



The CocoaSoils Program (a Norwegian Government-NORAD funded initiative), a public-private consortium has been created to address the issues of decline in productivity in cocoa and improve the livelihoods of smallholder cocoa farmers, while avoiding deforestation. The program has two main arms: Research for Development (R4D) and Partnership for Delivery (P4D). The R4D focuses on developing the protocols, establishing trials as well as data collection and management, while the P4D focuses on disseminating the recommendations from these trials in order to empower farmers and improve their livelihoods.

Satellite Trials: Latest updates

Following the January 2019 Annual CocoaSoils Forum, a team was set up to finalize the Satellite Trials Concept and Framework document being used as a guide for the implementation of Satellite Trials across the four countries. This team comprises private sector partners, the National Research Institutions (NARS), the International Institute of Tropical Agriculture (IITA) and Wageningen University and Research (WUR).

Click [here](#) to see team members.

Following this task, a smaller team including the focal points of the NARS have compiled a document on the good agricultural practices in terms of fertilizer application recommendations based on the latest cocoa training manual. This document and additional information provided by the scientists of the NARS helped the team developing the ontology to come up with detailed protocols for the different measurements that will be used in the Satellite Trials. The detailed protocols are currently being finalized.

OVERVIEW:

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The calculation of the amount of inputs (fertilizer, maximum amount of insecticides and fungicides) required per country per year for the first generation of Satellite Trials have been finalized and will be shared with the fertilizer providers in order to have the inputs shipped in countries on time as the implementation of Satellite Trials is planned for September 2019. The implementation of Satellite Trials will start with the site selections after the ongoing baseline survey in the different countries.

Despite the interest of various companies for Satellite Trials adoption, so far, 3 companies have communicated the number of sites and the countries where they will implement Satellite Trials.

Below is a table showing the companies and the countries in which the Satellite Trials will be implemented.

Country	Olam	Mondelez	Rockwinds
Ghana	25	40	30
Côte d'Ivoire	45	40	-
Cameroon	45	-	-
Nigeria	25	-	-

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Core Trials

There are currently 10 confirmed Core Trials sites across the world which are being undertaken by National Research Institutes in West Africa and chocolate manufacturing companies. There are 8 sites in Africa, 1 in Latin America and 1 in Asia. Below are status updates on some selected Core Trial Sites:

IITA - Nigeria (Ibadan)

In May and June, rains stabilized and plantain and weed growth were remarkable. Unfortunately one of the rains came with tremendous winds and destroyed 320 of the plantains, most of which were bearing bunches. Interesting to mention is that 71% snapped just above the soil surface, 28.8 % broke at the upper part of the pseudo-stem and only one uprooted. This is a good bill of root health indicating that the boiling water treatment before planting is still effective and has prevented nematode and weevil infestation. It can thus be assumed that the plantains will persist through the coming dry season and provide shade to the cocoa seedlings.



Plantains broken and snapped at the soil surface after a serious storm on May 20, 2019. (Photo Credit: IITA - Ibadan)

In early May a purchase of large quantity of raw chicken manure was made, which was mixed with soil and slashed biomass, mostly grass. These compost piles are to be opened just before the cocoa planting will start to

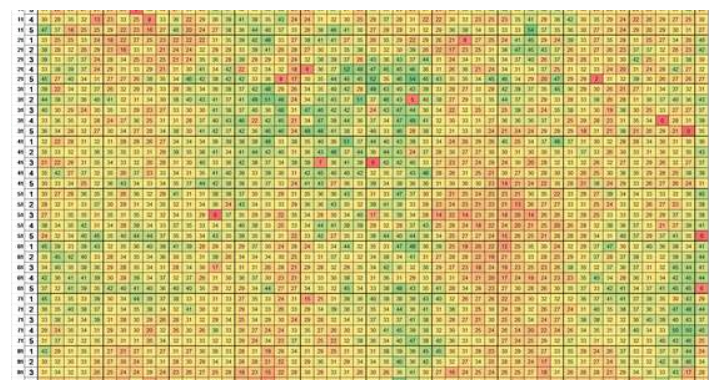
provide the 1kg of compost to the planting holes. As chicken manure is relatively high in Nitrogen (N) this compost will be mixed with compost from the trash collected at the clearing of the field, a year ago, mostly consisting of weeds and branches and leaves for the felled trees.

Currently the IITA core trial team is digging up the tree trash compost and separating out the undecomposed woody materials. These undecomposed branches are chipped in a wood chipper, along with newly cut bush and dead wood to produce a low nutrient mulch material which will be placed around the newly planted cocoa seedlings to prevent excessive weed growth, compaction and erosion. Planting is scheduled for July and at the moment a crew is digging the planting holes.



A wood chipper and a hood to capture chipped material. (Photo Credit: IITA - Ibadan)

A second crew has marked the sampling spots for the soil samples in all plots and an even larger crew is hand weeding the entire field in preparation for the planting. The recovery of the plantains after the dry season was quite impressive and thus two evaluations of plantain growth were conducted. This allows creating "heat maps" of plantain performance which will in addition to the "heat map" from the maize grain yield improve our ability to



A plantain growth heat map created from the evaluation data collected in May 2019. The greener the cell, the better the growth. Dark red are missing plants.

assess soil quality measured by a long term crop at high resolution. Despite the damages sustained in the storm the remaining plantain is growing well and on June 18, the first bunch was harvested.

- Digging and planting of 600 plantain on the extension of 0.5 hectares
- Cutting of tree trunks on the 0.5 ha plot.



CocoaSoils core trial staff with the first bunch of plantain cv Agbagba – 7.58 kg. (Photo Credit: IITA - Ibadan)

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CNRA - Cote d'Ivoire (Divo)

As part of the implementation of the CocoaSoils program, the Centre National de Recherche Agronomique (CNRA) is mandated to set up a Core Trial site on the Divo station. The aim of this trial is to better understand mineral nutrition and cocoa physiology on the one hand and to develop an Integrated Soil Fertility Management (ISFM) system, while improving cocoa production in a sustainable way. This test will be conducted with clonal material.

Actions taken in June 2019 :

- Setting up of nurseries with filling of sachets, grading and sowing beans in 6,800 sachets
- Clearing the plot
- Weeding the plot
- Insecticide treatment of maize against insect attacks



Germination of some cocoa beans from the greenhouse. (Photo Credit:CNRA)



Corn-associated plantain plot. (Photo Credit:CNRA)

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Baseline Data Collection – Field Report

The CocoaSoils baseline data collection commenced in Cameroon and Ghana on May 22, 2019 and June 18, 2019 respectively. The enumerators in both countries had a refresher training on the re-structured questionnaire and underwent a pre-test of the tool in nearby cocoa farming communities to acquire practical experience on the updated tool. Earlier challenges with partners' list of farmers and ensuring that, the representative agro-ecological zones for all partners are covered, accounted for the delay in the start of the baseline in these countries. Côte d'Ivoire and Nigeria will as well begin with a refresher training and pre-testing of the tool before going to the field.

Initial challenges on the field in Cameroon and Ghana had to do with the long distance of cocoa farms from the



6800 bags stored in the greenhouse on Chinese bamboo for the nursery. (Photo Credit:CNRA)

various communities. This has necessitated the use of motorcycles and cars in some communities to help access farms and this affects the expected time and number of questionnaires supposed to be administered in a day. The on-set of the rainy season especially in Ghana is also a major challenge as most farms are being rendered inaccessible by the rain and some farmers also take the advantage to leave the communities very early to work on their farms.

The poor weather condition is also affecting geo-tracing as most enumerators have to wait for a good network signal to record the measurement of the cocoa farms. Enumerators have been provided with wellington boots and raincoats to facilitate their work in the current rainy condition in Ghana.

Data collected is submitted to the CocoaSoils server by the enumeration teams weekly and the CocoaSoils M&E team then makes it available to the baseline coordinators with initial data quality checks and comments. The coordinators also check the data and give their teams feedback to improve quality of data collected across all countries.



Enumerators meeting the community of farmers before start of survey. (Photo Credit: IITA - Accra)



Enumerator interviewing a farmer (Photo Credit: IITA - Accra)

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Partnership for Delivery (P4D)

The Partnership for Delivery (P4D) component of the project implements the dissemination of the results obtained from the R4D component, with emphasis on improved soil fertility recommendations, improved cocoa productivity while avoiding deforestation in our implementation areas. This component is also responsible for the promotion and construction of strategic partnerships with industry partners, as well as with governments to improve existing policies related to sustainable cocoa production.

With regards to building strategic partnerships, two country committees, one in Côte d'Ivoire and the other in Ghana, have been established with a defined mandate and an established functional mechanism. The Country Committee in Cameroon held its maiden meeting at the end of May 2019 and the next meeting of the Committee is scheduled for September 2019. The maiden Country Committee meeting in Nigeria is scheduled to be held at the end of July and will devote national support to the project. With respect to the production of tools and manuals for the training of extension agents, extensive work has started, to collect existing documentation in each country and synthesis is expected to be done by the end of July. This will lead to enrichment and validation workshops of updated manuals in each country.

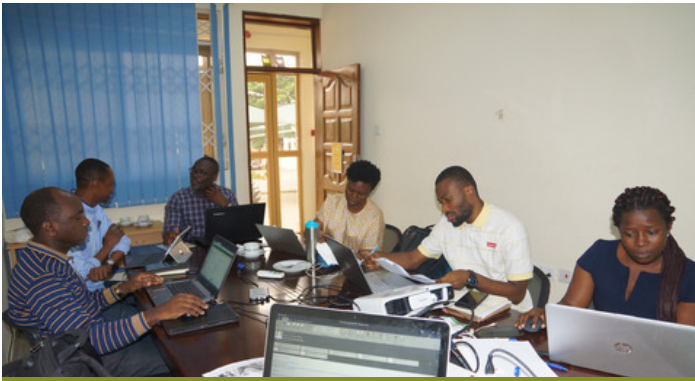
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Coordination team strategic meeting

The coordination team has held a strategic meeting in Accra, Ghana from July 16-18, 2019. The objective of this meeting was to ensure a synchronization of project implementation plan-timelines and current plans by each component of the project.

Topics discussed included:

- The Theory of Change, Results framework and Implementation plan.
- The Baseline survey and data collection
- Monitoring and Evaluation
- Implementation of Satellite Trials
- Implementation of Partnership for Delivery



Coordination team discussing the satellite trials
(Photo Credit: IITA - Accra)



Coordination team discussing the M&E
(Photo Credit: IITA - Accra)

Modelling soil fertility restoration strategies using organic inputs in cocoa plantations

Thomas Fungenzi is a PhD student with the University of Cranfield and is currently looking for datasets to enhance his research on modelling soil fertility restoration strategies using organic inputs in cocoa plantations. Any interactions to promote this project with the CocoaSoils network will be welcomed. Below is an excerpt of his presentation on his thesis topic. Follow this [link](#) to see the entire presentation.

Soil organic matter (SOM) reflects key aspects of soil functioning and is sensitive to management. It has direct and indirect influences on plants. SOM is, for example, a reservoir of nutrients, often linked to water holding capacity, buffers pH, contributes to CEC, stimulates growth and acts as a reservoir of matter and energy for soil micro-organisms. The aspiration of this study is to support decision-making around cocoa soil fertility management. The purpose of this research project is to evaluate the capacity of organic inputs to improve cocoa production by restoring optimal SOM levels.

The characterisation of SOM dynamics is addressed by a literature review, a meta-analysis, field measurements and a modelling exercise. Soil samples were collected

in a chrono sequence of Indonesian cocoa farms (ranging from 0.5 to 31 years old) and results will be used in the models. Different organic input strategies (i.e., “restoration scenarios”) will be assessed through simulations. Variations will involve nature and quality of the organic inputs, timings and application rates to reach a range of soil organic matter targets.

The final stage will be to estimate the effect on production. The possible effects of SOM on soil fertility properties will be investigated using pedotransfer functions. The influence of organic inputs on soil water holding capacity will be the prime focus, since soil water is a key driver of cocoa production.

The consequences on cocoa growth, and potentially on yields will be investigated further, using other models such as WalNulCas and CASE2.

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The 4th Open Science meeting 2019 of the Global Land Program

As part of the [4th Open Science meeting 2019 of the Global Land Programme](#), Dr. Marieke Sassen of UNEP-WCMC, a partner organization of the CocoaSoils Program gave a presentation on some of UNEP-WCMC’s analysis results under the theme “*Assessing current and future risk to biodiversity and ecosystem services from cocoa-driven deforestation in the cocoa zone of West Africa*” to promote the work and explore potential collaborations with others working in this area.

In her presentation, she discussed the spatially explicit approach that UNEP-WCMC used to help understand and visualize potential trade-offs among cocoa production and forest related biodiversity and ecosystem services at the national scale. She explained how they characterized and mapped potential future risk to biodiversity and ecosystem services due to cocoa expansion in the West African cocoa zone. She described how they used various modelling tools to link measures of biodiversity and ecosystem services to change in land use, under different future cocoa expansion scenarios.

The results showed that, depending on past impacts, there are different risks and some opportunities for biodiversity and cocoa in different countries in West Africa.

Follow this [link](#) to read her presentation.

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Lucette Adet - Ph. D. Student on CocoaSoils

Lucette Adet, is a PhD student at Crops Systems Analysis (CSA) at Wageningen University and Research (WUR), working under the CocoaSoils project on the research topic “*Ecophysiology and nutrition of Cocoa*”. This research is being done in collaboration with The World Agroforestry Centre (ICRAF), Nestlé Côte d'Ivoire and Centre National de Recherche Agronomique de Côte d'Ivoire (CNRA). She has a Masters Degree in Climate Change and Adaptation land Use from Federal University Technology Minna (Nigeria) and a Bachelor in Plant Biology and Physiology from University Felix Houphouët Boigny (Côte d'Ivoire).

The direct environment where cocoa trees are grown has a direct impact on how the crop perform during each stage of its development and also during each season. Due to long term weather variation, rainfall patterns change and increasing of air temperature, cocoa is susceptible to suffer from environmental stresses among which drought stress is mainly experienced by crops nowadays.



Lucette Adet, PhD student on the CocoaSoils Program

This complex, multi-sided mechanism implies that water deficit and dry air in the environment of the crop induces several different genetic, biochemical and physiological responses from the plants. Thus, there is a need to assess the relationship that are involved in the process of growing under different stresses particularly drought stress.

Therefore, under the CocoaSoils Program, Ms. Adet will use existing cocoa plantation composed of sufficiently homogeneous material. Her research aims to investigate physiological responses of cocoa trees to various levels of potassium treatments under drought stress in view to identify the extent and regulation of the interaction between these factors.

First of all, attention will be paid to cocoa photosynthetic responses to water stress under potassium application. Then, her study will look at the implication of potassium on drought resistance of cocoa flowering intensity and fruit setting. Furthermore, stem sap flow variation of cocoa tree in response to drought stress and potassium treatments will be investigated.

Finally, she will focus on verifying to what extent drought effects simulated in a physiological cocoa growth model (CASE 2) match those observed in the experiment. Ms. Adet will be based in Côte d'Ivoire and will benefit from the collaboration between Wageningen University and Research (WUR), and the other Ivoirian institutes involved in the project.

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Upcoming Events

P4D Committee Meeting - Nigeria

Date: 23 July 2019

Venue: Ibadan, Nigeria

The CocoaSoils Annual Forum

Date: 20 - 24 January 2020

Venue: Yaoundé, Cameroon

CocoaSoils Discussion Forum

What are your burning questions about enhancing cocoa production, maintenance of soil fertility, the challenges facing smallholder cocoa farmers, etc?

The CocoaSoils team has access to a very wide range of scientific and business expertise through the many partner institutions and companies who are collaborating. Please pose your questions to the coordinator at R.Asare@cgiar.org and we are open to a discussion in the next edition of our newsletter.

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Do you have a story to share? Send it to: Sa.Akande@cgiar.org