

INNOVATIVE DIGITAL DATA COLLECTION IN COLLABORATIVE COCOA FERTILIZER TRIALS

Ekatherina Vasquez, Wageningen University & Research, The
Netherlands

Lotte Woittiez , Joost van Heerwaarden, Arun Pratihast



2022 International Symposium on Cocoa Research (ISCR), Montpellier, France

CocoaSoils

- CocoaSoils addresses a huge knowledge gap on soil fertility and mineral nutrition needs of the cocoa tree, as well as exploring impacts of climate change, the role of agroforestry, avoiding deforestation and ensuring a living income for cocoa farmers.
- CocoaSoils is a public-private partnership between cocoa and fertilizer companies, CGIAR centers and other public research institutes. The consortium is co-led by IITA and Wageningen University & Research.



Trials set up

CORE TRIALS



11 Long-term nutrient response experiments
6 countries: Ghana, Nigeria, Cameroon, Cdi, Indonesia and Ecuador.



SATELLITE TRIALS



393 Farmer-managed sites
4 countries: Ghana, Nigeria, Cameroon, and Ivory Coast
T1: C+ I
T2: BMP + no F
T3: BMP + NF
T4: BMP + OF

Effects of:

- Multifactorial fertiliser combinations (N-P-K) as part of integrated soil fertility management
- BPM: Shading, pruning, weeding, pest control.

Aim: To evaluate the impact of optimized cocoa tree management and nutrient supply.

Collaboration in Research

Experts knowledge

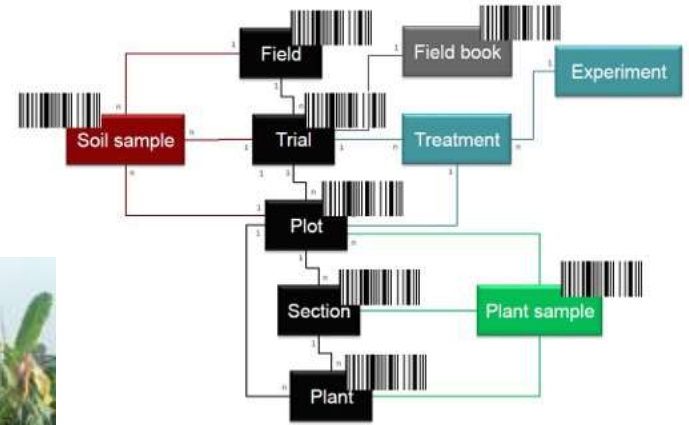


- Development of protocols for data collection and management of the trials.

Barcode system



- S0 => stands for satellite trial
- CA => Country code
- 064 => Field ID
- 004 => Plot ID
- 24 => Tree ID



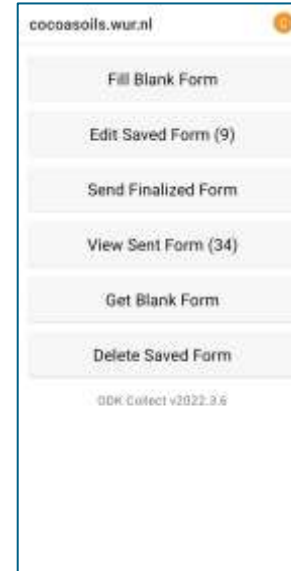
ODK Data Collection



Protocol



XLS



ODK forms



Data collection

Data Collection – Core trials

Trial Establishment

- Plot coordinates
- Field soil sample

Maize Uniformity Crop

- Maize harvest per plot

Nursery

- Nursery and seedling information

Field preparation

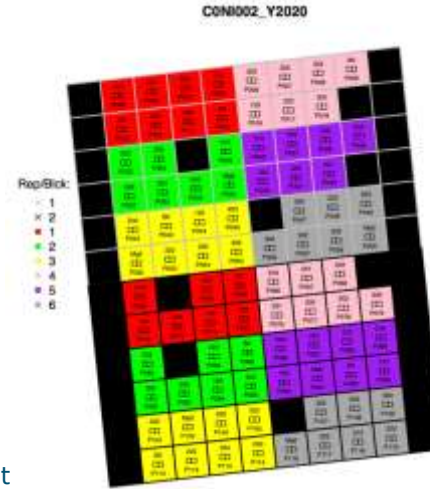
Planting cocoa

- Planting details, compost, fertiliser use, nutrient analysis.

Measurements

Management

- Weeding, pruning, pest and disease.



Yearly assessment

- Tree height
- Trunk circumference
- Crown depth and crown radius
- Leaf number
- Flushing, flowering, cherelle and pod presence
- Canopy cover
- Pod count per size class
- Pod and Bean yield
- Litter biomass
- Chupon removal

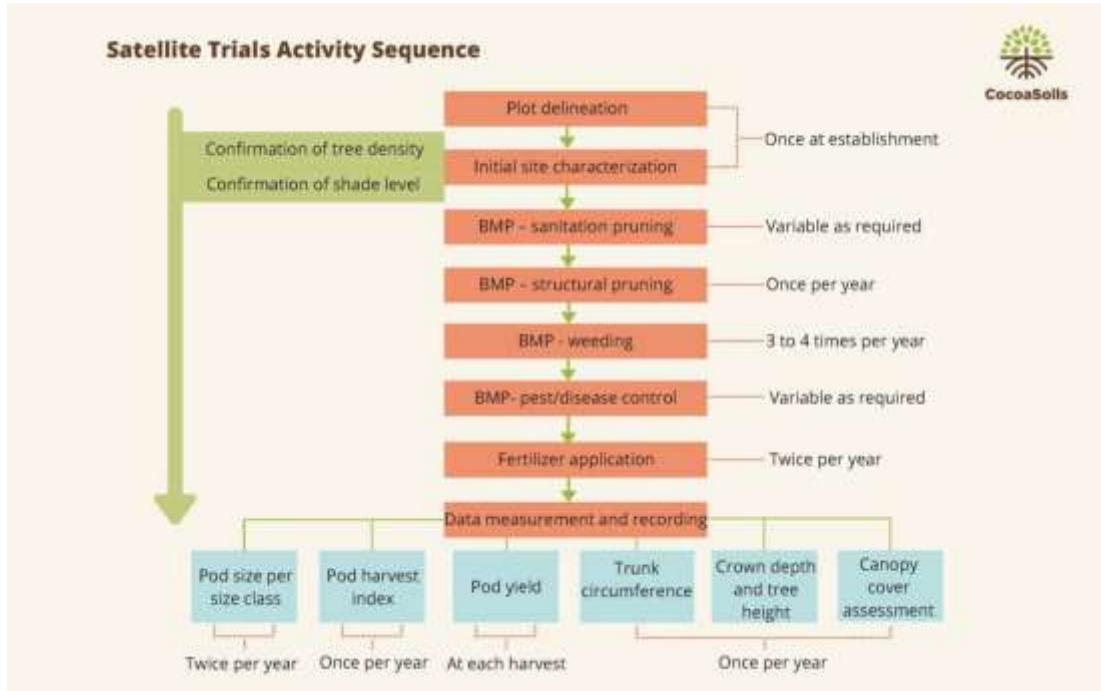
Nutrient response trial:

6 countries – 11 CT

Per trial

- * Fertilizer selection
- * Tailor-made formulation,
- * Design map of treatments,
- * Identification tool using ODK
- * Fertilizer preparation guidelines, and application.

Data Collection – Satellite trials



127 partners' technicians in Ghana, Cameroon, Nigeria and CdI.

Consecutive data collection since 2019.

Data storage and data publication

Core trial



Satellite trial



Field data collection



Data storage and
processing



Data publication



CocoaSoils Ontology

Cocoa Ontology: A collaborative
pathway for FAIR Data



January 2022

Data sharing with CocoaSoils partners

CocoaSoils Select a dataset to download [Home](#) [Downloads](#) [Contact](#)

Country:
 Company:
 Dataset:
 Date: from to

[Download as CSV](#) [Download as JSON](#)

Dataset with information about fertilizer application in treatment 4 (offtake model)

Data accessibility

I	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	E		
1	country	company	site_no	plot_id	substrate	prtn	yes	treat	period	ac_data	app10	pages	10	app10	14	other_14	rate	14	other_14	rate	observed
2	Ghana	Kuapa	K415004000	50G4000	000000	yes	1_0	period_1_g		yes	yes		yes								Good flower formation
3	Ghana	Kuapa	K415004002	50G4020	000000	yes	1_0	period_1_g		yes	yes		yes								Good flowering
4	Ghana	Kuapa	K415004011	50G4011	000000	yes	1_0	period_1_g		yes	yes		yes								Good flowering
5	Ghana	Kuapa	K415004025	50G4025	000000	yes	1_0	period_1_g		no	yes		Hydrated	yes	1.02g						
6	Ghana	Kuapa	K415004009	50G4009	000000	yes	1_0	period_1_g		yes	yes		Hydrated	yes	1.02						
7	Ghana	Kuapa	K415004050	50G4050	000000	yes	1_0	period_1_g		yes	yes		Hydrated	yes	1.02						
8	Ghana	Kuapa	K415004062	50G4062	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
9	Ghana	Kuapa	K415004048	50G4048	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
10	Ghana	Kuapa	K415004038	50G4038	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
11	Ghana	Kuapa	K415004045	50G4045	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
12	Ghana	Kuapa	K415004045	50G4045	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
13	Ghana	Kuapa	K415004013	50G4013	000000	yes	1_0	period_1_g		yes	yes		yes	yes							More cherries but there is incident
14	Ghana	Kuapa	K415004061	50G4061	000000	yes	1_0	period_1_g		yes	yes		yes	yes							All the fertilizer being given have
15	Ghana	Kuapa	K415004039	50G4039	000000	yes	1_0	period_1_g		yes	yes		yes	yes							Hand pollination was done on all 10
16	Ghana	Kuapa	K415004032	50G4032	000000	yes	1_0	period_1_g		yes	yes		yes	yes							Fertilizer was applied in May and 10
17	Ghana	Kuapa	K415004041	50G4041	000000	no	1_0	period_1_g		yes	yes		yes	yes							
18	Ghana	Kuapa	K415004042	50G4042	000000	no	1_0	period_1_g		yes	yes		yes	yes							
19	Ghana	Kuapa	K415004081	50G4081	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
20	Ghana	Kuapa	K415004082	50G4082	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
21	Ghana	Kuapa	K415004038	50G4038	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
22	Ghana	Kuapa	K415004031	50G4031	000000	no	1_0	period_1_g		yes	yes		yes	yes							Moderate
23	Ghana	Kuapa	K415004049	50G4049	000000	no	1_0	period_1_g		yes	yes		yes	yes							Moderate
24	Ghana	Kuapa	K415004050	50G4050	000000	no	1_0	period_1_g		yes	yes		yes	yes							Good
25	Ghana	Kuapa	K415004040	50G4040	000000	yes	1_0	period_1_g		yes	yes		yes	yes							Moderate
26	Ghana	Kuapa	K415004083	50G4083	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
27	Ghana	Kuapa	K415004082	50G4082	000000	yes	1_0	period_1_g		yes	yes		yes	yes							Plot looks different from the rest.
28	Ghana	Kuapa	K415004086	50G4086	000000	yes	1_0	period_1_g		yes	yes		yes	yes							Plot is responding well.
29	Ghana	Kuapa	K415004089	50G4089	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
30	Ghana	Kuapa	K415004088	50G4088	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
31	Ghana	Kuapa	K415004088	50G4088	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
32	Ghana	Kuapa	K415004089	50G4089	000000	no	1_0	period_1_g		yes	yes		yes	yes							
33	Ghana	Kuapa	K415004089	50G4089	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
34	Ghana	Kuapa	K415004045	50G4045	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
35	Ghana	Kuapa	K415004048	50G4048	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
36	Ghana	Kuapa	K415004047	50G4047	000000	yes	1_0	period_1_g		yes	yes		Hydrated	yes	1.02g						No
37	Ghana	Kuapa	K415004085	50G4085	000000	yes	1_0	period_1_g		yes	yes		yes	yes							
38	Ghana	Kuapa	K415004045	50G4045	000000	yes	1_0	period_1_g		yes	yes		yes	yes							No comments

Our aim:

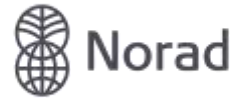
- To generate a set of **integrated soil fertility management** and a **decision support system** for intensifying cocoa production through judicious use of agricultural inputs.
- Documented evidence for **understanding** the physiological basis of cocoa **nutrient uptake and use**.
- Identification of **recommendation** domains and **impact** of **sustainable intensification** on forest pressure.
- Operational **open knowledge** and **data sharing portal** for the storage, management, and dissemination of cocoa intensification research results.

Conclusions

- Innovative data collection approaches are needed to improve data repositories and decision tools support.
- We have developed and operationalize an innovative digital data collection workflow, from field data collection and data processing to cocoa ontologies.
- Collaboration in cocoa research is key to improve productivity and farmers living income.

Acknowledgements

- NORAD
- Public-private partnership
- WENR team (Arun Pratihast, Sander, Janssen, Christina Cappello, Eloi Carvalho)
- WUR-PPS team (Ken Giller)
- IITA Ghana (Leonard Rhuzinamhodzi, Bernard Vanlauwe, Richard Asare)
- IITA Nigeria (Stefan Hauser)



Partnership

Project Lead/Donor	 			
National Research Institutes				
Intl Research Centres			 	<p>Alliance</p>  
Private partners	 	  	  	    

Thank you!

- Questions?

