



**World Cocoa Foundation  
African Cocoa Initiative Phase II (ACI II)**

**Cooperative Agreement AID-OAA-A-16-00052**

**End of Project Report**

**September 1, 2016 – May 31, 2022**

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## Acronyms

ACBG	African Cocoa Breeders' Group
ACI II	African Cocoa Initiative Phase II
AOR	Agreement Officer's Representative
CCC	Conseil du Café-Cacao
CNRA	Centre National de Recherche Agronomique
COCOBOD	Ghana Cocoa Board
COP	Chief of Party
CRIG	Cocoa Research Institute of Ghana
CRIN	Cocoa Research Institute of Nigeria
DFS	Digital Financial Services
FMARD	Federal Ministry of Agriculture and Rural Development
FTF	Feed the Future
FTFMS	Feed the Future Monitoring System
GAP	Good Agricultural Practices
GDA	Global Development Alliance
GDI	Global Development Incubator
GIZ	German International Development Cooperation
ICRAF	World Agroforestry Centre
IITA	International Institute of Tropical Agriculture
IRAD	L'Institut de Recherche Agricole pour le Développement
ISF	Initiative for Smallholder Finance
MINADER	Ministry of Agriculture and Rural Development
PMP	Performance Management Plan
R&R	Rehabilitation and renovation
SNV	Netherlands International Development Organization
SPD	Seed Production Division of Ghana Cocoa Board
ToT	Training of Trainers
TWC	Technical Working Committee
USAID	United States Agency for International Development
USAID/BFS	United States Agency for International Development/Bureau for Food Security
USG	United States Government
VSLA	Village Savings and Loan Associations
WCF	World Cocoa Foundation
WCF/ACI	World Cocoa Foundation African Cocoa Initiative, the first phase of ACI II

## Glossary

### **African Cocoa Initiative Phase II (ACI II)**

In September 2016, USAID approved a global development alliance program, entitled the African Cocoa Initiative Phase II (ACI II) project, which was purposefully designed to be a direct support to the CocoaAction sustainability platform. ACI II focused on a limited number of high-value interventions to: 1) Increase production and use of quality cocoa planting material; 2) Facilitate an enabled ecosystem for financial services; 3) Improve access to Village Savings and Loan Associations in Côte d'Ivoire; and 4) Improve the flavor quality of cocoa in support of total farm productivity and resilient agri-food systems among smallholder cocoa farmers in West Africa.

### **Centre National de Recherche Agronomique (CNRA)**

Côte d'Ivoire's national research institute for agriculture including cocoa. Plays a strong role in cocoa productivity research and breeding. Involved as a national institute in the supply of improved planting material and the assessment of heat/drought tolerant planting material. CNRA hosts the second ACI II flavor laboratory.

### **CocoaAction (CA)**

CocoaAction was launched in 2014 as a voluntary industry-wide strategy that focused on aligning the world's leading cocoa and chocolate companies' sustainability priorities with those of the governments of Côte d'Ivoire and Ghana. CA's common action, coordinated activities, and investments with other key stakeholders, aimed to improve learning and knowledge management across the sector. CA ended in 2019.

### **Cocoa Research Institute of Ghana (CRIG)**

CRIG is the national cocoa research institute of Ghana and host organization for the first ACI flavor and sensory laboratory. CRIG has a strong role in cocoa productivity research and breeding; is an active member of the African Cocoa Breeders' Group (ACBG); and is involved in the supply of improved planting material to WCF member companies.

### **Cocoa Research Institute of Nigeria (CRIN)**

CRIN is the national cocoa research institute of Nigeria. CRIN plays a key role in cocoa productivity research and breeding and is active in the ACBG. CRIN hosts the third ACI II flavor laboratory.

### **Conseil du Café-Cacao (CCC)**

CCC is the National Regulatory Authority for the cocoa sector in Côte d'Ivoire. CCC is responsible for coordination and policy making, including seasonal price setting, farmer training, rural services, and sector performance. CCC works with ACI II as the government representative and partner.

### **Ghana Cocoa Board (COCOBOD)**

COCOBOD is the National Regulatory Authority for the cocoa sector in Ghana. COCOBOD is responsible for purchasing all cocoa destined for export. COCOBOD represents the Government of Ghana's interests under ACI II.

### **L'Institut de Recherche Agricole pour le Développement (IRAD)**

IRAD is the national research institute for agriculture in Cameroon, including cocoa. IRAD supports cocoa productivity research and breeding strategies. IRAD is a key member of the ACBG and facilitates the dissemination and delivery of improved cocoa planting material to end-users in Cameroon. IRAD hosts the fourth ACI II flavor laboratory.

### **Village Savings and Loan Associations (VSLA)**

A VSLA is a self-managed microfinance initiative that provides communities with access to savings, credit, and other capacity building services. Association members are self-selected and self-governed. They meet on a weekly basis to deposit their savings.

## Executive Summary

In September 2016, USAID approved a Global Development Alliance program, entitled the African Cocoa Initiative Phase II (ACI II) project implemented by the World Cocoa Foundation (WCF), designed as a direct support to the CocoaAction<sup>1</sup> sustainability platform. In June 2019, USAID amended the agreement for ACI II to include new activities on Village Savings and Loan Associations (VSLA) in Côte d'Ivoire and to extend the end date of the program from September 30, 2021, to May 31, 2022.

ACI II's objectives were: 1) increased production and use of quality cocoa planting material; 2) an enabled ecosystem for financial services; 3) VSLAs in Côte d'Ivoire; and 4) improved flavor quality of cocoa. All these actions support farm productivity and resilient agri-food systems among smallholder cocoa farmers in West Africa. Total funding for the project was USD 12M comprising USD 5M from USAID and USD 7M in-kind from WCF member companies.

**Under Objective 1, Increased Production and Use of Quality Cocoa Planting Material**, the Cocoa Research Institute of Ghana (CRIG) has identified four cocoa hybrids that are tolerant to heat and drought stress. This achievement, which is the result of multilocational trials, will enable the release of these productive cocoa hybrids to farmers in areas with high frequencies of drought. This development is timely given increasing concern over encroachment into forests for the establishment of new cocoa farms. Farmers can continue to produce cocoa in areas that are currently classified as marginal, due to heat and drought stress conditions, by planning the tolerant hybrids.

The Institute of Agricultural Research for Development (IRAD) in Cameroon trained 138 lead farmers, 12 technicians and 10 research students in cocoa grafting techniques to enable them to use clonal material from the community budwood gardens to create new farms. This complements the establishment of 120 clonal cocoa farm plots with associated community budwood gardens in farmers' fields. By these achievements, farmers are reaping the benefits of working with clonal planting material as opposed to hybrid seedlings.

In Côte d'Ivoire, *Centre National de Recherche Agronomique* (CNRA) has established a budwood garden to serve as a central repository for 71 potential heat and drought tolerant cocoa varieties identified in areas of high drought frequency. By March 2022, 50% of the 2,592 copies of the identified varieties have survived in the budwood garden, with some already flowering and producing pods within 24 months, an indication of both precocity and high yield. Also, CNR has demonstrated a 65% improvement in the production of seedpods by irrigating cocoa seed gardens. The improvement over non-irrigated plots is shown not only in the number of pods but also in the number and quality (bean weight and size) of beans per pod.

**For Objective 2, An Enabled Ecosystem for Financial Services**, WCF partnered with the Initiative for Smallholder Finance (ISF) to identify digital financial services as a point of entry for improved financial services to cocoa farmers and cocoa farming communities. Subsequently, WCF collaborated with the Better than Cash Alliance (BTCA) to investigate the "cost of cash", which showed a USD 21.4 million per annum loss to actors in the cocoa value chain in Ghana because of the reliance on cash transactions.

Finally, WCF commissioned a study to assess the cost of digitization in the cocoa value chain in Ghana. This study revealed significant (USD 11.5m) potential cost savings to the cocoa value chain in Ghana from the use of digital payments rather than cash. It also set out the key opportunities and advantages in shifting to digital payments throughout the supply chain. The study recommends concerted sensitization and education on digital financial services and improved cellular network infrastructure in cocoa producing areas among others. The findings from the study are informing industry wide digitization of payments in the cocoa supply chain, the Cocoa Management System (CMS), led by the Ghana Cocoa Board.

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<sup>1</sup> CocoaAction was launched in 2014 and implemented until 2019 as a voluntary industry wide strategy that focused on aligning the world's leading cocoa and chocolate companies' sustainability priorities with those of the governments of Côte d'Ivoire and Ghana. CA coordinated activities and investments with other key stakeholders and aimed to improve learning and knowledge management across the sector.

**For Objective 3, Village Savings and Loan Associations in Côte d'Ivoire**, 528 new VSLAs, against a target of 384, were set up with most registered members being women younger than 30 years. The expected groups have total membership of 14,452 (3,650 men and 10,802 women). Three hundred existing VSLAs were also linked to formal financial institutions, providing support to 6,902 members.

Combined, the 21,190 members of the 828 groups mobilized savings of USD 1.85 M, of which USD 1.04 M was granted as loans to 14,031 members. These funds were deployed for trading, cocoa and food crop production, livestock rearing and education among others, and enabled VSLA members to thrive at the height of the COVID-19 pandemic in 2020.

Additionally, 211 gender committees have been set up to promote gender notions and monitor gender activities in their target communities. The members of these committees—592 women and 304 men—have undertaken 3,337 couple's dialogue sessions. The modules completed during these couple's sessions are Gender Concept, Stereotypes, Communication, Female leadership, Power, Law and Politics, Gender-based violence, Family resource management, Parental responsibility, Family planning and children needs/rights.

**Under Objective 4, Improved Flavor Quality of Cocoa**, the Cocoa Health and Extension Division (CHED) of Ghana Cocoa Board (COCOBOD) has trained more than 120,000 farmers in harvest and post-harvest techniques for improved cocoa flavor quality. CHED conducted the trainings using cocoa liquor produced at the flavor laboratory at the Cocoa Research Institute of Ghana (CRIG). To expand this training capacity, COCOBOD has commenced construction of a new USD 350,000 flavor laboratory and training center at CRIG, with COCOBOD doubling WCF member Ezaki Glico/TCHO's initial investment of USD 170,000.

Following the establishment of laboratories and training of their flavor lab teams and sensory panels, Cameroon's IRAD, Côte d'Ivoire's CNRA, and Nigeria's CRIN undertook the harvest, fermentation, drying and preparation of liquor from their stock of hybrids and clones introduced to farmers over recent years. These liquor samples were distributed to WCF company flavor quality experts and used in three live regional tasting sessions, the last in April 2022 for all four labs to calibrate the in-country tasting panels.

With all four flavor laboratories (in Ghana, Cote d'Ivoire, Nigeria and Cameroon) fully functional and in operation, ACI II is ensuring sensory and flavor analysis capacity for more than 70% of the world's cocoa beans.

The **Table of Indicators** on page 3 contains ACI II achievements against USAID indicators for the life of the project. In all, ACI II supported 496,739 smallholder cocoa farmers across West Africa including 263,167 farmers who obtained and applied improved cocoa planting material and postharvest practices on 197,667 hectares of cocoa farms and 21,190 members of VSLAs, 81% of whom are women.

This report contains details of the activities undertaken and the achievement of ACI II project results for the life of the project from September 2016 to May 2022.

**Table of Indicators**

FTF Indicator Number	Indicator	Life of Project: FY2017-FY2022		
		Target	Achieved	% Achieved
EG.3.2-24	Number of individuals in the agriculture system who have applied improved management practices	120,000	263,167	263%
EG.3.2-25	Number of hectares under improved technologies or management practices with USG assistance	202,000	197,667	98%
EG.3.2-27	Value of agriculture-related financing accessed because of USG assistance	\$500,000	\$ 37,939	8% <sup>2</sup>
EG.3-10-11-12	Yield of targeted agricultural commodities among program participants with USG assistance	700 kg/ha	637.5 kg/ha	91%
EG.3-2	Number of individuals participating in USG food security programs	170,000	496,739	292%
EG.4.2-7	Number of individuals participating in USG-assisted group-based savings, micro-finance, or lending	20,925	21,190	101%
GNDR-2	Percentage of female participants in USG-assisted programs designed to increase access to productive economic resources	90%	81%	90%

<sup>2</sup> VSLA groups granted USD 1.04 M in loans to members out of USD 1.85 M mobilized savings. However, due to COVID-19 related restrictions and other more systemic challenges like limited penetration in rural areas, linkage to formal financial institutions was significantly curtailed resulting in even lower levels of lending from these institutions. This is why the achievement for this indicator is so low.

# Key Highlights

## AFRICAN COCOA INITIATIVE PHASE II (ACI II) RESULTS HIGHLIGHTS



OBJECTIVE  
**01**

### INCREASED PRODUCTION AND USE OF QUALITY COCOA PLANTING MATERIAL

The Cocoa Research Institute of Ghana (CRIG) has:

- Identified **4** cocoa hybrids that are tolerant to heat and drought stress

The Institute of Agricultural Research for Development (IRAD) in Cameroon:

- 138** Lead Farmers
- 22** Technicians and Research students
- 120** clonal cocoa farm plots and community budwood gardens established

Centre National de Recherche Agronomique (CNRA) in Côte d'Ivoire has:

Established central budwood garden for

**2,592**

copies of identified varieties survived in the budwood garden

**71**

Potential heat and drought tolerant cocoa varieties

**65%**

estimated improvement in seedpod production by irrigating cocoa seed gardens.

OBJECTIVE  
**02**

### AN ENABLED ECOSYSTEM FOR FINANCIAL SERVICES

Better than Cash Alliance (BTCA) "cost of cash" study, showed a USD **21.4m** per annum loss to actors in the cocoa value chain because of the reliance on cash transactions.

WCF study on the cost of digitization in the cocoa value chain revealed USD **11.5m** potential cost savings from the use of digital payments rather than cash.

OBJECTIVE  
**03**

### VILLAGE SAVINGS AND LOAN ASSOCIATIONS (VSLAs) IN CÔTE D'IVOIRE

**528** New VSLAs established

**384** TARGET

**14,452** Registered members

**3,650** Men

**10,802** most members are Women below 30yrs



**300** existing VSLAs linked to formal financial institutions, providing support to **6,902** members.

**21,190** members of **828** groups mobilised savings of USD **1.85m**



USD **1.04m** granted as loans to **14,031** members

OBJECTIVE  
**04**

### IMPROVED FLAVOR QUALITY OF COCOA

In-country institutions (CRIG, CNRA, IRAD, CRIN) have invested at least **\$3** for every **\$1** of USAID funds deployed for flavour labs.

Four flavor laboratories fully functional and in operation, ensuring sensory and flavor analysis capacity for more than **70%** of the world's cocoa beans.



CHED of COCOBOD has trained more than **120,000** farmers in harvest and post-harvest techniques for improved cocoa flavor quality.

COCOBOD constructing new USD **350,000** flavor laboratory and training center at CRIG, doubling WCF member, Ezaki Gilco/TCHO's initial investment of USD **170,000**

Flavor lab teams and sensory panels trained for Cameroon's IRAD, Côte d'Ivoire's CNRA, and Nigeria's CRIN.

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## Introduction

The United States Agency for International Development (USAID) issued the Cooperative Agreement AID-OAA-A-16-00052 for the African Cocoa Initiative (ACI) Phase II through its Global Development Alliance (GDA) mechanism, in concert with relevant government agencies in participating countries. The USD 12M program (USD 5M from USAID and USD 7M in cash and in-kind leverage from WCF members) was to run from October 2016 to September 2021.

In June 2019, USAID approved a modification to the GDA for ACI II to include a new activity on VSLA Schemes. This VSLA activity is in line with USAID’s Private Sector Engagement Policy and the Women’s Global Development and Prosperity Initiative (W-GDP). The modification extended the period of performance by eight (8) months from September 29, 2021, to May 31, 2022.

Focus countries are Cameroon, Côte d’Ivoire, Ghana, and Nigeria, with the bulk of the effort going to Côte d’Ivoire and Ghana as the focus countries of the CocoaAction strategy. ACI II follows the successful implementation of the first phase of the WCF African Cocoa Initiative (WCF/ACI) project, from 2011 to 2016. ACI II is aligned with the WCF vision of a sustainable and thriving cocoa sector, where farmers prosper, communities are empowered, and the planet is healthy. WCF is achieving this vision through a stronger “systems approach” that integrates the various individual actions and actors into a holistic framework to drive the change needed to reach our shared vision.

Initially, the program was strongly aligned with WCF’s CocoaAction framework. CocoaAction was a voluntary industry-wide strategy that focused on aligning the world’s leading cocoa and chocolate companies’ sustainability priorities with those of the governments of Côte d’Ivoire and Ghana, and other key stakeholders, for common action, coordinated activities and investments, and improved learning and knowledge management across the sector. CocoaAction ended in 2019.

ACI II’s goal was to sustainably increase cocoa productivity among smallholder farmers in West Africa. ACI II objectives were: 1) Increased production and use of quality cocoa planting material; 2) An enabled ecosystem for financial services; 3) Improving access to Village Savings and Loan Associations in Côte d’Ivoire; and 4) Improving the flavor quality of cocoa.



Figure 1: Updated ACI II Results Framework

## **Objective 1 – Increased Production and Use of Improved Cocoa Planting Material**

Over the years, cocoa breeding programs internationally, and in West Africa, have produced new cocoa clones and hybrids with varying levels of tolerance to the most significant biotic and abiotic stressors of the crop. These breeding efforts have focused on increasing the productivity of cocoa alongside the threat of pathogens and abiotic stressors. However, the progress made in breeding is not apparent at the farm level, partially because many improved varieties have yet to be approved for distribution to farmers. This contributes to persistently low and unpredictable yields, estimated at less than 500 kg/ha across West Africa, where 70% of the world's cocoa is produced. This low level of yields is also attributable in part to the limited application of good agricultural practices by farmers, and the aging tree stock, which is made up of old low-yielding and susceptible varieties.

Objective 1 helped to translate the gains and progress made in breeding programs to the cocoa farms. This was achieved through increased production of improved planting material but also the increased use of this material (in the form of hybrid seed pods, hybrid seedlings and clones) by farmers. WCF aggregated company requests for seed pods and seedlings to coordinate with the Seed Production (SPD) Division of COCOBOD in Ghana to ensure the distribution of improved planting material through company supply chains.

### **Outcome 1.1 Increased Production of Quality Planting Material Using New Genetic Material and Technologies**

#### **Mitigating the Effects of Heat and Drought Stress**

##### Ghana

Drought and heat stress have become one of the most important limitations to the successful establishment and productivity of cocoa plantations across cocoa growing regions in Ghana. This is predominantly attributed to the fast-changing climate. These effects are worsened by soils with very low water holding capacity arising from poor farming practices that are antagonistic to cocoa production. Water availability is crucial for the development of cocoa plants, impacting both the quantity and quality of yields. Under drought and heat stress conditions, cocoa seedlings experience a tipping point after which they are unable to recover, and some management practices may not have the expected results. Like other climate events, prolonged dry seasons can reduce the size of cocoa beans and lead to decreasing yield as the flower abortion rate rises and wilting occurs (Dohmen, et al., 2017).

Previously, to combat the problem of heat and drought stress, the Cocoa Research Institute of Ghana (CRIG) identified cocoa genetic groups (clones and hybrid varieties) that support high seedling survival in the field, early fruiting, and stable high yields of mature trees under relatively high incidence of soil water stress. These studies were generally of a localized nature because they lacked replication over a wider region of the cocoa belt most affected by frequent droughts. As genotype-environment interaction is universal in crop growth and yield assessments, it remained unclear whether these hybrids developed and identified by CRIG would exhibit the same potential when cultivated under drought prevalence conditions in the cocoa growing regions of Ghana. Therefore, WCF provided funding that enabled CRIG to identify and select cocoa hybrids varieties tolerant to heat and drought. The resulting selected planting material was used by farmers to establish trial plots in areas (Afosu, Akomadan, Maabang, Tafo and Tepa) with high frequency of drought.

The rationale for these trials is that previously developed hybrid varieties with high yield in favorable environments might carry growth and yield penalties when cultivated in high-drought areas; specific varieties developed with tolerance to drought are needed in such areas. This rationale is because varieties currently recommended in the seed gardens were developed through testing in a range of favorable soil and climatic

conditions. Current varieties are therefore more adapted to favorable growing areas, accounting for the large losses of seedlings whenever plantings are subjected to extended periods of post-rainy season water stress, particularly in the first two years of crop establishment. Moreover, the rapidly changing climate requires that hybrids are well tested for target environments beyond the primary ecologies within which they were developed. Such testing, even in the absence of variety-environment interaction, affords greater precision in rating varietal performance due to increased replication.

CRIG's trials, under ACI II, on the selection of cocoa varieties with high levels of tolerance to soil water and heat stress span a period of four years. Activities began in September 2018 with the following specific objectives:

- To ascertain the relative growth rates, survival, precocity, and yield of new and existing cocoa hybrids during the first 36 months after planting in areas with high frequency of drought stress.
- To determine the level of genotype x environment interaction of selected cocoa hybrids tested at six benchmark sites for growth and yield traits.
- To validate physiological traits known to contribute to plant survival and yield in the field under conditions of soil water stress and high ambient temperatures.

### Côte d'Ivoire

Between 2014 and 2017, droughts lasted three to six consecutive months in the main production areas in Côte d'Ivoire affecting yields, bean quality and the establishment of new cocoa farms. Consequently, CNRA and the government of Côte d'Ivoire prioritized heat and drought tolerant cocoa varieties. Earlier, from 2010 to 2014, CNRA had established pilot plots to evaluate the behavior of about 20 hybrids in drought conditions. WCF, under ACI II, supported CNRA to build on this work to confirm the heat/drought tolerance of these hybrids planted in different agroecological zones. In the long term, by establishing budwood gardens to host the identified heat/drought tolerant material, the project has improved cocoa farmers' access to heat and drought tolerant hybrids and clones that have good levels of productivity. As a result, WCF anticipates that the first generation of heat/drought tolerant planting materials will be made available to farmers when the ban on planting material production and distribution in Côte d'Ivoire is lifted. This work complemented a concurrent CFC/ICCO/Biodiversity project to define the parameters for heat and drought tolerance for cocoa by collecting and analyzing data from old cocoa farms in different marginal areas of the country.

Environmental factors and persistent droughts have increased the importance of irrigation in the production of cocoa as more intensive production areas have become unproductive. This is more pronounced in seed gardens that supply planting materials in the form of hybrid seed pods, from which farmers establish new farms or replace old or diseased trees. However, because of the substantial cost involved in the installation and maintenance of irrigation infrastructure, a clear business case must be made to justify the costs. To make this case, WCF supported CNRA to document the impact of irrigation on seed pod production in seed gardens at CNRA stations at Divo and Soubré. The irrigation system was established by the Ivorian government in two of the seed gardens established during the first phase of ACI between 2014 and 2016.

Under ACI II, the observation compared irrigated and non-irrigated seed gardens in three fields of the same age growing under similar conditions over a 40-month (2018 to 2022) period to document the impact of irrigation on the quantity and quality of seed pod produced in these seed gardens. Parameters under consideration included the number of pods formed after pollination, the number of matured pods and the quality of beans in matured pods. At the Divo station, the comparison is between 300 irrigated trees and 300 non-irrigated trees all planted in 2014. At Soubré, the comparison is between 300 irrigated trees and 300 non-irrigated trees planted in 2014, and 480 irrigated trees and 520 non-irrigated trees planted in 2019.

**The anticipated outcome of the activities in the two countries is the availability of identified heat and drought tolerant cocoa planting material for distribution to farmers in areas of high drought frequency**

**as well as for transfer to, and incorporation into, the national breeding programs of ACI II implementing countries.**

### **CocoaTarget – Citizen Science**

In collaboration with the Alliance of Bioversity and CIAT, ACI II through WCF coordinated the implementation of CocoaTarget in Ghana. That project gave farmers the opportunity to participate in the selection of climate adapted planting material using the Tricot<sup>3</sup> method, a public-private-civil society partnership approach to cocoa variety testing (where farmers select the best performing planting material based on performance on their farms). In the project, WCF and Bioversity worked with farmers to test cocoa hybrids and clones for climate adaptation in a gradient of agro-ecological zones in Ghana. WCF, Bioversity and partners designed appropriate dissemination and scaling mechanisms by supporting inclusive business development to ensure the delivery of diverse and adapted genetic materials of cocoa addressing the specific demands of farmers.

The implementing partners were funded by the Dutch government, and included CRIG, and Kookoo Pa, a farmer cooperative. The project complemented other ACI II activities that supported business development in the management of professional nurseries to produce quality cocoa seedlings, as well as adding value to the production system of cocoa through intercropping and diversification at the farm level. The consortium composed of WCF, Bioversity International, CRIG, and Kookoo Pa provided opportunities for collaboration, mutual learning and information exchange across platforms and research programs.

The collaboration sought to achieve:

- New knowledge about how to implement farmer citizen science trials focused on cocoa in Ghana, including validated protocols and concrete experiences, with relevance to other countries and regions and other perennial species, and which may be scaled.
- Increased capacity of national partners to design, execute and analyze citizen science trials using the tricot approach, including the climatic analysis of trial data.
- New knowledge about the influence of climate-induced stress variables on the establishment and early growth of cocoa seedlings under farmer conditions and genotype-specific responses, enabling the identification of adapted improved planting material.
- Establishment of a network of farmer citizen scientists who may contribute to cocoa observational and experimental research in the long-term, including the long-term monitoring of the hybrids and clones present on their farms.
- Increased capacity of women and youth to manage nurseries and budwood gardens, to produce and distribute climatically adapted, stress-tolerant hybrids and clones, ensuring constant varietal renewal depending on the emerging needs of farmers and the findings on climate adaptation from on-farm testing.
- Shared this knowledge and research results in the uptake through stakeholder platforms established at the farmer community and national levels.

## **Key Achievement and Milestones**

### **Mitigating the Effects of Heat and Drought Stress**

#### Ghana

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<sup>3</sup> Triadic Comparisons of Technologies (tricot) is a new approach to test crop varieties and other technologies on-farm, under realistic conditions. Tricot is a ready-made methodology for the dissemination of varieties and other technologies and practices in highly variable areas. Through simple and hands-on experimentation, the participating farmers identify innovations that will be of real benefit to them.

CRIG evaluated twenty-seven (27) specific hybrids, including two seed garden types, at six sites measuring 2.2 ha each. The sites are Akim Tafo, Akomadan, Afosu, Mabang, and two farmer's sites Owuobegya Whan and Mensakrom. The evaluated hybrids were generated through manual pollinations of clones previously certified as true to type. These clones, developed during WCF/ACI, were selected from those that have shown good combining ability for seedling survival under abiotic conditions considered marginal for cocoa. Each location has a minimum of 3,000 seedlings per cocoa hybrid variety. Land preparation was completed and temporal shade with plantain and Gliricidia established in 2018, with the transfer of the cocoa plants to the field between May and July 2019. CRIG acquired basic equipment for monitoring soil moisture and crop response with the support of ACI II. This equipment, which includes a soil moisture probe with 120 access tubes, a chlorophyll meter, and a chlorophyll fluorimeter were installed in April 2020 after the plants had experienced the first major dry spell.

Across the parameters responsible for establishment (growth rate based on stem diameter increment and percentage survival) and precocity (flowering intensity and number of pods), seven of the 27 test hybrids performed much better than the others at all locations. In addition, the results show a considerable variation for all the studied traits, suggesting that selection among hybrids for the various locations is possible.

The set of data collected for FY2022 from the CRIG trial sites further confirmed previous results reported in 2019, 2020 and 2021. The results showed clear differences in stem diameter and early establishment between the various hybrids as well as the correlation between the flower intensity and the pod number. Hybrid varieties with higher flower intensity had a greater number of pods per tree. The results also indicated that hybrid varieties with the lowest percentage survival were among those with the smallest stem diameter and vice versa.

The strong correlation between survival and stem diameter indicates that the fast-growing hybrid varieties gave a higher number of surviving plants. The vigorous hybrid varieties had higher establishment success. The number of pods per tree also correlated strongly with stem diameter and flowering intensity. This implies that both stem diameter and flowering intensity in the early stage could be a better indicator for determining bean yield in later years as indicated in other studies (Glendinning, 1960; Padi et al., 2012; Ofori et al., 2015). The identified hybrid varieties could be used as planting materials in areas with high water stress environments.

A comprehensive yield performance and analysis of bean quality will be instrumental to provide information on the yield and quality of beans of these potentially identified hybrid varieties under resilient drought conditions or environment before recommending some of these varieties to farmers for planting in areas with high frequency of drought. In addition, the analysis of these potentially identified hybrid varieties should include a farmer survey to ascertain the adoption of these varieties by farmers.

#### Côte d'Ivoire

CNRA undertook maintenance activities and planting operations to improve the density of the budwood garden on all six established plots at Soubré. By March 2022 there were 2,592 plants, with an average survival rate of 50%. It is worth noting that most of the cloned plants showed signs of early flowering, indicating there is a possibility of finding potentially drought resistant cloned plants with superior productive characteristics. The table 1 below summarizes the status of plantings in the budwood garden at Soubré.

Table 1: Status of replaced plants of budwood garden for heat/drought tolerant clones

Blocks	Number of Plants	Number of Surviving Plants	Average Survival Rate
1	360	277	76.94%
2	360	214	59.44%
3	360	259	71.94%
4	360	234	65.00%
5	576	115	19.97%
6	576	195	33.85%
<b>Total</b>	<b>2,592</b>	<b>1,294</b>	<b>49.92%</b>

The third full year of observation of the impact of irrigation on seed pod production in seed gardens was concluded by CNRA concluded in March 2022. This third set of results from the observation, as presented in Table 2, continues to show clear differences in all bean quality parameters (pod size, number of normal beans per pod and average bean weight) for 500 pods harvested from irrigated and non-irrigated plots.

Table 2: Results of observations of the impact of irrigation after harvesting at Divo and Soubré

Plot Type	Divo				Soubré			
	Number of Pods	Pod Size (mm <sup>3</sup> )	Beans per Pod	Bean weight (g)	Number of Pods	Pod Size (mm <sup>3</sup> )	Beans per Pod	Bean weight (g)
<b>Irrigated</b>	228	683	43	1.40	289	540	36	1.30
<b>Non-irrigated</b>	189	608	41	1.20	239	413	29	1.00

The results obtained in Table 2 illustrate the positive impact of irrigation on pod size, number of beans and bean weight compared to non-irrigated plots at Divo and Soubré. The results confirm previously collected data and point to the fact that irrigation improves both pod production and the quality of beans. The gain from irrigation is estimated at approximately 65% based on the comparison between irrigated and non-irrigated plots.

### CocoaTarget – Citizen Science

The citizens science field activity implementation started in late 2019 following disbursement of the first batch of funding for the project and the arrival of a post-doctoral fellow in Ghana to coordinate field data collection. WCF coordinated field activity implementation in addition to convening review and knowledge sharing meetings. Field implementing partners selected farmers and implemented activities in all 20 target communities and established nurseries for both cocoa and food crops. Given the choice between eggplant, okra and pepper, farmers overwhelmingly selected pepper for the tricot trial. Accordingly, seedlings for three varieties of pepper were distributed to the farmers in June 2020.

### District Learning Platforms

At the first district learning platform event held in February 2021 in the Ashanti Region of Ghana, farmers shared lessons on planting material, including farmers' perceptions, challenges, opportunities, and innovations.

Outcomes from the event were:

- The use of weedicides is not recommended as it kills most of the crops and plants, thereby reducing farmers access to planting materials.
- Farmers within the Districts preferred hybrid cocoa seedlings to the Tetteh Quarshie (Amazonia) due to its early fruiting.
- Farmers preferred cocoa pods (seeds) as compared to the nursery seedlings due to the inability of seedlings to survive.
- Smallholder farmers sought farming advice and information from colleague farmers, the ministry of Food and Agriculture (MOFA), non-governmental organizations and from their personal farming experiences.
- Farmers within the districts provided shade for their cocoa seedlings to withstand the heat from the sun, usually using plantain.

- Women were involved in various innovations to influence the survival of their crops such as peeling plantain suckers to control pest and diseases.
- Farmers within the district are surviving amid climate change through diverse small-scale innovations.

At the second district learning platform event held in June 2021 in the Ashanti Region of Ghana, farmers shared lessons on crop and tree nurseries, and how to explore opportunities for rural women and youth.

- All beneficiary communities were conversant with their own private nurseries, and commercial nurseries within reach.
- Individual nurseries were mainly for vegetables and cocoa, while commercial nurseries were for cocoa and other cash crops like oil palm.
- Farmers' source of cocoa seeds/seedlings were mainly from the government, LBCs, Kokoo Pa, commercial nurseries, and old farms.
- The need to use seeds or seedlings depends on the crop, soil type, weather conditions, time of planting, and the farmer's choice.
- Most crop seeds/seedlings were available in the community or nearby communities except tree crop seeds/seedlings.
- There was an opportunity with outside seedlings sellers, but variety cannot be trusted and there is high mortality.
- Women were the highest "innovators" during the data collection exercise.
- Women in the target communities made an appeal to government officials present to help them establish community nurseries which would be closer than the centralized nurseries.
- There was a minimal record of youth participating in any agricultural work in these communities; the youth of these communities were not interested because they do not have the patience to wait for a few years to make money off any agriculture activities.
- Women dominated the number of participants present at the learning platform event. It was mentioned that the job of establishing nurseries was considered more suited to women while the men focused on other sources of income for their livelihood.

#### National learning Platforms

A national learning platform event in March 2021, which was organized virtually, brought together farmers, researchers, private sector, and public institutions at the national level to discuss challenges and proposed solutions in the seed production system. The theme for this event was "Cocoa planting materials: from common challenges towards joint solutions".

These were a few of the recommendations:

- Bring nurseries closer to farmers.
- More seed gardens would increase total seed availability.
- Community nurseries should get free pods and basic inputs (e.g., polybags, farm tools, watering can etc.). Seedlings should be distributed for free.
- Increase the propagation, availability, and access to temporary shade crops before the transfer of the cocoa seedlings to the field. Steps to improve extension service delivery include providing farmers with the appropriate information on the agronomic calendar for the field establishment of cocoa seedlings, and establishing shade tree crops, trainings, and sensitization on temporary shade establishment before cocoa seedlings are planted.
- Combine cocoa seed nurseries with shade tree nurseries to be part of the distribution package. Farmers should have exclusive rights to shade tree crops. Establish decentralized, compatible shade tree nurseries at the community/rural level for distribution.
- Forestry Commission – The registration of permanent shade trees to give farmers the exclusive right to own shade trees and communities to designate areas to cultivate trees for firewood without harming the environment.
- Encourage more trees species that can be used as a barrier crop/plant against mealybug vector of CSSVD.

The second national learning platform event in February 2022 was on the theme: “Putting nurseries to work for smallholder cocoa farmers in Ghana.”

These are a few of the recommendations:

- Nurseries should be established close to the farming community to improve supervision and reduce transportation costs.
- Digging wells and boreholes closer to the community is a better solution than establishing the nursery close to streams or rivers, which are the main water sources.
- The cost of digging wells could be lower than the spending on transport to and from the nursery established on the banks of streams and rivers.
- Access to resources should be spearheaded by organizations; the price for digging wells should be negotiated by organizations so that farmer groups are not exploited because this is more cost effective.
- Relying on local labor is cost effective; groups of age 45-50 who are residents of the community, who can mobilize themselves and support each other.
- Setting up nurseries the right way can provide opportunities for youth to get involved in cocoa farming.

#### Field Training: Farmers’ Ability to Determine Yield Through Weighing Exercise

This exercise determined the ability of farmers to accurately quantify yields through weighing and visual estimations. The aim of the study is to assist researchers in planning future on-farm participatory research where farmers play an active role in data measurement and collection.

This exercise was conducted in six communities - Addaikrom, Abofrem, Kojofuordjorkrom, Kojokrom, Bopa and Ntom. A total of 50 farmers were used in conducting this research. The exercise was conducted by using cocoa and maize to determine the yield estimations. Farmers were required to provide demographic information in the study questionnaires. Information volunteered by farmers was treated by researchers as confidential and anonymous and not linked to members of households.

The outcome from the research revealed the following:

- Most farmers had little or no education and could not read or write, making it difficult for them to communicate figures on the scale. They did so by visual expression and pointing at the numbers they thought were right.
- Farmers had little or no training in the use of the butcher’s scale and the cocoa digital scale.
- Most farmers do not join farmers school or trainings organized by cooperatives and government institutions due to lack of interest and the unattractiveness of the trainings, which have become repetitive over time.
- Farmers indicated that the trainings always benefited the few who have strong ties with their leads in the communities. Therefore, they did not feel inclined to participate in events where resources were always distributed to the people closest to leadership.

The CocoaTarget activity helped farmers to systematically select the best performing material from their farms, while helping them learn and apply the best agricultural practices not only for cocoa but for associated crops like vegetables and economic tree species. More importantly, the activity provided the opportunity for stakeholders (CRIG, SPD, CHED and other COCOBOD subsidiaries) to learn from farmers what works in the field. Specifically, inclusive nurseries, which underpin the distribution of seedlings, will require a change in social and gender norms to overcome these challenges. That includes women’s access to suitable land close to water sources, redistribution of household tasks to others, less restrictions on women’s mobility, and improved access to financial capital.

### **Outcome 1.2 Increased adoption and use of improved planting material**

High performance planting material is the cornerstone of a sustainable cocoa economy. Cocoa competes with other crops for suitable land and labor, and the sector must ensure that farmers have good access to good cocoa

planting materials as part of a packaged measure to increase productivity and thereby improve the overall economy of their farms.

Quality seed is among the most important production resources that greatly influence agricultural productivity. Despite productivity gains of 50% recorded among farmers that have fully adopted hybrid cocoa as planting materials, access remains difficult and sometimes non-existent (IITA/STCP 2003). Lack of access to improved planting materials has compromised yields of cocoa (Aikpokpodion and Adeogun 2011).

The noticeable decline in output from cocoa producing regions with aging, diseased and moribund cocoa farms means that it is high time to make a substantial effort in the development and supply of better planting materials (true to type hybrid planting material) for farmers as part of the overall effort to improve the sustainability of cocoa production.

Increased use of better planting materials lies at the heart of not only keeping pace with the increasing demand of cocoa but also the drive to make cocoa more sustainable. Better varieties of cocoa with improved yields and ability to resist attack from pest and disease would enable a reduced overall environmental footprint for cocoa production, reduced deforestation, and allow other tree crops to be grown in the same growing areas. A major obstacle in achieving this higher producing, more sustainable objective in cocoa production is the supply of significant volumes of improved (hybrid) planting materials to farmers. (Gomes et al., 2015)

The use of farmer produced cocoa seeds has also in part affected yields due to poor inherent genetic and physical qualities of the seeds and susceptibility of such landraces to severe pests and disease infestation (Asare et al. 2016).

An assessment conducted by (Asare et al. 2010) on the production of hybrid cocoa seeds in Ghana showed that there is a shortfall in production even though there is no scientific mechanism in place to determine farmer demand. This is further heightened by the seasonal time gaps from production through harvesting to distribution, making it difficult for farmers to access quality seeds for planting at the right time of the year.

### **Production and distribution of improved seed pods**

In Ghana, hybrid seed pods are produced and distributed to WCF member organizations by the Seed Production Division (SPD), a pre-harvest Division of Ghana Cocoa Board. To achieve this mission, SPD has established seed gardens across the cocoa growing regions of the country. Currently, Seed Gardens continue to serve as the main source of genetically improved seeds with the potential to yield better, tolerate CSSVD, mature early and establish well in the field. SPD Cocoa Stations therefore continue to play the role of a sole producer and distributor of hybrid cocoa seed pods to WCF member organizations. SPD has 27 cocoa stations located strategically in all cocoa growing regions.

During the first phase of ACI, in collaboration with COCOBOD, WCF provided support for the establishment of 50 ha of seed gardens, (5 ha each at 9 cocoa stations) and 10 ha of budwood garden (1ha each at 10 cocoa stations) within the period of 2013 to 2015. The objective of these seed gardens (located at Bunso in the Eastern Region, Fumso, and Akomadan in the Ashanti Region, Buako, Sankore, Goaso and Wamfie- Western North, Bono, and Ahafo Region respectively, Assin Foso in the Central Region, and Saviefe in the Volta Region) was to facilitate the availability and enhance the accessibility of hybrid cocoa seed pods to farmers. Under ACI II, WCF leveraged the investment in the establishment of these seed gardens to ensure the supply of hybrid cocoa seed pods to member companies to raise cocoa seedlings for farmers.

### **Assessing Seed Garden Capacity - Ghana**

Regarding the cocoa seed pod distribution, the distance to SPD stations remains one of the main challenges for companies, especially when they cannot obtain the full quota of allocated pods after driving long distances for collection. Prolonged drought related conditions have compounded this challenge, which could explain the reduction in the supply of pods that companies had requested at reporting time. It is expected that this development will have knock-on adverse effects for the distribution of improved hybrid cocoa seedlings to farmers in the second half of FY2022.

The last assessment since the establishment of the seed gardens under the first phase of ACI II was in 2016. Because the supply of hybrid cocoa seed pod over the past cocoa seasons to member companies could not meet the demand, there was a need to assess the production performance of the seed gardens against the established capacity. The assessment, conducted in February 2022, enabled WCF to understand the challenges and coordinate member companies' input to provide the necessary mitigation measures to address them.

### Assessing Planting Material Capacity - Nigeria

During the implementation of the first phase of ACI between 2013 and 2016, WCF supported the establishment of 15 ha seed gardens and 10 ha of bud-wood gardens in Nigeria, which began producing seed pods in 2018. This was part of the strategy to enhance capacity in the cocoa sector among national institutions and address specific gaps in cocoa productivity improvements, including the provision of better planting materials.

The general objective of the task, undertaken in 2019, was to assess the status of the seed gardens and bud-wood gardens established under ACI I, as well as the existing stock of seed and bud-wood gardens. The goal was to determine how much planting material WCF member companies could access from these facilities to support their sustainability programs.

Specific tasks:

- Review status of seed and bud-wood gardens with members of the cocoa breeding team at CRIN;
- Undertake field verification visits to the various seed and bud-wood garden sites to ascertain the actual status of the seed and bud-wood gardens firsthand;
- Confirm planting material needs for Cocoa Livelihoods Program (CLP) matching grantee – Tulip Cocoa in the context of the surrounding communities/State;
- Make detailed cost estimates for the establishment of nurseries and seed gardens to support sustainability; and
- Make recommendations to match planting material availability with farmers' anticipated needs

### Introducing clonal planting materials to farmers

In Cameroon, WCF supported IRAD to introduce clonal material to farmers. This involved the transfer of previously developed clonal varieties under WCF/ACI to farmers' fields and the training of the beneficiary farmers in the appropriate methods and technique for the handling, propagation, production, and maintenance of clonal planting material. This activity is also equipping beneficiary farmers and field technicians with the tools (community budwood gardens and tools for grafting) and skills (training on establishment and management of budwood gardens and farms) to successfully produce, distribute, and use clonal planting material in farm conditions. Activities took advantage of existing capacity that WCF member company sustainability programs have built at the farm level over the years.

## Key Achievements and Milestones

### Production and distribution of improved seed pods in Ghana

In the 2018/2019 cocoa season, companies requested 656,272 hybrid cocoa seed pods. Of this, they received 291,283 improved hybrid cocoa seed pods from SPD. From these pods, companies raised and distributed almost 7 million seedlings which helped about 38,227 (11,272 women) farmers in 1,392 communities to plant an estimated 6170.78 hectares of farmland. Table 3 below summarizes the utilization of pods distributed to member companies to raise seedlings for farmers.

Table 3: Utilization of Cocoa Seed Pods in Ghana

Parameters	2019	2020	2021
Number of pods requested	656,782	706,762	846,607
Total quantity of pods received from SPD stations	291,283	272,152	316,695
Number of beneficiary communities	1,362	830	1,741
Number of beneficiary farmers	38,229	22,215	53,836

How many of the beneficiary farmers were females?	11,272	6,843	17,829
Total number of seedlings raised	7,307,595	3,359,358	7,607,680
Total number of seedlings distributed to farmers	6,855,745	3,456,774	6,802,755
Total Hectares Planted	6,171	2,947	5,942

In the 2019/2020 cocoa season, WCF supported the distribution of 272,152 improved hybrid cocoa seed pods from SPD. Companies raised and distributed more than 3.3 million seedlings. These seedlings helped 22,215 (including 6,843 women) farmers in at least 424 communities to plant 2,947 hectares of farmland. The reduction in the distribution of seedlings in the 2019/2020 was due to the impact of Covid-19 because of the restriction on movement.

The allocation and distribution of pods was remarkably improved in the 2020/2021 cocoa season (from the 272,125 pods distributed in the 2019/20 season) because of the improved allocation and improved distribution mechanism of pods from SPD stations to member companies and the relaxed Covid travel restrictions. Member companies were notified earlier of their allocations and availability of cocoa seed at the designated SPD stations in their operational areas/districts. This enhanced the on time pick-up and distribution of pods. Companies received 316,695 of the improved hybrid cocoa seed pods from SPD. From these pods, companies raised and distributed almost 7 million seedlings, which helped about 53,836 (17,829 women) farmers in 1,741 communities to plant an estimated 5,942.9 hectares of farmland.

The distribution of improved planting material and the associated training in nursery management, combined with other good agricultural practices, helped more than 50,000 farmers in the 2020/2021 cocoa season replace their ageing tree stock and established new farms with high yielding varieties.

### Assessing Seed Garden Capacity - Ghana

In February 2022 an assessment of the seed garden was carried out to ascertain and verify the operation and performance of the seed gardens established with the support of WCF. The selected sites for the assessment were CRIG, New Tafo and Bunso in the Eastern Region, Buako in Western North, Sankore in Ahafo Region, Fumso in Ashanti Region and Assin Foso in the Central Region.

Below is the status of the seed gardens assessed:

- All the seed gardens were fully established in 2014 with planting density 1,100 per ha and a land size of 5 ha. A one-hectare budwood was also established in addition to the seed garden for the multiplication of clones.
- All seed gardens were in operation and utilized purposefully to produce cocoa seed pods.
- Some of the cocoa trees were well established with overhead shade trees (*Gliricidia* and other tree species) at recommended planting distances in some sections of the sites, while at some sites the cocoa trees were poorly established. This was attributed to uneven rainfall patterns and prolonged drought conditions affecting field establishment. This affected flowering and pod formation (yield). Hence, some trees bared none and/ or very few pods.
- Inadequate maintenance of the seed garden in terms of pruning was observed at some sites (Sankore, Bunso and Assin Foso). However, weed management and pest control were satisfactory.
- In all of the seed gardens, pollination of flowers and harvesting of the seed pods commenced in 2018 with an average production between 5,000 pods per ha (at the Bunso seed garden) and 15,000 pods per ha (at the CRIG seed garden). This indicates a significant gap in production that requires immediate redress.
- In all of the seed gardens, the last harvesting was done within the period of September 2021 and the last pollination was done in December 2021, with pods projected to be harvested within the period of March and April 2022.

The assessment concluded that the seed gardens are producing below capacity because of the uneven rainfall pattern and the resilient drought conditions, leading to deficiencies in flowering and pod formation, which greatly reduce production.

There were general challenges with the management of the older plots at the seed gardens at the SPD stations that include: aged trees, dwindling land area for seed gardens, poor staff incentives, labor, encroachment of acquired land by communities, inadequate funding from government, lack of basic equipment and infrastructure and over-reliance on rainfall for production.

### **Assessing Seed Garden Capacity - Nigeria**

WCF/ACI supported the establishment of 15 hectares of seed gardens and 10 hectares of budwood gardens in Nigeria. The underlying concept of this program was to safeguard and secure these elite materials at CRIN and Ondo Tree Crops Unit to preserve the unique characteristics and traits intrinsic to the Nigerian origin for chocolate manufacturers to source for their recipe.

Under ACI II, an assessment of these seed gardens was carried out. From the findings, all sites had been properly selected, delineated and planted with plantain shade crops. Planting of budded and grafted cocoa rootstocks was done on all sites except CRIN Ajassor, Ondo State Tree Crops Unit sites at Owena and Ile-Oluji. However, there was a significant loss of budded/grafted clones due to death of scions, massive take over by rootstocks and limited post-planting management and field maintenance.

Analysis of available data showed that CRIN has an average total production capacity of 190,228 pods (with a range of 135,568 to 227,626 pods) annually from all four CRIN stations, including the Ibadan headquarters. It was estimated that CRIN can support the production of 5.7 to 6.7 million seedlings to plant up to 5,560 hectares of cocoa plantation annually. In addition, the Ondo State Tree Crops Unit has the capacity to produce about 10 million seedlings from seed gardens to plant an estimated 8,500 hectares annually.

In summary, it is possible to produce enough hybrid pods to plant more than 15,000 hectares annually in Nigeria. However, current demand of 15 million for hybrid seeds of newly released CRIN Tc 1–8 far outstrips the ability to produce adequate numbers of seed pods, which makes the expansion of seed garden capacity imperative in Nigeria.

In view of the observations made on the field, the following actions were recommended to remedy the situation:

#### **1. Nursery activities:**

- The vegetative propagation methods used in the nursery should be reviewed. Of the two methods currently used, only budding is recommended for seed and budwood garden establishment. In addition, CRIN may introduce rooted cuttings;
- The top-grafting method should be discontinued henceforth for seed garden establishment and germplasm conservation efforts; and
- As part of the routine in budding, the rootstock shoot should be decapitated once the scion union has been successfully established and produced a good number of matured leaves for self-sustenance. This will allow the scion to be fully established and prevent competition from the main rootstock shoot.

#### **2. Field activities:**

- All surviving planted rootstocks should be closely evaluated for the survival or death of the scion of budded clones to ascertain the integrity of surviving stands.
- All surviving stands that are rootstocks and therefore off-type should be removed immediately. This will keep the field clean of unintended materials when the field will be re-established with selected clones; and
- As much as possible, field maintenance by CRIN management should be encouraged. Given the closure of the project, all seed and budwood garden locations should be properly handed over to CRIN for continued management if not already done so.

### 3. Project funding support:

- Given the increasing demand for planting material to support WCF member companies and national institutions, there is the need to have a clear management plan and strategy with CRIN or to push for investment and effort to support private seed gardens rather than the national seed gardens.

### Introducing clonal planting materials to farmers

IRAD completed a full range of activities for clonal propagation of improved cocoa varieties and distribution to farmers in FY2021. These activities include production and propagation of shade trees, vegetative propagation of cocoa trees for budwood garden establishment and introduction of cocoa clonal varieties to selected farmers. As of May 31, 2022, 120 plots of 0.25 hectares each were successfully established and maintained within two of the target communities of Mbangasud and Ntsama. Each established plot includes hybrid cocoa seedlings, temporary and permanent shade trees and grafted plants established for budwood gardens. Table 4 provides a summary of the status of activities as of May 31, 2022.

Table 4: Summary of activities for introduction of cocoa clonal planting material to farmers in Cameroon

Component	Activity	Specific Tasks	Major Achievements
<b>Capacity building for introduction of clonal planting material to farmers</b>	Selection and training of technicians and members of farmers organizations	Build the capacity of IRAD and the members of the selected farmers organizations	-10 trained cocoa technicians fully operational at the IRAD training center. -100 trained farmers from the 2 cooperatives.
<b>Establishment of budwood gardens for introducing clonal material to farmers</b>	1. Multiplication of IRAD best clones to create budwood garden	Budding Grafting	Three budwood gardens with IRAD's elite clones
	2. Establishment of central budwood garden for clonal material at IRAD Nkolbisson and one in each of the target communities.	- Clone production - Land Preparation - Establish temporary shade (plantain) - Establish cocoa clones	
<b>Selection and support to farmers for the introduction of clonal planting material</b>	1. Selection of farmer groups for participation in clonal trials	Meetings with farmers groups	120 farmers selected within two farmers organizations of the Barry Callebaut's network: MBAGASSUD and Ets NTSAMA
	2. Establishment of shade on-farm sites using recommended agroforestry tree species	Produce rootstocks Grafting	-More than 2,000 plants of agroforestry tree species distributed to farmers in 2021. -8,000 plantain PIF plantlets delivered to farmers to serve as temporal shade.
	3. Establishment of farms for selected farmers using clonal material	Planting of clonal material	120 on-farms plots of 0.25ha each successfully established in both sites.

### Challenges

Specific to the seed gardens established with support from WCF/ ACI, the challenges are the low amount and uneven distribution of rainfall, prolonged drought during the dry season, lack of infrastructure (such as bore holes, irrigation system etc.) and inadequate mechanisms to assess farmer demand for planting materials. But opportunities exist for the seed gardens to address these challenges.

For the introduction of planting material, many farmers abandoned their farms and dropped out of the scheme when they realized the amount of work required to maintain farms established with clonal planting material. This is because farmers are used to hybrids, which require less work but are less predictable in terms of yield. The farmers who persisted with the more strenuous work with the clones are reaping the benefits. Farmers have

come to understand that they need to be aware of the extra work involved in working with clones and treat cocoa farming as a business if they want to benefit from the using clonal planting material.

## **Lessons and Opportunities**

To overcome these challenges, the seed gardens should adopt an irrigation scheme to reduce the over reliance on annual rainfall for production. This will ensure year-round production, as opposed to the current seasonal production, and offset the relentless drought conditions. Financial investments in the establishment and expansion of seed gardens should be considered. These investments can build on existing opportunities and resources, including large tracts of land for seed garden expansion, strong linkage with CRIG, existence of huge demand for pods and seedlings, availability of technical knowhow from CRIG, substantial support from COCOBOD, and willingness of SPDs to embrace Public-Private Partnership investment options.

To this end, WCF continues to work with member companies to mobilize the requisite resources to irrigate existing SPD seed gardens while working with COCOBOD for further investment in the establishment of new seed gardens.

## **Objective 2 – An Enabled Ecosystem for Financial Services**

Access to financial services remains a big constraint for the estimated two million smallholder cocoa farmers in West Africa. It is a barrier to the adoption of new production technologies and improved practices, especially when it comes to farm renovation but also in terms of farm-specific plans to increase productivity and off-farm income-generation. The need for capital and access to financial services in cocoa-growing communities, however, is not limited to just the cocoa value chain but extends to the income diversification strategies of cocoa-growing households. These often include food crop production, either individually or in a group, and the wider number of small businesses that support the sector, such as spray service providers and transporters.

Financial access initiatives in the cocoa sector are dominated by outmoded, often paper-based payment systems. Extension of trade finance and working capital tends to dominate the financial transactions of farmers. Therefore, service quality is decreasing, contributing to an overall pattern of low service delivery. The main products of many financial institutions are not well-suited to seasonal or long-term cocoa value chain mechanisms. Financing is done by the supply chain actors and not 3<sup>rd</sup> party providers, often resulting in women being doubly burdened by the lack of access to finance.

WCF, in partnership with the Global Development Incubator’s Initiative for Smallholder Finance (ISF), used a sector-wide approach to perform a participatory review of the financial services and assessed (Assessment report included as Annex 6) where specific services or efforts were needed to yield expected results for both women and youth. The review revealed a set of priority recommendations for the life of the project which included supporting a pre-competitive design consortium focused on the use of mobile money (Ghana or Cote d’Ivoire) in the cocoa sector. WCF and its member companies with USAID input gravitated towards a simple digital payments solution, which was combined with the work of the Better Than Cash Alliance to establish a “best fit” digital payments platform tailored to cocoa that enabled the development and integration of other services.

WCF awarded a sub-grant to the Global Development Incubator (GDI)’s Initiative for Smallholder Finance (ISF) to perform a landscape analysis across Côte d’Ivoire and Ghana. The assessment focused on a review of formal and informal sources of financial services available to cocoa smallholder farmers in both countries. The assessment identified opportunities for ACI II and its partners to develop interventions in support of cocoa producer access to appropriate financial services. One specific focus included exploring the feasibility of a blended finance vehicle for the renovation and rehabilitation (R&R) of diseased and aged cocoa farms. The aim was to provide the financial and technical resources required to significantly renovate and rehabilitate cocoa farms in Côte d’Ivoire and Ghana.

This approach was selected to ensure future global supply for cocoa and to intensify investments in the sustainable livelihoods of cocoa farmers.

In FY2017, ISF completed the landscape analysis and provided a strategic recommendation on financial requirements for restoration and rejuvenation of cocoa farms in Côte d'Ivoire and Ghana. ISF also provided financial inclusion models based on experiences in other sectors with comparable commodities, such as coffee, which have reached a more mature stage of development related to R&R. The ISF recommendation was summarized in the following key points:

*I. Invest in industry enablers and financial infrastructure*

1. Establish a consortium for the creation of a federated data hub (Côte d'Ivoire or Ghana);
2. Support the government in establishing a digital platform for subsidy transactions (Ghana);
3. Support the extension of cocoa purchasing contracts between cocoa exporters and branded chocolate companies to introduce longer time horizons (up to 10 years) in the industry (Côte d'Ivoire);
4. Initiate a pilot of a process to digitally map farms in key cocoa growing regions (Côte d'Ivoire)
5. Design and deliver a renovation fund for the long-term redevelopment of the cocoa producing asset base (Ghana and Côte d'Ivoire); and
6. Initiate a capacity building and advocacy campaign to encourage government establishment and enforcement of a land rights/program (Côte d'Ivoire).

*II. Adapt or extend existing financial models*

7. Pilot the development and adaptation of Alternative Credit Scoring models to create a targeting model for the cocoa industry (Côte d'Ivoire);
8. Support a pre-competitive design consortium among mobile money operators to enhance penetration of rural financial services (Ghana or Côte d'Ivoire);
9. Identify existing service providers through which to adapt and expand an eWallet program (Ghana or Côte d'Ivoire);
10. Identify existing service providers through which to adapt and expand renovation program (Côte d'Ivoire); and
11. Support the development of a second syndicated loan fund through COCOBOD targeting renovation (Ghana)

Of these recommendations, the three most viable for implementation were:

- Federated data hub for the storage and management of data on smallholder farmers;
- Alternative credit scoring, and;
- Eventual consortium for rural mobile finance to assure the delivery of financial services to farmers.

Digital financial services (DFS) cover financial products and services, including payments, transfers, savings, credit, insurance, securities, financial planning, and account statements. They are delivered via digital/electronic technology such as e-money (initiated either online or on a mobile phone), payment cards and regular bank accounts including mobile money, which have had a significant impact in providing financial access to marginalized groups, including smallholder farmers, particularly in Africa. As such, DFS has the potential to vastly improve the lives and livelihoods of cocoa smallholders in Ghana. From a broader value chain perspective, DFS can also increase the speed and security of payments and lower the cost of doing business under certain conditions. ACI II undertook studies to ensure a comprehensive landscaping of stakeholders' experience and an analysis of the business case for moving to digital payments within the context of cocoa and Ghana. The analysis looked at financing products, services and approaches such as savings, loan products, insurance products, pension schemes, and e-banking, and documented the current payment process in cash and the value proposition of appropriate digital payments for LBCs. Past and current payment digitization initiatives completed by LBCs, FSPs, COCOBOD & other government bodies were mapped and evaluated, and a report was prepared.

The results of the assessment were presented to the TWC in September 2017, prompting consultations and streamlined recommendations, which called for:

- Federated data hub for the storage and management of data on smallholder farmers;
- Alternative credit scoring, and;
- Eventual consortium for rural mobile finance to assure the delivery of financial services to farmers.

After the consultations ended, ACI II piloted the selected interventions for scale-up. The main challenges for access to finance especially in Ghana are the high-interest rate, lack of dedicated financing options for farmers, and limited knowledge on the part of financiers about key aspects of agricultural lending such as the agronomic calendar. However, experiences in Côte d'Ivoire and Nigeria under WCF/ACI showed that with the right combination of coaching, training and technical assistance, lending to farmers with virtually no defaults is possible.

ACI II activities fell into company-specific and pre-competitive categories. The company-specific activities were focused on technical assistance as requested by WCF member companies and provided by the WCF DFS technical expert consultant. The pre-competitive activities were those that were to the benefit of the industry overall, providing access to all WCF members to content, activities and engagements that brought them closer to initiating or scaling digitization initiatives in their supply chains.

In Ghana, the DFS project promoted and supported the engagement, and implementation efforts of large cocoa buyers and their agribusiness intermediaries.

## **Outcome 2.1 Increased availability and use of high-quality financial services by farmers**

WCF undertook a review of all materials related to cocoa financing in Ghana. The DFS team conducted informant interviews with key stakeholders including government officials, NGOs, LBCs, and microfinance institutions involved in rural financing to analyze cocoa farmers' perceptions of savings and financial products and services with a special focus on digital services. These interviews helped to identify farmer preferences about digital financial products and services. The review also identified the strengths and weaknesses of current payment systems from farmer and buyer perspectives; it mapped the processes and costs of transitioning to digital payments for the different cash touchpoints and intermediaries in the value chain while identifying and evaluating past and current payment digitization initiatives and pilots and existing platforms serving smallholder farmers. In addition, the review documented payment processes/models that are already used by actors along the cocoa value chain such as LBCs FSPs and COCOBOD. The report detailed the benefits and drawbacks of digitization, analyzed the public and private sector drivers for digitization of the cocoa value chain, and provided some case studies of agriculture value chain digitization in Africa and the lessons learned from those initiatives.

Subsequently, WCF convened a webinar focused on digital payments for its members, which included presentations from various organizations involved in conducting research in, supporting and/or implementing agriculture digitization initiatives in Ghana and beyond. The objective was to ensure that each company had individuals that understand payment digitization and could engage with the solution providers with a view to greater collaboration. This was the basis for targeted technical assistance to companies, for which the selection criteria included:

- Support engagements between buyers on a pre-competitive basis or between buyers, exporters, suppliers and License Buying Companies (LBCs) along the value chain to develop a model
- Defined pilot size that includes the number of individuals, the volume of payments completed digitally and the extent to which the ecosystem is built out in the pilot, providing as many opportunities for farmers to use their e-money as possible. As such, the extent to which the pilot size is conducive to scaling up will be evaluated and considered in selection.
- Demonstrable company resources allocated to the DFS initiative.
- Shared learnings for other companies or industrywide.
- Building and strengthening the capacity of smallholder farmers and other value chain actors in the cocoa production areas to be able to uptake, utilize and maximize benefits associated with their access to digital financing services may facilitate access to key inputs such as quality planting materials.

Prior to the selection of recipients for the DFS technical assistance, WCF undertook a survey to help establish a baseline for farmer understanding and use of DFS; identify farmer points of expenditure to target digitization efforts; and developed and conducted training for farmers and purchasing clerks. WCF organized a workshop on digital financial services in November 2018 to introduce company members to mechanisms to digitize payments in the cocoa value chain. The workshop was to ensure that there is clarity within cocoa companies on the process and implications of going digital and mitigation strategies for any challenges as well as to expose the participants to the materials that would be used to educate other stakeholders (including farmers) on digital financial services. During this workshop, financial aggregators (NFORTICS and IT Consortium), issuers of digital credit (Jumo Ghana), digital pensions and digital health insurance (Peoples' Pensions Trust and Mirco Ensure) were introduced to participants, including WCF company members (Kookoo Pa, Kuapa Kokoo Limited, ECOM, The Hershey Company, Touton, Cargill, OLAM, Cocoanect now Beyond Beans ETG, and Tree Global). Subsequently, WCF facilitated introductory exchanges between member companies and Licensed Buying Companies as potential users, and DFS providers (MTN, Vodafone, AirtelTigo and NFORTICS), during which the service providers presented their products and offerings and scheduled individual follow-up meetings with participants. The World Bank Ghana Office hosted and facilitated these exchanges.

Recognizing how digital payments can be a game-changer for farmers, WCF and the Better Than Cash Alliance worked in partnership to support the growth of digital payments in the cocoa value chain to promote inclusive growth, boost productivity and improve the livelihoods of smallholder cocoa farmers, especially women. WCF is a member of the Better Than Cash Alliance, a UN-based global partnership of governments, companies, and international organizations that accelerates the transition from cash to digital payments to drive inclusive growth. The Alliance has over 60 members across 30 emerging markets, including companies and business organizations such as Unilever, H&M, Gap Inc and Grupo Bimbo.

The objectives of this initiative were:

- **Learn:** Better understand the opportunities and challenges of introducing digital payments to cocoa farmers;
- **Disseminate:** Share the learnings and best practices knowledge; and
- **Support:** Support WCF members with neutral and responsible DFS-related technical assistance.

## Key Achievements and Milestones

### Provision of technical assistance on digital financial services to WCF member companies

Regarding the provision of technical assistance, all WCF member companies received a request for proposals document in April 2019, encouraging them to submit a proposal that detailed their request for DFS implementation support from WCF. Four companies submitted expressions of interest, of which three signed MOUs with an agreed scope of work. The agreed activities (which started in July 2019) in the statement of work for the three companies included:

- Training of staff, PCs and farmers on DFS.
- Ecosystem buildout to support the digitization of pay points so that farmers have a broader range of locations to spend their e-money.
- Farmer sensitization of DFS to ensure maximum uptake and activity levels.
  - Review existing training content and channels to identify opportunities for embedding DFS content.
  - Development of DFS content and upload to an existing application for engagement with farmers via voice, SMS and other channels.
- Development of RFP template which LBCs can use to engage with providers as they select their payments provider.
- General assistance & trouble shooting.

### Development and dissemination of DFS sensitization materials

In the quest to ensure that farmers were well informed on the opportunities that DFS presents (financial

inclusion and improved security being key among others), voice sensitization messages endorsed by COCOBOD were disseminated to 1,175 farmers (72% male and 28 % female). The sensitization messages consisted of three modules: 1) introduction to DFS; 2) the benefits of DFS; and 3) the various DFS-enabled products and services accessible to smallholder farmers. The sensitization tool was shared with COCOBOD and all WCF member companies on a pre-competitive basis and is now a part of cocoa extension educational materials in Ghana.

WCF partnered with four member companies to train more than 4,000 farmers that supply certified beans to Mars, Ferrero and Nestle and 14 field officers in six cocoa districts using sensitization content on DFS. In 2020, COVID-19 related restrictions on in-person interaction resulted in the use of community public address systems to broadcast customized voice messages at the community level. The other mode of delivery was through phone calls.

The information shared secured the buy-in and willingness of farmers to accept payments of premiums digitally directly to their individual mobile money wallets irrespective of the mobile network operator. Farmer concerns were mostly on security threats and fraud related to digital payments, and withdrawal charges. However, farmers' confidence level in ensuring the safety of mobile accounts was improved after education on the dos and don'ts related to handling of their Personal Identification Numbers (PIN), and following stricter measures put in place by MNOs to protect clients' money. Participant farmers alluded to the fact that the benefits associated with receiving funds and transacting digitally outweigh the cost of withdrawal.

#### **WCF Collaboration with BTCA– Cost of Cash Study**

Kicking off the evolution of digital payments, many LBCs that purchase cocoa in Ghana had been debating whether and how to shift from cash to electronic payments. To assist in this decision-making, WCF, together with BTCA, commissioned an inquiry into the costs of cash payments in the cocoa value chain, as well as the costs associated with digitizing those payments. A virtual forum organized to disseminate the findings attracted representatives of 24 WCF members (Ferrero, Indecresa, Itochu, Ecom, Mondelēz, Kuapa Kokoo, Adikanfo, Sucden, Lindt, UPL, Cargill, Kookoo Pa, Compañía Nacional de 10 Chocolates, Guittard, Barry Callebaut, The Hershey Company, Mars, Inc., Nestlé, Olam, Ezaki Glico, Touton, GCB Cocoa, Chocolats Halba and Starbucks) across five (Africa, Europe, Asia, and the Americas) continents. The cost of cash study, published in late June 2020, estimates a direct cost of cash of \$21.5 million per annum in Ghana's cocoa value chain. This consists of:

- Delays associated with cash payments increase the interest expense for LBCs by at least \$3.9 million a year.
- \$15.9 million worth of risk from the carrying of cash; misapplication, theft and robberies and bad debts specifically related to cash transactions.
- Time and travel costs associated with cash of up to \$1.5 million spread across the value chain.

#### **Digitizing payments in Ghana's cocoa supply chain: Four building blocks for responsible and scalable digitization**

Of the USD 21.5 million lost to the cocoa value chain because of the reliance on cash transactions, the cost of cash study implied that LBCs lose USD 4.1 million in revenue or 3.6% of their margin annually. During the launch of the cost of cash study in June 2020, BTCA presented four building blocks with complementary information, which set out how to digitize payments in a way that is responsible and scalable, to the benefit of all stakeholders.

These building blocks are summarized as follows:

1. **Know their smallholder farmers:** Responsible digitization starts with understanding the financial lives of farmers, establishing their level of comfort with digital financial services, and gauging their demand for those services. This information helps to put farmers' financial behavior and expectations at the centre of digitization measures. It also guides the development of sensitization tools, which build farmers' familiarity with digital payments and helps ensure companies move at the appropriate pace as they implement their digitization measures. Creating a clear understanding across the entire value chain of the digitization process is essential for increasing the level of acceptance and uptake by the various

value chain actors. This applies equally when making the initial decision to switch to digital payments, selecting a Financial Service Provider (FSP) and agreeing on an implementation approach with the selected FSP. There are two key elements to building this value proposition. First, ensuring there is agreement on the objective and scope of digitization within the company, including with Purchasing Clerks (PCs), district officers of LBCs and other partners. Second, rigorously selecting and overseeing the FSP and ensuring that implementation plans, and timelines are developed and deployed jointly with the FSP.

2. **Build an internal and external value proposition for digitization:** Creating a clear understanding across the entire value chain of the benefits of digitization is essential to increase the level of acceptance and uptake from the various value chain actors. This applies equally when making the initial decision to switch to digital payments, selecting an FSP and agreeing on an implementation approach with the selected FSP. There are two key elements to building this value proposition. First, ensuring there is agreement on the objective and scope of digitization within the company, including with PCs, district officers of LBCs and other partners. Second, rigorously selecting and overseeing the FSP and ensuring that implementation plans and timelines are developed jointly with the FSP.
3. **Enable farmers to spend funds and access services digitally by building a robust digital payments acceptance ecosystem:** Digitizing cocoa payments alone is not sufficient to drive DFS adoption at scale in Ghana’s cocoa supply chain. Success in this regard will depend largely on developing an ecosystem in which farmers can purchase goods and services digitally without having to cash-out. Access to digital services (financial or non-financial) that present a good value proposition for the farmers is also critical. Building a robust digital payments acceptance ecosystem in Ghana requires focus on four areas:
  - i. DFS access points, which need to be numerous and well-located for farmers and PCs.
  - ii. DFS liquidity management, which helps ensure all farmers can access their funds where and when they need it.
  - iii. DFS merchant acceptance, which includes targeted efforts to identify and digitize common farmer transactions, such as at input shops, pharmacies, grocery stores, and creates awareness among farmers that they can pay digitally in these places.
  - iv. Access to other digital services (both financial and non-financial), including digital savings, credit, insurance or pay-as-you-go solar energy panels and products.
4. **Sensitize companies’ staff and farmers on the value of digitized of payments:** Given the low level of financial and digital literacy in Ghana’s rural areas, helping staff and farmers understand and embrace digital payments is crucial to success. This starts with developing information, communication and educational materials for staff and PCs that explain why digitization is beneficial to the company and materials for farmers that explain the benefits for them to move away from cash to digital payments.

### Cost of Digitization Study

The Cost of Cash Study demonstrated clearly that gains could be made by digitizing transactions in the cocoa supply chain, just as the four building blocks to responsible and scalable digitization showed how to proceed. However, there remained the question of the cost of these digitization efforts. To facilitate decision making by industry stakeholders on cash relative to digital payments, WCF commissioned a study on the costs of digitization to provide a clear and evidence-based analysis of each of the two payment systems, using detailed activity-based costing along the supply chain. A blended workshop (virtual and in-person) was organized for stakeholders to validate the findings from the study “Cost of Digitization”. Forty one participants (28 in person and 13 virtual) were involved. Stakeholders represented included WCF members (Beyond Beans ETG, Touton, The Hershey Company, ECOM, OLAM, MARS, ITOCHU), FSPs and Fintechs (BoG-GhIPSS, nFortics, Farmerline), BTCA, UNCDF, FAO and the US Embassy.

Farmers’ DFS experience indicated that 42% had bank accounts, 7% owned cards (E-zwich or ATM) and 51% had mobile money accounts. Eight (53%) of the 15 communities reached had mobile money agents present while the seven other communities must travel a distance of between one to four miles, or 20 minutes to 1.5 hours, to reach an agent. Twenty (6.4%) of 311 farmers and PCs presently use a mix of cash and banking payment systems while 93.6% use solely cash for trading cocoa beans. A considerable number (138 or 44%) of

farmers were willing to migrate from cash to digital payment systems for cocoa transactions; this proportion increases to 190 (60%) if transaction fees are waived.

The total value of costs associated with cash payments (USD 21.37M) significantly outweighs that of digital payments (USD 9.85M); implying cost savings for digital payments of USD11.53M over cash payments. This bodes well for the future of digital payments, which look set to unseat the deep-seated cash system, though challenges abound for this transition. The major challenges of DFS deployment were illiteracy, the burden of transaction fees, poor cellular network connectivity, availability of agents, an unsupportive ecosystem, and huge initial set-up and sensitization costs.

The study would have been incomplete without a final analysis to compare the costs of cash payments with the costs of digitizing payments within the cocoa supply chain. The costs of cash payments presented as compared in the table was based on data from the *Costs of Cash Study* (WCF/BTCA, 2020).

Table 5: Costs of Cash Vs Digital Payment

<b>Costs</b>	<b>DIGITAL (USD)</b>	<b>CASH (USD)</b>
Payment platforms and management Systems	690,000	23,000
Onboarding (set-up)	1,200,000	0
Transaction fee	540,400	0
Subscription/ maintenance	115,000	0
Sensitization and training	1,333,333	0
Cyber security	5,600,000	0
Human support systems	368,000	150,000
Theft	0	15,900,000
Transport costs	0	1,400,000
Interest from delays	0	3,900,000
<b>Total Costs</b>	<b>9,846,733</b>	<b>21,373,000</b>

The transition away from the use of cash in Ghana’s cocoa value chain has begun. Cocoa buying companies are searching for new ways to deliver greater benefits to farmers while improving efficiency, sustainability, traceability, and transparency in their cocoa procurement. Digitizing payments in the value chain can mitigate substantial risks faced daily by staff and agents of buying companies. At the same time, digital payments can lower the significant financial costs that threaten the profitability of the sector. End-to-end financial transparency can help cocoa processors around the world to verify where their products are sourced and reduce the risk profile of the sector for domestic lenders. For the smallholder farmers who form the backbone of the cocoa sector, digital payments can unlock financial services that will help them afford inputs, manage liquidity, and become more resilient throughout the years. Collaboration facilitated by WCF among FSPs, Financial Technology Companies, Aggregators, Mobile Network Operators (MNOs), on the four blocks of responsible and scalable digitization, will contribute to the achievement of the benefits of digitization.

### **Mainstreaming WCF member companies’ digitization with financial inclusion roadmap**

Sustaining the results of the digitization of payments in the supply chains of some WCF members companies required continued efforts and investment to ensure that companies achieve better access to finance, investment in farms, supply chain transparency with a digital procurement tool, and efficiency in doing business. However, to ensure broader financial inclusion for farmers in companies’ supply chains, WCF facilitated other complementary interventions such as organizing farmers into savings groups (like VSLAs), linking VSLA groups to formal financial institutions, developing farmer transactional history (e.g., mobile money) or economic ID (i.e., provide financial institutions with data) for banks to assess risk and providing credit and loans products. This involved sharing workable and successful examples of implementation with service providers including financial institutions, digital service providers, developers of financial products and agricultural technology organizations.

WCF member companies, in their effort to ensure that farmers within their sustainability program had access to financial services, established savings groups—the Village Savings and Loans Associations - through which members (women and the youth especially) had access to informal savings and loan products. However, these

services could not cater to all the financial needs of group members. Linkages of the informal savings groups to the formal banking services sector ensured a broader coverage of the financing needs of members of savings groups. WCF member companies are at various stages of implementing the following steps to financial inclusion:

**1. Implementing digital financial services**

To ensure that the gains chalked from the pilot of digitization with members are entrenched, WCF engaged members to clearly outline the internal needs for digitization. Digitizing payments along the supply chain of members such as base payments (beans purchases) and premium payments via digital platforms (cards, mobile wallets) by companies to their supplying farmers and intermediaries ensure financial inclusion. This ensures that companies know their smallholder farmers, build the internal and external value proposition for digitization, and enable farmers to spend funds and access services digitally by building a robust digital payments acceptance ecosystem.

**2. Developing farmer digital procurement tool**

This involved using digital procurement solutions to enable farmer profile documentation, track information for procurement, develop farmer transactional history (e.g. mobile money), and create economic IDs (i.e. provide financial institutions with data) for banks to access risk and provide credit and loans products. Vigorous education on digital financial services using tools developed by WCF will increase the level of knowledge of farmers and member companies on the financial services that are accessible digitally. Financial services that are delivered through digital tools and channels include savings, loans, (micro)insurance, payments, investments, and pay-as-you-go services. Companies gain from the benefits of digitization such as secured and transparent transactions.

**3. Strengthening farmer professionalization through the inclusion of financial and digital literacy in training curriculums and farm business services**

This involved educating company staff and farmers on the value of digital payments to ensure buy-in and acceptance. Company efforts have built the capacity of farmers within their supply chain to professionalize their production. Financial and digital literacy was key to ensuring that farmers became aware of the kind of financial services, which they could access through traditional banking and digital tools. Farmers also became aware of financial products such as (micro)insurance for crops and productive assets to mitigate risks such as drought and crop losses or cushion transactions.

**4. Organize target beneficiaries into savings groups and build their capacity**

Member companies are supporting VSLAs in their supply chains to facilitate access to financial products such as savings and loan. But VSLA groups cannot sufficiently meet the loan needs of members. WCF linked these groups to formal financial institutions to facilitate access to bigger loans to boost production. A matrix of parameters for determining groups' strength, solidarity, and their suitability to be linked to financial institutions was developed and used for group assessments.

**5. Link savings groups to financial institutions and co-design financial products**

Product development encompasses understanding the needs of farmers and developing tailored financial products to address such needs. WCF, with BTCA, supported a collaborative effort between farmer groups and providers of financial services, facilitated by member companies, to develop products addressing the need for input credit using tried and tested methods such as tripartite agreements, savings and loans products for fees, microinsurance (assets, transactions, premium, health and crop), investments and any other needs of the group using group solidarity as collateral. The implementation of the WCF financial inclusion roadmap ensured capacity building within and among value chain actors in financial services, leveraging the gains of DFS interventions. This facilitated other financial inclusion interventions such as formalizing informal savings groups, co-designing financial products such as microinsurance, developing farmer digital procurement tools and economic ID to meet actors needs and, in the long term, ensure financial inclusion.

### **Training of LBCs and companies on the Building Blocks on Responsible and Scalable Digitization**

To ensure that companies effectively use the tools that have been developed over the period based on the evidence of the cost of cash to Ghana's cocoa sector, representatives of companies were trained using the four building blocks. This was coordinated and led by WCF and BTCA. Beyond Beans, who are directly involved in the payment of farmers to the last mile through their partner LBC, Cocoa Merchant Limited shared their experience with participants. Participating companies included Barry Callebaut/Nyonkopa, Mondelez, Beyond Beans, Cargill, Olam, The Hershey Company, Mars, JB Cocoa, Sucden, Nestle and Cocoa Merchant Limited. The building blocks focused on:

- Know their smallholder farmers,
- Build an internal and external value proposition for digitization,
- Enable farmers to spend funds and access services digitally by building a robust digital acceptance ecosystem and,
- Sensitize companies' staff and farmers on the value of digitized payments.

### **Financial Product Co-creation**

As part of the ladders to ensure financial inclusion, WCF through the management of the financial inclusion working group activities has established a relationship between member companies and Blue Marble Microinsurance to co-develop a microinsurance product to mitigate the risk of farmers. Seven (Olam, Cargill, Beyond Beans, Mondelez, Mars, Barry Callebaut and Touton companies in-country leads (Ghana and Cote d'Ivoire) were engaged.

Upon interaction with companies, the risks identified to mitigate include deficit of rainfall (and correlation with pests), high temperature, excess rainfall (correlated with black pod disease, pests and rot) and other pests and diseases, such as CSSVD. Even though the process is in its inception phase, the anticipated approach will be to develop a crop agnostic cover offered as business interruption insurance as farmers have a variety of income-generating activities, not just cocoa and possibly the potential to bundle insurance with input loans. The insurance premiums could be made through a group fund against weather shocks leveraging on VSLAs and cooperatives or through certifications such as Fairtrade, Rainfall Alliance and companies' premiums.

The distribution channels that can be used for this anticipated product are through the cooperatives in Cote d'Ivoire and VSLAs/Farmer Unions or Licensed Buying Companies in Ghana. The next steps to implement this model will be to communicate with the sustainability heads of the various WCF member companies to inculcate that in their sustainability programs if feasible.

### **Industry Sustainability Interventions**

Following the collaboration with WCF, BTCA has recruited a consultant based with COCOBOD to provide technical assistance on the cocoa management system (CMS). COCOBOD has decided to digitize payments along the cocoa supply chain. A pilot of the system was initiated in the 2022/23 cocoa season and then a full rollout in the subsequent season by refining the system considering the lessons learnt and feedback received, and the challenges addressed based on the pilot. A workshop with LBCs and stakeholders in the cocoa supply chain was undertaken to communicate to them the approach, solicit feedback from them and then address frequently asked questions in relation to the payment functionality of the cocoa management system.

Leveraging the technical assistance received from WCF on the digitization of payments (premiums) in 2019, Beyond Beans ETG, a supplier of certified beans to Nestle, Mars, and Ferrero through LBCs (Cocoa Merchant Limited and Federated Commodities) has decided to set up a DFS unit to oversee the payment of all premiums to their suppliers digitally to all their farmers in their supply chains in Ghana, Cote d'Ivoire, East Africa in all their agricultural value chains that include cocoa and coffee.

### **Challenges**

Decisions by cocoa companies to transact in cash or digital do not provide uniformity for transactions for all players in the cocoa sector where there is competition for a larger market share. This posed a challenge for

companies that decided to transact digitally because smallholder farmers preferred to receive payments in cash rather than digital.

There was a level of apprehension toward the paradigm shift for companies that decided to transact digitally. This is partly because smallholder farmers indicated their low level of digital literacy as a challenge to uptake and use DFS tools effectively and efficiently.

The underdeveloped nature of infrastructure to support digital payments and the use of digital financial tools compounded the problem. Access to reliable network connectivity, access to liquidity and agent cash-out points, and access to digitized merchant points widely to enable payments of goods and services digitally were all lacking.

## Lessons and Opportunities

The DFS component of ACI II created significant interest in digital payment in the cocoa supply chain with the partnership with the Better Than Cash Alliance coupled with the findings from the *Cost of Cash to Ghana's Cocoa Sector* and the *Cost of Digitization Study* making evident the compelling benefits of transacting digitally. The industry regulator, the Ghana Cocoa Board decision to digitize all payments in the cocoa supply chain is a build on the success of the WCF partnership with the Better Than Cash Alliance under ACI II.

Once fully operational, the payment functionality of the Cocoa Management System will present an opportunity for providers of financial services to plug into the system and develop tailored financial products for cocoa farmers. Digital payments by all industry players in the cocoa sector will tremendously develop the ecosystem since this will present opportunities for DFSPs to invest in infrastructure development to capture a share of the cocoa sector market.

Future activities can focus on addressing the bottlenecks that hinder DFS uptake and reaping the benefits. Working with stakeholders to engage in a robust ecosystem buildout to support digital payments, agent network and liquidity management, developing digital literacy content for youth and women to contribute to their economic empowerment.

With Village Savings and Loan Associations being a core intervention for companies' sustainability projects, digitizing their operations provides a use case for managing their funds digitally, thus contributing to financial inclusion.

## Objective 3 – Village Savings and Loans Associations (VSLA) in Côte d'Ivoire

Village Savings and Loan Associations (VSLA) are community-based women's associations/ organizations bringing together 25 members on average. Its main activities are savings and loans. VSLA members regularly contribute to the fund based on a unanimously agreed amount and, with the funds saved, grant each other loans. The repayment of the loans is made with interest that increases the amount available in the fund. At the end of each cycle, members share the total amount of the fund between themselves. Each member therefore recovers his or her contributed savings with an additional gain (via the interest).

The objective of the VSLA Project in Côte d'Ivoire funded by USAID was to:

- Increase the capacity of impoverished cocoa growing households, and especially their female members.
- Manage their financial resources and withstand shocks to their livelihoods by providing access to three basic financial services – savings, loan, and enhanced household income.

- Develop and strengthen savings and credit activities in communities where Barry Callebaut, Blommer, Cargill, Hershey, Mars, Mondelez, Nestle and Olam source cocoa in Cote d'Ivoire, through the creation of 387<sup>4</sup> new VSLAs and the linkage of 634 VSLAs to formal finance institutions to have the opportunity to place their group savings and access larger loans.

This activity was planned to reach at least 20,925 members through VSLAs. The two main activities of creating and linking VSLAs to financial institutions were accompanied by the creation of Gender Committees in charge of organizing couple dialogue sessions, awareness-raising sessions on gender issues. The aim of this component of the project was to reduce the risk of beneficiaries becoming victims of gender-based violence because of the VSLA.

During the period of implementation (Oct. 2019 – March 2022), companies' implementing partners promoted the VSLA+ model and continued to raise awareness about its functioning and benefits. They facilitated VSLA group formation, continued training for VSLA coaches on the VSLA methodology, with a particular focus on Gender, Financial Education, Income Generating Activities, Literacy, Parental Education and Family Business Management. As some VSLAs matured, they were linked to formal finance institutions.

### Creating New VSLAs

The creating of VSLAs started in October 2019 with all companies, though the activity was disrupted, from March to April 2020, due to the COVID-19 crisis. After COVID-19 related restrictions to movement and gatherings were lifted, savings meetings were held in strict compliance with health protection measures (hand washing and social distancing) and frequency remained regular, except in a rarest case where some participating members were mandated to collect contributions from members who were not attending the meeting.

In April 2020, The SEEP Network published a set of recommendations on how to support savings groups and their members during the COVID-19 crisis through a guidance note. This [guide](#) sought to help VSLAs implementing companies to support savings groups in adapting to the COVID-19 pandemic. Four months after its introduction, the WCF Social Development team conducted a survey to assess the usage of the guide in adapting VSLAs established as part of WCF member companies' sustainability interventions and identify strategies adopted in response to the COVID-19 crisis. [Here](#) is the report of the survey.

### Linking VSLAs to Formal Financial Institutions

WCF evaluated mature VSLA groups to assess their performance and readiness for linkage to formal financial institutions. To facilitate account opening, implementing partners held VSLA awareness sessions for account opening and training sessions for the members on financial products. These sessions and the subsequent linkage to formal financial institutions secured the growing funds of VSLA, ensured better management of funds and provided access to loans for larger-scale business initiatives.

### Gender

Activities related to Gender involved the facilitation of couple's dialogues, setting up of Gender Committees, and training of voluntary coaches. After the training, participants were expected to replicate the knowledge received throughout their communities to drive behavioral change and reduce gender inequalities. Participants were also in charge of serving as advisors; providing assistance and conflict resolution bodies for households, and raising local awareness to reduce gender disparities and increase women's participation in household decision-making.

### Literacy/Parental Education Training and Other Support

Adult literacy courses were offered for interested VSLA members. The approach consisted of selecting participants (voluntarily) in various VSLA groups of the same community to set up the literacy centers. Literacy center facilitators were trained by DAENF (*Direction de l'Alphabétisation et de l'Education Non Formelle*), the national literacy service. All literacy centers have been handed over to the government at the end of the project to ensure their continuity.

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<sup>4</sup> This number increased to **407** because of the Cargill and Hershey contract modification. This also affected the number of members to be reached from an initially planned 20,925 to **21,000**.

In addition, selected communities received support to strengthen positive parenting practices, empowering mothers and fathers to meet the challenges of raising children. Seven (7) modules were implemented - family life, communication, self-esteem, emotional or caring care and positive discipline, child protection, Early Childhood Development (ECD) and nutrition. This was coupled with farmer business management training to put cocoa-farming households on the path to sustainable prosperity by exploring tools such as: Exploring our Home; Managing Income from Major Sources of Income and Exploring Opportunities to Increase Household Income; Exploring How to Work Together, Defining a Change Plan.

## Key Achievements and Milestones

Table 6: Summary of activity indicators

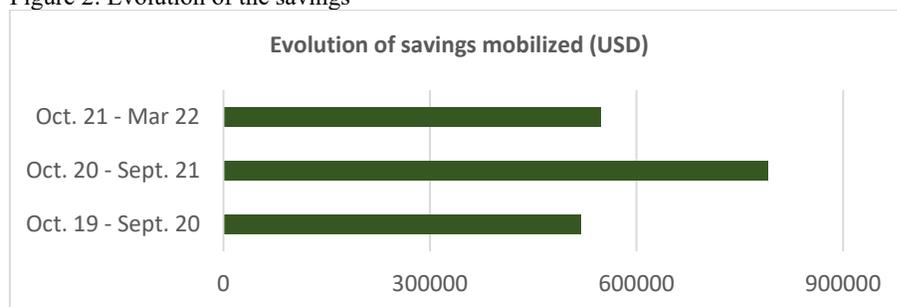
		Creation of VSLA	Linkage of VSLA		Total of Supported (a + b) <sup>5</sup>
		Newly created and trained on VSLA curriculum (a)	From newly created VSLA <sup>6</sup>	From Existing VSLA (b)	
<b>VSLA Groups</b>	Target	407	104	530	<b>937</b>
	Achieved	528	133	300	<b>828</b>
<b>Number of Members</b>	Target	10,250	2,515	10,750	<b>21,000</b>
	Achieved	14,288	3,245	6,902	<b>21,190</b>

### Creating New VSLAs

As presented in Table 6 above, a total of 528 VSLAs created are still active with 83% (11,877 of 14,288) of members registered being women. More than 22% of these women (2,560) are under 30 years old. Thus, all the expected groups have been created (130% of target). A total of 31 groups with 674 members dropped out due to a lack of cohesion within the group. However, some spontaneous groups filled the gap, joining the project because of the results and benefits observed in neighboring communities. Of the registered members, 84% were regular attendees at meetings.

Combined, the 528 groups created under this activity raised USD 1,858,871 in savings, of which USD 1,037,713 was granted as loans (women took 92% of these loans, meaning USD 953,162) to members. VSLA members also contributed USD 149,045 in a social fund to support members in times of family emergency. As illustrated in Figure 2, there was a continuous evolution of the savings mobilized by the members throughout the duration of the activity. This evolution is attributable to the understanding and involvement of the membership, which has had a significant impact on the savings achieved. This change was accentuated with the beginning of the second cycle (in 2021) for many VSLAs, the majority of which have adopted a larger share amount.

Figure 2: Evolution of the savings

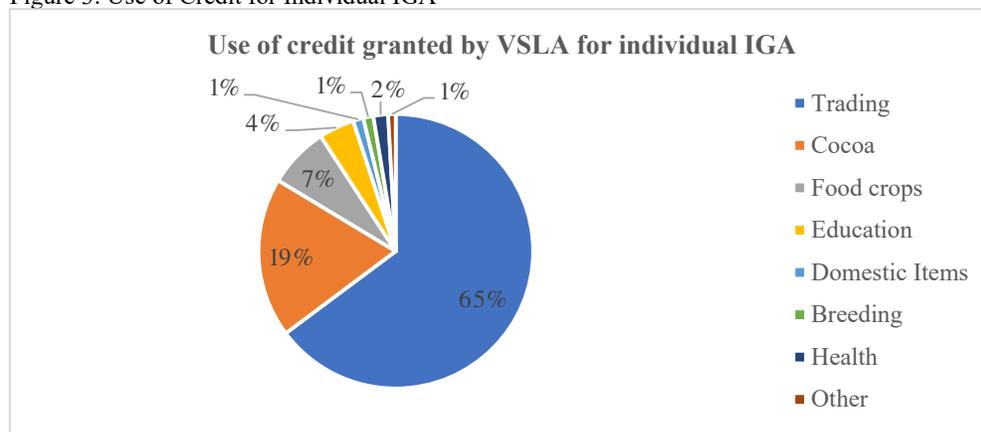


<sup>5</sup> This total reflects the total of groups and members enroll in the overall project.

<sup>6</sup> This data can't be part of the total of beneficiaries supported because it is already considered the category creation of VSLA

As illustrated in Figure 3 below, the majority (65%) of the VSLA loans to members were invested in trade to get more income and for agricultural purposes in cocoa (19%) and food crops (7%). There was also a slight increase in the use of credits for education during the project (from 2% to 8%).

Figure 3: Use of Credit for Individual IGA



The economic power demonstrated by the beneficiaries' investment and expenditure on the items above is a result of the benefit obtained after the share-out of the first cycle as well as the confidence generated among other community members because of these results. Approximately 50% of the VSLAs created in this project have proceeded to share their savings from the first cycle of activity.

### Linking VSLAs to Formal Financial Institutions

Three (03) Memorandum of Understanding (MoU) have been signed respectively with UNACOOPEC-CI (*Union Nationale Des Coopératives d'Epargnes et de Crédit de Côte d'Ivoire*), ECOBANK and ADVANS, financial institutions, for a SIM card-linked account opening for mobile banking, in partnership with MTN, a mobile network operator.

Implementing partners linked 300 existing VSLAs of which 284 to ADVANS and 16 to COOPEC. VSLAs registered a saving of USD 130,570 in these institutions. Also, a credit of USD 20,939 has been granted to 32 groups.

From VSLAs newly created, 133 VSLAs of which 126 to ADVANS and 7 to ECOBANK have been linked (128% target). These VSLAs registered savings of USD 11,481 in the financial institutions. Also, credit to the tune of USD 17,000 was granted to 2 groups. Overall, most of loan granted (USD 37,937) have been invested in Trade (40%) and Cocoa (8%).

In addition to the group accounts, VSLA members could also open their own accounts in these institutions and enjoy the same benefits. 54 members including 38 women opened individual accounts (33 in ADVANS and 21 in ECOBANK).

### Gender

A total of 211 gender committees were set up to promote gender notion and monitor gender activities in their target communities. The members of these committees (304 men and 592 women) were trained on couple's dialogue methodology to enhance their understanding of the conditions and techniques for conducting couple dialogue sessions.

There were 3,337 couple dialogue sessions held in the communities with 14,452 VSLA members (3,650 men and 10,802 women). Here are the couple dialogue main modules completed: Gender concept, Stereotypes, Communication, Female leadership, Power, Law and Politics, Gender-based violence, Family resource management, Parental responsibility, Family planning, children needs/rights.

In an illustration of the positive effects of the gender component, an implementing partner was able to advocate for the administrative and local authorities of Méagui and Touih to reduce the number of out-of-court settlements of GBV cases in beneficiary communities. In addition, a departmental platform has been set up in Méagui to combat gender-based violence and especially out-of-court settlements of rape cases. During the advocacy, several traditional chiefs (including the paramount chief of Méagui) decided to no longer tolerate out-of-court settlements of rape cases in their communities. They decided to help widowed women benefit from inheritance and to grant them portions of land. On behalf of all the chiefs, the spokesperson asked for forgiveness from the women as they recognized that some social norms continue to marginalize them. A better place now will be given to women in the society as they deserve to be treated on the equity basis. After this hearing, several conflict resolution sessions were conducted, including six couple's conflicts that were successfully handled by Gender Committees, successfully staving off divorce.

### **Literacy/Parental Education Training and Other Support**

Started in September 2020, 40 literacy centers (25 Levels 1 and 15 Levels 2) were opened to deliver training. The courses, distributed according to the level of training, have benefited:

- Level 1: 660 adult learners (103 men/557 women) with 78% of learners advanced to level 2 (including 80% of the women).
- Level 2: 281 adult learners (53 men/228 women).

Due to the COVID-19 restrictions and some field work activities, only 42% of Level 2 courses could be completed. The connection with the IEP will ensure the follow-up of the centers through CIEPA (*Conseiller de l'Inspection Primaire en Alphabétisation*).

A total of 7 advisers from the primary education inspectorate (4 in Level 1 and 3 in Level 2) will support the function of these centers. They are assisted by 51 volunteers/facilitators (50 men/1 woman) trained to deliver courses to learners.

After the training of trainers, 1,584 members, including 1,104 women, were trained on the main modules.

Mrs. Adjoua, Ekloueyo VSLA member, to whom the training in parental education brought a positive change in her household, testified by saying: "Before training, I used to say violent words to my children and my children responded to me in the same way. I was worried about why my children were not respectful. But I learned in the training how to communicate well with others. Since I stopped using violent language, I have noticed that my children have changed their behavior toward me. I noticed more respect than before".

The first Farmer Business Management Training (FBMT) training module allowed the couples to understand the importance of strengthening communication and transparency. It also allowed them to have a common vision to better manage their resources to stop getting into debt and build up savings for the realization of a life project. In all, 2,235 members of 70 VSLAs received the training modules during this semester (October 2021 to March 2022). This is how a couple from Adjalé Ouflé VSLA in Amanikouakoukro, considers their resource tree as the compass of their household. Mrs. Touré said: "The FBMT training allowed us to go beyond cultural limits. In our country, the woman should not be the first to make decisions, but when we did our exercise, my husband and I started to think about the possibilities of diversifying our sources of income, and it was I who gave the ideas and my husband who accepted them".

Similar positive changes have been recorded in Koffikro, where a husband now helps his wife freely. He explained: "Before, I could not help my wife because of questioning looks from neighbors, but today I do it without worrying about what others think of me. I feel good and fulfilled because my wife can now have time to rest. The clock allowed me to see that my wife was working a lot, so I decided to help her. Now we cook attiéké together, and I help her with the housework. From now, there is harmony and joy in our home."

During the training sessions, participants developed 448 change plans. The visions developed include to buy a piece of land and build a house, start an IGA (hair dressing shop, food crops, breeding, cocoa and rubber farm, etc.), better child education support. Periodic monitoring of the change plans was conducted by the project teams

to assess the progress of implementation. These visits identified a need for capacity building in improved African chicken breeding for which 158 members (82 men and 76 women) received training.

## Challenges

The low level of VSLA savings observed in the institutions is because the financial institutions were not able to capture all the mobilized savings due to the disruption of the mobile network. Indeed, to facilitate financial transactions, savings are deposited in mobile money accounts and then transferred to MFI accounts. Most of the groups are in areas with very limited access to this network. The savings of the groups on mobile money could not be transferred to the accounts of MFIs. Therefore, the financial institutions are only able to capture physical deposits and not the bulk of the savings which are in the mobile money wallets.

Also, the fear of having issues with microfinance institutions and limited cash out opportunities in the immediate neighborhood are also real constraints not yet overcome by the sensitization efforts made by the implementing partners.

## Lessons and Opportunities

Notwithstanding the many challenges that hindered the timely implementation of project activities - including COVID-19 and political tensions - the project's objectives were achieved. Indeed, contract extensions were granted to all partners involved in this project to fulfill the commitments. Implementing partners experience and adaptation allowed to reach the achievements presented in this report. It is noteworthy that VSLAs have proven to be a very important channel for addressing women's empowerment, financial inclusion, and gender needs. Over the 30 months of the project duration, VSLA members continue to show resilience vis-a-vis COVID19 challenges by continuing to save and pay their membership dues leading to an increase of the savings over the reporting period. The increased economic power displayed by VSLA members (savings, loans granted, trainings, etc.) increased the enthusiasm of other community members for VSLA. In all, 121 spontaneous VSLAs with 4,038 additional members joined the project following the successful results observed in the other communities. This has resulted in a 130% achievement rate compared to the set targets, reflecting the increasing level of confidence that the population have in the VSLA methodology.

To ensure even greater success going forward, particular focus should be on:

- ✓ Identifying literate women members, increasing support to women on basic literacy and numeracy for them to lead independently or with little supervision the management of their VSLA. There is a high demand for VSLA creation in cocoa-growing communities which is not always being matched with available skilled coaches.
- ✓ Reinforcing community awareness on the importance of couples' dialogue session and further engage community leaders on gender-related issues.
- ✓ Increase awareness of the importance to save in accounts opened in financial institutions to have larger loans and secure their savings.

These are underpinned by the following learnings:

- ✓ Continuity of VSLA activities depends on a relevant combination of good group members and coaches' capacity building and monitoring field visits.
- ✓ Transparent management of the VSLA reinforces trust between members and promotes social bonds, hence social cohesion.
- ✓ The organization of share out ceremonies, convincing results, and the conviviality between VSLA members encourage communities to create "spontaneous" VSLAs.
- ✓ Women's participation in household decision-making is becoming more noticeable through couples' dialogue sessions; Explaining VSLA activity to spouses helps gain their trust and acceptance of the program.

## Objective 4 – Increased Flavor Quality of Cocoa

### Outcome 4.1 Flavor Quality Assessment Capacity is Available in West Africa to support Purchasing Decisions and Practices

Branded and large-scale chocolate makers depend on a steady supply of consistent flavor and quality from West African cocoa production to avoid constantly changing their chocolate recipes and overall flavors profile in the market. There is a growing concern that fundamental flavor and quality attributes of bulk cocoa, which is dominated by West and Central African cocoa, have eroded over time from cross-pollination and poor or haphazard varietal selection during breeding, and from poor and inconsistent post-harvest practices (pod breaking, fermentation, and drying).

Also, most cocoa breeding programs in West Africa primarily focus on productivity gains such as plant vigor and physical characteristics such as disease tolerance, yield, beans size and fat content and less on flavor quality and attributes. As a result, the rich, intense chocolate flavor the region has been known for historically has deteriorated and is gradually becoming more acidic with less chocolate flavor. This has affected these origins' prominent position and growth within the bulk and premium segments of the chocolate market.

Selection for flavor is gaining more attention among plant breeders, driven in large part by the increasing expectations and demand of consumers (Dawson and Healy 2018). Hence, cocoa planting material distributed to farmers should have desirable flavor and quality characteristics to meet the increasing demand of consumers, in addition to other traits such yield, pest and disease tolerance and tolerance for harsh environmental conditions. In this regard, WCF, under ACI II, worked with the cocoa producing countries of Cameroon, Côte d'Ivoire, Ghana and Nigeria to ensure that flavor quality, which is the key reason chocolate producers include cocoa from specific origins in their recipes, is not lost in the pursuit of other desirable characteristics.

During the first phase of ACI, from 2011 to 2016, WCF supported the establishment of a flavor quality laboratory at the Cocoa Research Institute of Ghana (CRIG). WCF transitioned the laboratory to CRIG, which operated the lab without WCF support from December 2016 to March 2018. In April 2018, a new MOU was signed between WCF and CRIG to implement activities under ACI II, which included WCF providing larger scale equipment, and in February 2020, WCF member Ezaki Glico cut the sod for the construction of a new flavor laboratory and Centre of Excellence at CRIG. WCF also supported the establishment of a second flavor quality laboratory at the *Centre National de Recherche Agronomique* (CNRA) in Côte d'Ivoire in 2019. The third flavor and quality laboratory became operational in September 2020 at the Institute of Agricultural research for Development (IRAD) in Cameroon. And finally, WCF supported the establishment of the fourth flavor and quality laboratory at Cocoa Research Institute of Nigeria (CRIN) in Nigeria in October 2020.

WCF member companies Guittard Chocolate and Seguíne Cacao played a pivotal role in training the lab teams. TCHO, Mondelēz and Nestle participated in group tasting sessions for the lab teams, which have provided the four countries with the ability and the necessary tools to train cocoa extension staff and farmers on appropriate harvest and post-harvest techniques on flavor improvement. The labs support national cocoa research institutes to integrate flavor characteristics into their cocoa breeding programs to ensure that traditional flavor quality is maintained.

WCF engaged a consultant, who worked directly with staff of CRIG, CNRA, IRAD and CRIN to bring the flavor labs up to international standards and to document the standard operating procedures (SOP) for lab operations and equipment care, fermentation and drying, tasting sessions and trainings. As a first assignment, the consultant, Ms. Dorine Kassi, SOP for flavor quality laboratory management and operations, which have been adapted and included in standard manuals and are fully in use in all four countries.

## Key Achievements and Milestones

### Expanding the capacity of flavor quality in Ghana

To enable the flavor quality laboratory at CRIG to train more farmers, WCF supported the acquisition of larger scale equipment for the lab. This new equipment expands the labs capacity from 30kg of samples per week to close to 100kg, which has enabled CRIG to produce enough cocoa liquor to train all cocoa farmers who benefit from cocoa extension services in Ghana on flavor quality. In all, CRIG has trained more than 442 cocoa extension, and 647 quality control staff, who in turn have trained 302,045 cocoa farmers, including 99,947 women, in Ghana in appropriate harvest and postharvest practices. Three farmers who benefited from the flavor quality trainings in Ghana were recognized at the 2019 edition of the Cocoa of Excellence (CoEx) - International Cocoa Awards at the *Salon du Chocolat* in Paris in October 2019 and two more beneficiary farmers received recognition at the 2021 edition of the Awards.

In February 2020, WCF member TCHO, and parent company Ezaki-Glico provided a boost for the expanded capacity of the flavor laboratory in Ghana with the sod cutting ceremony for the construction of a new flavor laboratory and training center. The facility, which had an initial cost of almost USD 170,000, was modified by COCOBOD upon review. Construction is progressing well on the new design, valued at more than USD 350,000 for which COCOBOD is the main funder. Ezaki Glico is pleased with the management of the project and with the supervision of the contractors and attention to detail. Currently the project is at 65% completion with the goal of reaching full completion by January 2023.

### Supporting training on flavor quality in Côte d'Ivoire

WCF provided support for laboratory management training to the CNRA team after the establishment of the flavor laboratory at CNRA in Abidjan. Collaboration with CNRA for regular field outreach to farmers resulted in the training of 1,200 farmers, CNRA staff and extension agents in 2019 using cocoa liquor samples processed at the laboratory in Bingerville. In all, this collaboration enabled WCF to reach about 20,000 additional farmers, CNRA agents and extension agents in Côte d'Ivoire. In March 2019, WCF facilitated the visit of a delegation of farmers and leaders of cooperatives from Côte d'Ivoire to their counterparts in Ghana. During the visit, the farmers, accompanied by officials from the Ivoirian national cocoa regulatory institution Conseil du Café-Cacao, extension agency ANADER and research institute CNRA, learned from their Ghanaian counterparts who have benefited from previous WCF flavor quality activities.

Between October 2019 and September 2020, members of the CNRA lab team and the FQ Consultant participated in the 2019 Cocoa of Excellence - International Cocoa Awards in Paris, where they interacted with, and learned from, members of the Cocoa of Excellence Technical Committee. In a first for West Africa, some of the cocoa liquor samples produced by the new flavor lab were distributed to WCF company flavor quality experts for use in a live regional sensory analysis session. This tasting session, held in September 2020 and attended by representatives of laboratories in Cameroon, Côte d'Ivoire, and Nigeria helped to calibrate and to verify the results of tastings of the CNRA lab team.

The lab team undertook fermentation, drying, and liquor preparation from the in-country stock of hybrid and clones introduced to farmers over the years. These liquor samples were distributed to WCF company flavor quality experts for use in a second live regional tasting session analysis, which was held in June 2021 and attended by representatives of labs from Cameroon, Nigeria, and Côte d'Ivoire. The second tasting session helped to verify the results of the CNRA team, evaluate lab performance (in terms of liquor preparation and sensory evaluation) and assess the function of the CNRA lab. Subsequently, the CNRA lab team took part in the preparation of cocoa bean and liquor samples for the third and final live regional cocoa tasting and training session in April 2022.

CRNA is preparing to expand the FQ lab, install new equipment and recruit technical personnel to man the lab as well as requesting support from the German Cooperation to establish a fermentation center in Abidjan.

### New flavor quality laboratory in Cameroon and Nigeria

CRIN in Nigeria and IRAD in Cameroon received the equipment for their respective flavor labs. Both institutes nominated four-member teams to manage the lab. The ACI II Flavor Quality Consultant undertook a review of

the lab in Nigeria in December 2019 followed by the lab in Cameroon in March 2020 and made recommendations for improvements, which have been done in both countries. Training for the lab teams, planned for April 2020, before the imposition of COVID-19 related travel restrictions, were organized virtually, with the first two on lab equipment set up and cocoa liquor preparation conducted in September and October 2020 respectively. Subsequent trainings were organized and delivered remotely until the lifting of travel restrictions in 2021.

### Cameroon

The Flavor and Quality (FQ) Laboratory of IRAD became operational in September 2020 and began upgrading the capacity of the FQ Laboratory & Sensory Panel and the assessment of flavor potential of the local germplasm in the early part of 2021.

Activities undertaken between the October 2021 and March 2022 included:

- Preparation of controlled reference sample:  
The physical and sensory evaluations of samples from approximately 50 local farmers have been received at the FQ Lab for flavor evaluation and feedback to farmers. These samples were also used during sensory training, and to identify potential reference liquor samples for future trainings.
- Clonal Fermentation of Cacao from IRAD Gene Bank:  
The sensory evaluation of the genetic clonal material (10 clones) available in the cocoa gene banks of the Institute of Agricultural research for Development (IRAD) and the training of the 12 FQ Lab members on the clonal fermentation (micro-fermentation) 2021 was conducted in December.
- Sensory evaluation of cocoa beans samples:  
The FQ lab continued with the training of the panelists on the improvement of their skills in the sensory evaluation of cocoa bean samples.

The lab team took part in the preparation of bean samples for the regional cocoa tasting and training session in April 2022. These liquor samples were distributed to WCF company flavor quality experts for use in the virtual regional tasting session and in subsequent data analysis. Also in April 2022, the IRAD FQ lab conducted training for farmers on the impact of post-harvest practices on the flavor quality of beans. The lab prepared samples (beans and liquors) that farmers will see and taste during field trainings. About 30 farmers were selected within a cocoa farmer cooperative which works in partnership with the FQ Lab for the training. This activity was to build the capacity of farmers in sensory evaluation and ensure that farmers employ good post-harvest practices that enhances flavor quality.

### Nigeria

Correspondingly, the establishment of the CRIN FQ lab in Nigeria completed the fourth and last lab under ACI II. Activities undertaken between the period of October 2021 and March 2022 included:

- Processing and Flavor Evaluation of Stakeholders' Bean Samples:  
Dried cocoa bean samples were obtained from stakeholders (farmers, merchants / processors such as OLAM, Pil Plantation) for flavor evaluation. Efforts to obtain more samples from other farmer groups and exporter are on-going.
- Development of a lab manual with Standard Operating Procedures (SOPs) for Cocoa Harvest and Post-harvest Practices:  
The FQ Lab manual and SOPs on cocoa harvest and post-harvest practices have been developed for the lab use.
- Training / Practical Demonstration on Harvest and Post-harvest Practices with CRIN:  
CRIN continued with training of FQ Lab team, field officers on cocoa plots and cocoa fermentary staff conducted from November 29 to December 04, 2021. This training was conducted with practical demonstration during cocoa pods harvesting for clonal fermentation. The lab team was trained on processing of liquor from cocoa beans, while the panelists were trained on cocoa flavor sensory analysis.
- Clonal Fermentation of Cacao from CRIN Gene Bank:

This involves the systematic selection and fermentation of clones/hybrids for flavor evaluation at the lab. Some cacao clones were selected for this activity. The CRIN team were trained on clonal fermentation led by WCF consultant, Dorine Kassi. This activity helped the cocoa breeders at CRIN in the selection of parents to be used for breeding program. Prior to the field activity the consultant also trained the lab team on the use of data logger to collect data during fermentation and upload the data for analysis.

- Controlled reference samples:  
This activity is on-going. It involves the preparation of reference samples (under-fermented, over-fermented, black pod, dirty) to be used for training farmers in cocoa cooperatives on good practices for enhancing cocoa flavor. Some of these samples have been converted to pellets for ease of use during farmers trainings. Similarly, efforts are being made through Dorine Kassi to obtain 18 reference samples from CNRA lab in Cote d'Ivoire.

Equally, the lab team took part in the preparation of bean samples for the third regional cocoa tasting and training session in April 2022. These liquor samples were distributed to WCF company flavor quality experts for use in the live regional tasting session analysis.

### **Collaborating with the International Standards for the Assessment of Cocoa Quality and Flavor (ISCQF)**

WCF was involved in the development of the cocoa quality standards, as part of the [International Working Group for the development of ISCQF](#). WCF member companies Guittard Chocolate, Barry Callebaut, ECOM, Valrhona and Ezaki Glico (through their subsidiary TCHO), are also close partners of Bioversity in the Cocoa of Excellence Program that has been central in developing cocoa quality standards and protocols.

To further promote the transfer of international standards and protocols, WCF's collaboration on the ISCQF looks to support origins to take advantage of the labs to:

- Protect national, historic flavor profiles and markets while identifying new planting material and flavor profiles to support premium and ultra-premium market opportunities.
- Identify the traditional and regional flavor profiles and genetics that have led the region to become leading global suppliers of cocoa.
- Identify drifts and shifts in planting material flavor in recent decades.
- Identify and establish flavor profiles of hybrid planting material currently in distribution.
- Identify and establish flavor profiles of clonal planting material currently under development.

### **Challenges**

Overall, the established FQ labs have been adequately maintained with trainings (tasting panel, lab staff, farmers, and extension agents) and sensory evaluations of cocoa bean samples in progress. However, there is the need to address some issues and challenges to ensure the sustainability of the FQ labs.

These challenges are

- Inadequate infrastructure and space for the establishment and expansion of flavor and quality labs
- Inadequate funding and investment of governments in origin/producer countries into flavor and quality of cocoa beans
- Inadequate finance and support to purchase technological equipment for the establishment and expansion of FQ labs, training of farmers on good post-harvest management practices, tasting panel, lab staff and extension agents.

- Creating and communicating an understanding of cocoa quality to farmers and producers' groups and identifying the quality targets to meet in an easily understandable way that transcends culture and language
- Separating flavors (like astringency, acidity, and bitterness) derived from fermentation issues against ancillary flavors (like fruity, floral, and nutty) and how to effectively link these to physical cues from smell and cut test with strong association and calibration.
- Effective panelist training and initial and ongoing calibration is an overarching concern, as well as, finding ways to calibrate successfully in a cross-cultural setting.
- Although efforts are being made in the development of reference samples, reliable reference, and calibrated samples (liquor and chocolate) are lacking and produced on an ad hoc or opportunistic basis.
- Off flavors (like smoky and over fermented) are easier to understand and assess, others like high astringency (tannic notes) or high acidity are harder to get across. Ancillary flavor notes are even harder.
- Most farmers have never tasted chocolate made from their own beans. Giving them that opportunity is vital in the quality transformation process but getting farmers to taste liquor or their beans (and to taste more often) is a challenge.
- Inadequate quality training materials: the training materials must be good, rigorous, up to date with the most recent research. Training must be strong to ensure that the knowledge can be transmitted, and the information shared widely, and the grading system adopted broadly.

## Learnings and Opportunities

There are many opportunities to address some of these challenges. These include:

- Availability of space/land for the establishment and expansion of FQ labs
- Strong linkage with research institutions in origin countries/producer countries
- Existence of high value markets
- Existence of huge demand of consumers for cocoa products
- Availability of strong support and collaboration from international institution such as Alliance Bioversity-CIAT/Cocoa of Excellence
- Willingness of origin countries to embrace collaborations and partnerships in flavor quality investment options
- Availability of expertise in flavor quality assessment from internationally recognized institutions such as the Alliance of Bioversity and CIAT/Cocoa of Excellence (International Standards for the Assessment of Cocoa Quality and Flavor (ISCQF)), and other companies such as Guittard and TCHO
- Existence of quality downloadable training materials and standard operating procedures (SOPs) for FQ lab management and sensory evaluations on CoEx and ISCQF online platforms
- Strong support from regulators of cocoa in producer countries
- Willingness of origin/producer countries to embrace Public-Private Partnership investment options in high value markets for flavor and quality.
- Availability of support and expertise for the integration of flavor quality into breeding programs in origin countries to develop improved hybrid planting materials with good flavor and quality bean attributes.

## Annexes

1. Success Stories
2. Ghana Cocoa Seed Pod Utilization Report 2019, 2020, 2021
3. Ghana Heat and Drought Tolerance Trials Final Report

4. Nigeria Seed Garden Capacity Assessment
5. Ghana Seed Garden Capacity Assessment
6. ISF Financial Services Landscape Study
7. Inception Report for DFS in Ghana's Cocoa Sector
8. Hidden Cost of Cash to Ghana's Cocoa Sector
9. The Cost of digitization study
10. Cameroon Flavor Lab Visit Report
11. Nigeria Flavor Lab Establishment Story
12. FQ Labs Regional Tasting Session Report

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