u>
	Branches exhibit vertical growth habit <u>AND</u>
	Canopies of trees do not touch (CSSVD prevention) <u>AND</u>
	Mostly single stem trees
	Clonal Trees, major criteria of all trees:
	Observation:
	• Height of tree < 3.5 m <u>AND</u>
	• 2-3 main branches, in balance, clearly visible <u>AND</u>
	<ul> <li>&gt;75% of leaves capture direct or a lot of indirect light <u>AND</u></li> </ul>
	<ul> <li>good aeration in the whole farm <u>AND</u></li> </ul>
	• chupons on <10% of trees
	Other criteria (to support positive judgement)
	Branches exhibit vertical growth habit AND
	• Canopies of trees do not touch each other (CSSVD prevention)

Rating	Criteria
Medium	Observations:
	Hybrid Trees. >90% of trees must have:
	• Max height of the tree: < 5 m AND
	• 2-5 main branches, in balance AND
	• all main branches are visible AND
	50% of leaves likely to canture direct and indirect light AND
	• good aeration AND
	• Chuppers on <25% of trees
	Other criteria to support positive judgement
	• Height of lorquette: 1.5-2m AND
	Branches exhibit at least some vertical growth habit AND
	• $< 25\% - 50\%$ of canonies of trees touch each other AND
	Mostly single stem trees
	• Wostly single stem trees
	Observations:
	Clonal Trees. >90% must have:
	• Height of tree < 4.5 m AND
	• Max 4 main branches, in balance, clearly visible AND
	• 50-75% of leaves likely to canture light AND
	Good agration
	Other criteria to support positive judgement
	Branches exhibit mostly vertical growth habit AND
	Some (<25%) canonies of trees touch each other AND
	• Chupons on <10% of trees
Bad	Observations:
Dau	Hybrid Trees most trees on the farm have
	• Height of the tree: > 5m OP
	• Only one stem until grown or >5 main branches, near balance, some or most main branches
	• Only one stem until crown of >5 main branches, poor balance, some of most main branches
	Not visible <u>OR</u>
	• Most leaves are not likely to capture light and trees are not aerated well under or within the
	canopy
	• >25% chupons on the trees
	Other criteria (to support negative judgement)
	• Height of lorquette: >2m OR
	Most branches have horizontal growth babit OB
	Nost branches have nonzontal growth habit <u>on</u>
	• $r_{23\%}$ of catopies of trees touch each other $OK$
	Observations:
	Clonal trees, most trees have
	• Height tree > 4.5 m $OR$
	• S3 main branches, noor balance, most branches not visible OP
	$\sim$ >5 main branches, poor balance, most branches not visible <u>ON</u>
	• poor paration under or within canony OP
Bad	<ul> <li>&lt;25% - 50% of canopies of trees touch each other <u>AND</u></li> <li>&lt; &lt;25% - 50% of canopies of trees touch each other <u>AND</u></li> <li>&lt; Mostly single stem trees</li> </ul> Observations: Clonal Trees, >90% must have: <ul> <li>Height of tree &lt; 4.5 m <u>AND</u></li> <li></li></ul> Max 4 main branches, in balance, clearly visible <u>AND</u> <ul> <li>So-75% of leaves likely to capture light <u>AND</u> </li> <li>Good aeration Other criteria to support positive judgement <ul> <li>Branches exhibit mostly vertical growth habit <u>AND</u> </li> <li>Some (&lt;25%) canopies of trees touch each other <u>AND</u> </li> <li>Chupons on &lt;10% of trees Observations: Hybrid Trees, most trees on the farm have <ul> <li>Height of the tree: &gt; 5m OR </li> <li>Only one stem until crown or &gt;5 main branches, poor balance, some or most main branches not visible <u>OR</u> <ul> <li>Nost leaves are not likely to capture light and trees are not aerated well under or within the canopy </li> <li>&gt;&gt;25% chupons on the trees </li> </ul> Other criteria (to support negative judgement) <ul> <li>Height of Jorquette: &gt;2m <u>OR</u></li> <li>Most branches have horizontal growth habit <u>OR</u> </li> <li>&gt;&gt;25% of canopies of trees touch each other <u>OR</u> </li> <li>many multiple-stem trees (&lt;25%) </li> </ul></li></ul></li></ul></li></ul>

Rating	Criteria
	Other criteria (to support negative judgement)
	• Branches exhibit mostly horizontal growth habit <u>OR</u>
	• >50% of canopies of trees touch each other <u>OR</u>
	• >25% chupons on the trees
C2. Pest, D	Disease and Sanitation: What is the Pest and Disease (P&D) and Sanitation condition for
supporting	g or limiting the yield potential of the planting material?
Good	Observation:
0000	P&D
	• Spread of pest disease is low measured by few pods and branches affected on $< 10\%$ of the
	trees QB only in a few pockets on <10% of farm area) AND
	• the P&D presence causes little loss
	Sanitation
	• trees are nearly free of diseased, damaged, wilted, dead or mummified pods, epiphytes, or
	ant nests and tunnels AND
	• no diseased plant material on the ground near the tree
Medium	Observation:
	P&D
	• < 25% of trees have significant presence of non-debilitating diseases on pods, stems and
	branches leading to loss of <15%
	Sanitation
	• < 25% have diseased, damaged, wilted, dead or mummified pods, epiphytes, dead branches,
	or ant nests and tunnels <u>AND</u>
	< <25% of land have some diseased plant material on the ground near the tree
Bad	Observation:
	• > 25%) have significant presence of non-debilitating diseases on pods, stems and branches
	leading to significant loss of >20% OR
	• The spread of diseases to many trees all over the farm
	Sanitation
	• > 25% of trees have diseased damaged wilted dead or mummified nods eninbytes dead
	branches, or ant nests and tunnels OR
	<ul> <li>&gt;25% of land has diseased plant material on the ground near the tree</li> </ul>
C3. Weedi	ng: What is the weeding condition for supporting or limiting the yield potential of the planting
material?	
Good	Observation:
	• The ground under the canopy of trees is kept clean of undesired undergrowth and very little
	weed is visible
Bad	Observation:
	• Undesired undergrowth or weeds up to knee height on >10%) of the farm and outside canopy
	of cocoa trees <u>OR</u>
	<ul> <li>&gt;10% of area under canopy of cocoa trees has weeds</li> </ul>
C4. Harves	sting: What is the harvest condition for supporting or limiting the yield potential of the planting
material?	

Rating	Criteria
Good	Observation:
	• Few over-ripe pods on maximum 10% of the trees AND
	<ul> <li>&lt;10% under-ripe pods harvested (if this can be observed)</li> </ul>
Bad	Observation:
	<ul> <li>&gt;10% of trees have over-ripe pods OR</li> </ul>
	<ul> <li>&gt;10% of harvested pods are under-ripe (if this can be observed)</li> </ul>
C5. Shade	What is the shade level for supporting or limiting the yield potential of the planting material?
Carad	
Good	<u>Ubservation</u>
	• Good shade is light shade which can be measured by 70 - 80% of sumight reaching the canopy
	of most cocoa trees $\underline{OR}$ presence of 12 to 18 large shade trees of >20 m tail per na $\underline{AND}$
	Shade trace are compatible with cases i.e. no best of disease incompatition for root or
	• Shade trees are compatible with cocoa i.e. no nost of disease, no competition for root of
Deal	
ваа	<u>Observation</u> :
	Bad shade is insufficient shade or too much shade which is measured by <70% of more than
	80% of sunlight reaching the canopies of most cocoa trees <u>OR</u> < 12 or > 18 large shade trees of >
	2011 tail per halok
	• <75% receive shade during part of the day OR
	• Shade trees that are not compatible with cocoa i.e. nost of disease, competition for root of
D. Soli Fer	tinty Management
D1. Physic	al condition of farm land (soil condition): What is the physical condition of the land and its
limiting fa	ctors for cocoa cultivation?
Good	Observation:
	<ul> <li>No signs of erosion, no roots visible on the surface <u>AND</u></li> </ul>
	• few rocks or gravel on farm surface or in the ground as measured by 3 holes of 30 cm deep
	per plot <u>AND</u>
	• soil is neither too sandy or argillic as measured by touch/roll test on soil from 3 holes of 30
	cm deep per plot <u>AND</u>
	well drained either naturally or through drainage canals <u>AND</u>
	• slope < 15%
Bad	Observation:
	• signs of erosion, roots visible on the surface <u>OR</u>
	• many rocks or gravel on farm surface or in the ground as measured by 3 holes of 30 cm deep
	per plot <u>OR</u>
	• soil is too sandy or too argillic measured by touch/roll test on soil from 3 holes of 30 cm deep
	per plot) <u>OR</u>
	• poorly drained (waterlogged) <u>OR</u>
	• slope > 15%
D2. Organ	ic Matter (Soil Health): What is the volume and level of decomposition of organic matter on
and in the	soil and what are other indicators of soil health i.e. worm, insect activity and microbial life for
supporting	g or limiting the yield potential of the planting material?
Good	<u>Ubservation</u> :
	Clear signs or microbial activity everywhere on the farm with multiple layers of decaying
	organic material covering the soil under the cocoa canopies of all trees, worms, worm castings,
	Insect activity, soil pores <u>AND</u>
	• Organic material left in the farm and/or extra organic material (compost, manure) around

Rating	Criteria
	cocoa trees or in 'mulching rows or trenches' evenly spread through the farm (note: pod husk
	left in the farm is a strong positive indicator)
Bad	Observation:
	<ul> <li>&gt;10% of soil under the cocoa tree canopies is exposed without at least one layer of decaying</li> </ul>
	organic material <u>OR</u>
	Little or no signs of organic material in the farm or microbial activity in the soil
D3. Fertiliz	zer Formulation: What kind (formulation) of fertilizer is used at the farm i.e. nutrient content,
nutrient b	alance and non-acidifying and does it support or limit the yield potential of the planting
material?	
Good	Interview:
	• Use of well-balanced NPK + Secondary + Micro nutrients fertilizer with N in CaNitrate AND
	No use of Urea <u>AND</u>
	• If pH <5.7 apply mechanism to add Ca to soil i.e. use relevant dose of lime, higher doses of
	Nitrabor, more organic material etc.
Medium	Interview
	• Use of Ammonium based NPK + Secondary + Micro nutrients fertilizers with reasonable
	nutrient balance, if accompanied with significant doses of lime/kieserite/dolomite or Nitrabor
	AND
	• No use of orea <u>AND</u>
	• If ph <5.8 apply mechanism to add ca to soll i.e. use relevant dose of lime, higher doses of
Bad	
Dau	Use of noorly balanced fertilizer OB
	Use of Ammonium based N without additional lime. Kieserite or Dolomite OR
	Use of Urea
D4. Fertiliz	zer application: How is fertilizer used i.e. dosage, timing and application technique, and does it
support or	r limit the yield potential of the planting material?
Good	Interview
	For details see manual
	For Mature trees and to sustain 1.5 mt/ha AND
	<ul> <li>&gt; 700 kg/ha of all fertilizer combined excluding lime/dolomite <u>AND</u></li> </ul>
	<ul> <li>applied under the leaf litter or in the soil at the root system of the trees <u>AND</u></li> </ul>
	applied at least once per year
Medium	Interview
	For details see manual
	For Mature trees and to sustain 1.5 mt/ha <u>AND</u>
	<ul> <li>&gt; 400 - 700 kg/ha of all fertilizer combined excluding lime/dolomite <u>AND</u></li> </ul>
	• applied mostly under the leaf litter or in the soil at the root system of the trees <u>AND</u>
_ ·	applied at least once per year
Bad	Interview
	For details see manual
	For initiature trees and to sustain 1.5 mt/na $\underline{OK}$
	<ul> <li>&lt; 400 kg/na or all rentilizer combined excluding lime/dolomite <u>OR</u></li> <li>mostly applied close to trupk or for from tree root system, applied on loof litter OP</li> </ul>
	<ul> <li>mostly applied close to trunk or far from tree root system, applied on lear litter <u>UR</u></li> <li>applied &lt;1 time per veer</li> </ul>
	• applied <1 time per year

# **6.3Additional Tables**

Household income (GHS)	Obs.	Mean	p-value	Interpretation
Male	88	16,776.33		Not Significant
Female	31	11,118.60	0.16	
Pooled	119	15,302.46		
diff	5,657.73			

## Annex Table 1. Real Household Income for FarmGrow Beneficiaries at Endline

Source: UofG field data 2021

#### Annex Table 2. Real Cocoa Farming Income for Respondents (Pooled)

Real cocoa income (GHS)	Obs.	Mean	p-value	Interpretation
Baseline	246	8,796.64		Significant
Endline	242	10,624.20	0.08	
Pooled	488	9,702.93		
diff		-1,827.56		

Source: UofG field data, 2018 & 2021

#### Annex Table 3. Real Cocoa Farming Income for FarmGrow Farmers at Endline

Household income (GHS)	Obs.	Mean	p-value	Interpretation
Baseline	120	7,703.41		Significant
Endline	119	10,434.97	0.04	
Pooled	239	9,063.48		
diff		-2,731.56		

Source: UofG field data, 2018 & 2021

#### Annex Table 4. Farm size comparison between FarmGrow Males and Females at Endline

Group	Obs	Mean	P-value	Interpretation
Male	88	4.6766		
Female	31	2.6917		
Pooled	119	4.1595	0.01	Significant
diff		1.984919		

Source: UofG field data 2021

#### Annex Table 5. Farm yield comparison between FarmGrow Males and Females at Endline

Group	Obs	Mean	P-value	Significance
Male	88	0.39		
Female	31	0.41		
Combined	119	0.39	0.78	Not significant
diff		(0.01)		

Source: UofG field data 2021

#### Annex Table 6. Mean comparison test (t-test) of respondent's Farm size (Ha)

Farm size (Ha)	Obs.	Mean	p-value	Interpretation
Baseline	246	4.73		Not Significant
Endline	244	4.26	0.21	
Pooled	490	4.49		
diff		0.47		

Source: UofG field data, 2018 & 2021

#### Annex Table 7. Mean comparison test (t-test) of respondent's Farm yields (tons/ha)

Yield (tons/ha)	Obs.	Mean	p-value	Interpretation
Baseline	246	0.3282515		Significant
Endline	241	0.3760117	0.03	
Pooled	487	0.3518864		
diff		-0.0477602		

Source: UofG field data, 2018 & 2021

## Annex Table 8. Mean comparison test (t-test) of respondent's farm income per hectare (GHS)

Farm income per hectare (GHS)	Obs.	Mean	p-value	Interpretation
Baseline	246	2,417.36		Not Significant
Endline	241	2,624.17	0.18	
Pooled	487	2,519.70		
diff		-206.82		

Source: UofG field data, 2018 & 2021

#### Annex Table 9. Mean comparison test (t-test) of respondent's farm income per capita (GHS)

Farm income per capita (GHS)	Obs.	Mean	p-value	Interpretation
Baseline	236	2,788.72		Not Significant
Endline	238	3,122.51	0.38	
Pooled	474	2,956.32		
diff		-333.7968		

Source: UofG field data, 2018 & 2021

#### Annex Table 10. Cocoa Farm Details (Male and Female farmer comparisons)

		Bas	eline		Endline			
	Treat	ment	Cont	rol	Treatr	nent	Cont	rol
	Male	Female	Male	Female	Male	Female	Male	Female
Avg # of farms cultivate d	2	2		2	2	2	2	2
% with new farms in last 5 years	38.20%	35.48%	38.36%	39.62%	51.14%	25.00%	41.10%	30.19%
Average farm size (ha)	4.14	3.27	5.32	5.74	4.68	2.69	4.61	4.01
Cocoa Yield (kg/ha)	353.87	342.22	339.20	261.98	390.61	405.04	392.83	311.33
Cocoa income	9,630.7 9	6,665.0 0	12,473.6 3	9,733.0 2	13,303.5 2	8,330.4 5	15,287.3 1	8,543.9 2
Farm income per capita	2,862.0 3	2,666.9 4	2,814.51	2,704.9 0	3,622.81	2,978.1 9	3,025.01	2,488.7 1

Source: UofG field data, 2018 & 2021

## Annex Table 11. Amount of credit/loans requested by respondents

Statistic	Baseline			Endline			
	Control	Treatment	Pooled	Control	Treatment	Pooled	

N	19	17	36	40	34	74
Max	5 000 00	12 000 00	12 000 00	20 000 00	5 000 00	20 000 00
Min	100.00	100.00	100.00	100.00	200.00	100.00
SD	1,229.53	2,927.14	2,181.24	3,530.45	1,133.91	2,834.33
Mean	1,378.95	1,876.47	1,613.89	3,257.50	1,482.35	2,441.89
Median	1,000.00	1,000.00	1,000.00	2,500.00	1,150.00	1,850.00

Source: UofG field data, 2018 & 2021

# Annex Table 12. T-test Amount of loan requested (MALE vs FEMALE) Control

Group	Obs	Mean	Std. Err	Std. Dev	[95% confidence interval]	
Male	21	4204.76	918.94	4211.11	2287.88	6121.64
Female	19	2210.53	517.97	2257.80	1122.30	3298.75
Combined	40	3257.50	558.21	3530.45	2128.41	4386.59
diff		1994.24	1085.24		-202.72	4191.20
diff = mean(Male) - mean (Female)						t = 1.8376
diff = 0					degrees of	freedom = 38
Ha : diff <0		Ha : diff = 0			Ha : diff > 0	
Pr (T < t) = 0.9630		Pr ( T  >  t ) = 0.0740			Pr (1	7 > t) = 0.0370
Courses UsefC field date 2024						

Source: UofG field data 2021

## Annex Table 13. Amount of loan requested for treatment by sex

					[95% confidence		
Group	Obs	Mean	Std. Err	Std. Dev	interval]		
Male	22	1504.55	266.33	1249.18	950.69	2058.40	
Female	12	1441.67	270.09	935.62	847.20	2036.13	
Combined	34	1482.35	194.46	1133.91	1086.72	1877.99	
diff		62.88	413.08		-778.55	904.30	
diff = mean(Male) -						t =	
mean (Female)						0.1522	
diff = 0					degrees of freedom = 32		
Ha : diff <0		Ha : diff = 0			Ha : diff > 0		
Pr (T < t) = 0.560	Pr ( T  >  t )	= 0.8800		Pr (T > t) = 0.4400			

Source: UofG field data 2021

# Annex Table 14. Amount of loans successfully received by respondents (GHS)

	Baseline			Endline				
Statistic	Control	Treatment	Pooled	Control	Treatment	Pooled		
Median	1,000.00	1,000.00	1,000.00	2,000.00	1,000.00	1,500.00		
Mean	1,168.42	1,800.00	1,466.67	2,737.50	1,297.06	2,075.68		
SD	1,077.58	2,953.81	2,165.18	3,398.09	1,132.30	2,696.46		
Min	100.00	100.00	100.00	100.00	200.00	100.00		
Max	5,000.00	12,000.00	12,000.00	20,000.00	5,000.00	20,000.00		
N	19	17	36	40	34	74		

Source: UofG field data, 2018 & 2021

## Annex Table 15. T-test on Amount of loans received (MALE vs FEMALE) Control

Group	Obs	Mean	Std. Err	Std. Dev	[95% confidence interval]		
Male	21	3452.38	894.02	4096.90	1587.49	5317.27	
Female	19	1947.37	518.79	2261.36	857.43	3037.31	
Combined	40	2737.50	537.29	3398.09	1650.74	3824.26	
diff		1505.01	1062.29		-645.47	3655.50	
diff = mean(Male) - mean (Female)						t = 1.4168	
diff = 0					degrees of freedom = 38		
Ha : diff <0		Ha : diff = 0			Ha : diff > 0		
Pr (T < t) = 0.9177	Pr (T < t) = 0.9177		= 0.1647		Pr (T > t) :	= 0.0823	

Source: UofG field data 2021

## Annex Table 16. Amount of loans received (MALE vs FEMALE) Treatment

					[95% confidence		
Group	Obs	Mean	Std. Err	Std. Dev	interval]		
Male	22	1331.818	275.8997	1294.084	758.0534	1905.583	
Female	12	1233.333	231.3771	801.5137	724.0758	1742.591	
Combined	34	1297.059	194.1885	1132.304	901.9793	1692.138	
diff		98.48485	412.2832		-741.3086	938.2782	
diff = mean(Male) -						t =	
mean (Female)						0.2389	
diff = 0					degrees of freedom = 32		
Ha : diff <0		Ha : diff = 0			Ha : diff > 0		
Pr (T < t) =0.593	36	Pr ( T  >  t	) = 0.8127		Pr (T > t) = 0.4064		

Source: UofG field data 2021

#### Annex Table 17: Household decision-maker in borrowing and paying back loan

	Male	%	Female	%	Pooled	%
Main decision-maker to borrow from	n Non-Gov	ernmental Org	anisation (N	IGO)		
Spouse/partner	1	9.1	1	8.3	2	8.7
Parent-in-law	0	0.0	0	0.0	0	0.0
Mother/father	0	0.0	0	0.0	0	0.0
Brother/sister	0	0.0	0	0.0	0	0.0
Grandparent	0	0.0	0	0.0	0	0.0
Children (biological)	0	0.0	0	0.0	0	0.0
Other relative	0	0.0	0	0.0	0	0.0
Servant/employee	0	0.0	0	0.0	0	0.0
Other non-relative	0	0.0	0	0.0	0	0.0
Myself	2	18.2	1	8.3	3	13
Not applicable	8	72.7	10	83.4	18	78.3
Total	11	100.0	12	100.0	23	100.0
Main decision-maker on what mone	y or item b	orrowed from	NGO shoul	d be used for		
Spouse/partner	1	9.1	1	8.3	2	8.7
Parent-in-law	0	0.0	0	0.0	0	0.0
Mother/father	0	0.0	0	0.0	0	0.0
Brother/sister	0	0.0	0	0.0	0	0.0
Grandparent	0	0.0	0	0.0	0	0.0
Children (biological)	0	0.0	0	0.0	0	0.0
Other relative	0	0.0	0	0.0	0	0.0

Servant/employee	0	0.0	0	0.0	0	0.0			
Other non-relative	0	0.0	0	0.0	0	0.0			
Myself	2	18.2	1	8.3	3	13			
Not applicable	8	72.7	10	83.4	18	78.3			
Total	11	100.0	12	100.0	23	100.0			
Person responsible for repayment of money or item borrowed from this NGO									
Spouse/partner	0	0.0	1	8.3	1	4.3			
Parent-in-law	0	0.0	0	0.0	0	0.0			
Mother/father	0	0.0	0	0.0	0	0.0			
Brother/sister	0	0.0	0	0.0	0	0.0			
Grandparent	0	0.0	0	0.0	0	0.0			
Children (biological)	0	0.0	0	0.0	0	0.0			
Other relative	0	0.0	0	0.0	0	0.0			
Servant/employee	0	0.0	0	0.0	0	0.0			
Other non-relative	0	0.0	0	0.0	0	0.0			
Myself	3	27.3	1	8.3	4	17.4			
Not applicable	8	72.7	10	83.4	18	78.3			
Total	11	100.0	12	100.0	23	100.0			

## Annex Table 18: Household decision-maker in borrowing and paying back loan

Main decision-maker to borrow from the formal lender (bank/financial institution) most of the time								
	Male	%	Female	%	Pooled	%		
Spouse/partner	4	21.1	3	17.6	7	19.4		
Parent-in-law	0	0.0	0	0.0	0	0.0		
Mother/father	0	0.0	0	0.0	0	0.0		
Brother/sister	0	0.0	0	0.0	0	0.0		
Grandparent	0	0.0	0	0.0	0	0.0		
Children (biological)	0	0.0	0	0.0	0	0.0		
Other relative	0	0.0	0	0.0	0	0.0		
Servant/employee	0	0.0	0	0.0	0	0.0		
Other non-relative	0	0.0	0	0.0	0	0.0		
Myself	4	21.1	3	17.6	7	19.4		
Not applicable	11	57.8	11	64.8	22	61.2		
Total	19	100.0	17	100.0	36	100.0		

Main decision-maker on what money or item borrowed from the formal lender (bank/financial institution) should be used for

	Male	%	Female	%	Pooled	%
Spouse/partner	3	15.8	4	21.1	7	18.4
Parent-in-law	0	0.0	0	0.0	0	0.0
Mother/father	0	0.0	0	0.0	0	0.0
Brother/sister	0	0.0	0	0.0	0	0.0
Grandparent	0	0.0	0	0.0	0	0.0
Children (biological)	0	0.0	0	0.0	0	0.0
Other relative	0	0.0	0	0.0	0	0.0
Servant/employee	0	0.0	0	0.0	0	0.0
Other non-relative	0	0.0	0	0.0	0	0.0
Myself	6	31.6	3	15.8	9	23.7
Not applicable	10	52.6	12	63.1	22	57.9
Total	19	100.0	19	100.0	38	100.0

institution)								
	Male	%	Female	%	Pooled	%		
Spouse/partner	2	10.5	3	16.7	5	13.5		
Parent-in-law	0	0.0	0	0.0	0	0.0		
Mother/father	0	0.0	0	0.0	0	0.0		
Brother/sister	0	0.0	0	0.0	0	0.0		
Grandparent	0	0.0	0	0.0	0	0.0		
Children (biological)	0	0.0	0	0.0	0	0.0		
Other relative	0	0.0	0	0.0	0	0.0		
Servant/employee	0	0.0	0	0.0	0	0.0		
Other non-relative	0	0.0	0	0.0	0	0.0		
Myself	6	31.6	3	16.6	9	24.3		
Not applicable	11	57.9	12	66.7	23	62.2		
Total	19	100.0	18	100.0	37	100.0		

Person responsible for repaying the money or item borrowed from the formal lender (bank/financial

Source: UofG field data, 2021

# Annex Table 19: Household decision-maker in borrowing and paying back loan

Main decision-maker to borrow from group-based microfinance or lending sources most of the time								
	Male	%	Female	%	Pooled	%		
Spouse/partner	0	0.0	0	0.0	0	0.0		
Parent-in-law	0	0.0	0	0.0	0	0.0		
Mother/father	0	0.0	0	0.0	0	0.0		
Brother/sister	0	0.0	0	0.0	0	0.0		
Grandparent	0	0.0	0	0.0	0	0.0		
Children (biological)	0	0.0	0	0.0	0	0.0		
Other relative	0	0.0	0	0.0	0	0.0		
Servant/employee	0	0.0	0	0.0	0	0.0		
Other non-relative	0	0.0	0	0.0	0	0.0		
Myself	0	0.0	3	25.0	3	13.6		
Not applicable	10.0	100.0	9	75.0	19	86.4		
Total	10.0	100.0	12	100.0	22	100.0		
Main decision-maker on what money or item borrowed from group-based micro-finance or lending								

:y group g sources should be used for

	Male	%	Female	%	Pooled	%		
Spouse/partner	0	0.0	0	0.0	0	0.0		
Parent-in-law	0	0.0	0	0.0	0	0.0		
Mother/father	0	0.0	0	0.0	0	0.0		
Brother/sister	0	0.0	0	0.0	0	0.0		
Grandparent	0	0.0	0	0.0	0	0.0		
Children (biological)	0	0.0	0	0.0	0	0.0		
Other relative	0	0.0	0	0.0	0	0.0		
Servant/employee	0	0.0	0	0.0	0	0.0		
Other non-relative	0	0.0	0	0.0	0	0.0		
Myself	0	0.0	3	25.0	3	13.6		
Not applicable	10	100.0	9	75.0	19	86.4		
Total	10	100.0	12	100.0	22	100.0		
Person responsible for r	Person responsible for repaying the money or item borrowed from group-based micro-finance or							
lending sources								

	Male	%	Female	%	Pooled	%			
Spouse/partner	0	0.0	0	0.0	0	0.0			
Parent-in-law	0	0.0	0	0.0	0	0.0			

Mother/father	0	0.0	0	0.0	0	0.0
Brother/sister	0	0.0	0	0.0	0	0.0
Grandparent	0	0.0	0	0.0	0	0.0
Children (biological)	0	0.0	0	0.0	0	0.0
Other relative	0	0.0	0	0.0	0	0.0
Servant/employee	0	0.0	0	0.0	0	0.0
Other non-relative	0	0.0	0	0.0	0	0.0
Myself	0	0.0	3	25.0	3	13.6
Not applicable	10	100.0	9	75.0	19	86.4
Total	10	100.0	12	100.0	12	100.0

# Annex Table 20: Household decision-maker in borrowing and paying back loan

Main decision-maker to borrow from informal credit / savings groups most of the time?								
	Male	%	Female	%	Pooled	%		
Spouse/partner	3	16.6	2	13.3	5	15.2		
Parent-in-law	0	0.0	0	0.0	0	0.0		
Mother/father	0	0.0	0	0.0	0	0.0		
Brother/sister	0	0.0	0	0.0	0	0.0		
Grandparent	0	0.0	0	0.0	0	0.0		
Children (biological)	0	0.0	0	0.0	0	0.0		
Other relative	0	0.0	0	0.0	0	0.0		
Servant/employee	0	0.0	0	0.0	0	0.0		
Other non-relative	0	0.0	0	0.0	0	0.0		
Myself	5	27.8	6	40.0	11	33.3		
Not applicable	10	55.6	7	46.7	17	51.5		
Total	18	100.0	15	100.0	33	100.0		
Main decision-maker on what	money or iten	n borrowed fi	om informa	ıl credit / savir	ngs groups s	should be		
used for	I	1						
	Male	%	Female	%	Pooled	%		
Spouse/partner	2	11.8	2	13.3	4	12.5		
Parent-in-law	0	0.0	0	0.0	0	0.0		
Mother/father	0	0.0	0	0.0	0	0.0		
Brother/sister	0	0.0	0	0.0	0	0.0		
Grandparent	0	0.0	0	0.0	0	0.0		
Children (biological)	0	0.0	0	0.0	0	0.0		
Other relative	0	0.0	0	0.0	0	0.0		
Servant/employee	0	0.0	0	0.0	0	0.0		
Other non-relative	0	0.0	0	0.0	0	0.0		
Myself	5	29.4	6	40.0	11	34.4		
Not applicable	10	58.8	7	46.7	17	53.1		
Total	17	100.0	15	100.0	32	100.0		
Person responsible for repaying	g the money o	or item borro	wed from In	formal credit	/ savings gr	oups		
	Male	%	Female	%	Pooled	%		
Spouse/partner	2	11.8	2	13.3	4	12.5		
Parent-in-law	0	0.0	0	0.0	0	0.0		
Mother/father	0	0.0	0	0.0	0	0.0		
Brother/sister	0	0.0	0	0.0	0	0.0		
Grandparent	0	0.0	0	0.0	0	0.0		
Children (biological)	0	0.0	0	0.0	0	0.0		
Other relative	0	0.0	0	0.0	0	0.0		
Servant/employee	0	0.0	0	0.0	0	0.0		

Total	17	100.0	15	100.0	32	100.0
Not applicable	10	58.8	7	46.7	17	53.1
Myself	5	29.4	6	40.0	11	34.4
Other non-relative	0	0.0	0	0.0	0	0.0

## Annex Table 21: Household decision-maker in borrowing and paying back loan

Main decision-maker to borrow from this Informal lender most of the time								
	Male	%	Female	%	Pooled	%		
Spouse/partner	2	11.1	2	11.8	4	11.4		
Parent-in-law	0	0.0	0	0.0	0	0.0		
Mother/father	0	0.0	0	0.0	0	0.0		
Brother/sister	0	0.0	0	0.0	0	0.0		
Grandparent	0	0.0	0	0.0	0	0.0		
Children (biological)	0	0.0	0	0.0	0	0.0		
Other relative	0	0.0	0	0.0	0	0.0		
Servant/employee	0	0.0	0	0.0	0	0.0		
Other non-relative	0	0.0	0	0.0	0	0.0		
Myself	4	22.2	4	23.5	8	22.9		
Not applicable	12	66.7	11	64.7	23	65.7		
Total	18	100.0	17	100.0	35	100.0		
Main decision-maker on v	vhat money	or item borro	wed from th	is Informal le	nder should b	e used for		
	Male	%	Female	%	Pooled	%		
Spouse/partner	2	11.1	4	20.0	6	15.8		
Parent-in-law	0	0.0	0	0.0	0	0.0		
Mother/father	0	0.0	0	0.0	0	0.0		
Brother/sister	0	0.0	0	0.0	0	0.0		
Grandparent	0	0.0	0	0.0	0	0.0		
Children (biological)	0	0.0	0	0.0	0	0.0		
Other relative	0	0.0	0	0.0	0	0.0		
Servant/employee	0	0.0	0	0.0	0	0.0		
Other non-relative	0	0.0	0	0.0	0	0.0		
Myself	4	22.2	6	30.0	10	26.3		
Not applicable	12	66.7	10	50.0	22	57.9		
Total	18	100.0	20	100.0	38	100.0		
Person responsible for rep	paying the m	noney or item	borrowed fr	om this Inforr	mal lender			
	Male	%	Female	%	Pooled	%		
Spouse/partner	1	5.9	3	16.7	4	11.4		
Parent-in-law	0	0.0	0	0.0	0	0.0		
Mother/father	0	0.0	0	0.0	0	0.0		
Brother/sister	0	0.0	0	0.0	0	0.0		
Grandparent	0	0.0	0	0.0	0	0.0		
Children (biological)	0	0.0	0	0.0	0	0.0		
Other relative	0	0.0	0	0.0	0	0.0		
Servant/employee	0	0.0	0	0.0	0	0.0		
Other non-relative	0	0.0	0	0.0	0	0.0		
Myself	4	23.5	5	27.7	9	25.7		
Not applicable	12	70.6	10	55.6	22	62.9		
Total	17	100.0	18	100.0	35	100.0		

Source: UofG field data, 2021

Decision-maker to borrow from friends or relatives most of the time							
	Male	%	Female	%	Pooled	%	
Spouse/partner	0	0.0	3	15.8	3	7.9	
Parent-in-law	0	0.0	0	0.0	0	0.0	
Mother/father	0	0.0	0	0.0	0	0.0	
Brother/sister	0	0.0	0	0.0	0	0.0	
Grandparent	0	0.0	0	0.0	0	0.0	
Children (biological)	0	0.0	1	5.3	1	2.6	
Other relative	0	0.0	0	0.0	0	0.0	
Servant/employee	0	0.0	0	0.0	0	0.0	
Other non-relative	0	0.0	0	0.0	0	0.0	
Myself	0	0.0	4	21.1	4	10.6	
Not applicable	19	100.0	11	57.8	30	78.9	
Total	19	100.0	19	100.0	38	100.0	
Decision-maker on what	money or ite	m borrowed f	rom Friends o	r relatives sho	ould be used for	or	
	Male	%	Female	%	Pooled	%	
Spouse/partner	0	0.0	3	15.8	3	7.9	
Parent-in-law	0	0.0	0	0.0	0	0.0	
Mother/father	0	0.0	0	0.0	0	0.0	
Brother/sister	0	0.0	0	0.0	0	0.0	
Grandparent	0	0.0	0	0.0	0	0.0	
Children (biological)	0	0.0	0	0.0	0	0.0	
Other relative	0	0.0	0	0.0	0	0.0	
Servant/employee	0	0.0	0	0.0	0	0.0	
Other non-relative	0	0.0	0	0.0	0	0.0	
Myself	0	0.0	5	26.3	5	13.2	
Not applicable	19	100.0	11	57.9	30	78.9	
Total	19	100.0	19	100.0	38	100.0	
Person responsible for re	paying the m	noney or item	borrowed fro	m Friends or r	elatives		
	Male	%	Female	%	Pooled	%	
Spouse/partner	0	0.0	3	15.8	3	7.9	
Parent-in-law	0	0.0	0	0.0	0	0.0	
Mother/father	0	0.0	0	0.0	0	0.0	
Brother/sister	0	0.0	0	0.0	0	0.0	
Grandparent	0	0.0	0	0.0	0	0.0	
Children (biological)	0	0.0	0	0.0	0	0.0	
Other relative	0	0.0	0	0.0	0	0.0	
Servant/employee	0	0.0	0	0.0	0	0.0	
Other non-relative	0	0.0	0	0.0	0	0.0	
Myself	0	0.0	5	26.3	5	13.2	
Not applicable	19	100.0	11	57.9	30	78.9	
Total	19	100.0	19	100.0	38	100.0	

Annex Table 22: Household decision-maker in borrowing and paying back loan Decision-maker to borrow from friends or relatives most of the time

# 6.4Research Papers Developed for the Sat4Farm Project

Abdu A, Gray B. 2020. Understanding Gender and Empowerment in Cocoa Farming Communities in the Brong Ahafo Region of Ghana: Baseline Qualitative and Quantitative Assessment. Grameen Foundation.

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Gray B, Gomez J, Arthur F, Rubio H. 2020. FarmGrow: Farm Investment Plans for Smallholder Cocoa Farmers in Ghana Midline Assessment. Grameen Foundation.

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Sarpong D, Osei-Asare Y, Gray B, Tsekpo E. 2020. FarmGrow: Farm Development Plans for Smallholder Cocoa Farmers in Ghana Baseline Report. Grameen Foundation and University of Ghana, Legon. <u>https://grameenfoundation.org/documents/FarmGrow-Baseline-Report-2182020.pdf</u>

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Maynard J, Neff J, Herrick J, Gray B, McCord M, Gatti G. 2020. Map to the Future (M2F): Integrating soil mapping into cocoa farm development plans in Ghana. Grameen Foundation. The Sustainability Innovation Lab at the University of Colorado, Boulder USA, United States Department of Agriculture (USDA), Agricultural Research Service.

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# **7.0 ENDNOTES**

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<sup>2</sup> Abdu A, Gray B. 2020. Understanding Gender and Empowerment in Cocoa Farming Communities in the Brong Ahafo Region of Ghana: Baseline Qualitative and Quantitative Assessment. Grameen Foundation <u>https://grameenfoundation.org/documents/FarmGrow-Gender Empowerment Cocoa-Farming-</u>

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