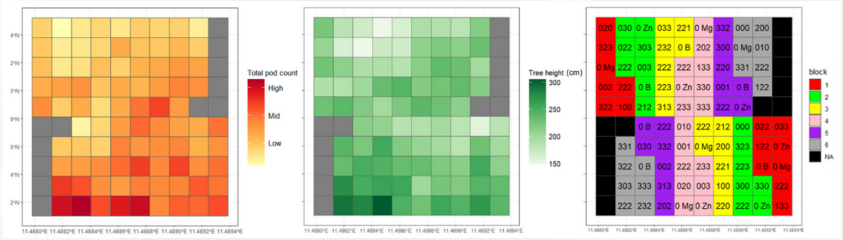

Way forward

- Continue with the management and data collection in the 10 Core Trials.
- Improve the existing data collection pathways and protocols.
- Analyse the available data (vegetative growth and yield) to assess the effects of nutrient combinations on establishment, early vegetative growth, yield, and yield components.
- Ensure regular communication between CT managers and the Trials and Data teams.
- Start collecting pod count data per tree, to assess variability among trees.
- Visit trials with incomplete data to retrieve the remaining data and/or conduct additional measurements.
- Seek additional funds to conduct a leaf sampling campaign in all trials to determine critical leaf concentrations through DRIS and CND, and to calculate nutrient use efficiencies.
- Develop improved fertilizer recommendations and update the offtake model.

Further reading & more information

Van Heerwaarden et al. (2022) Multi-locational nutrient response trials for the development of cocoa fertilizer recommendations.

Van Heerwaarden & Woittiez (2019) Experimental design & fertiliser rates.

Contact

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CocoaSoils

Core Trials Fact Sheets July 2025

IITA · CGIAR · Norad · CGIAR Sustainable Farming · Wageningen University & Research

Background

The CocoaSoils Core Trials are long-term multi-nutrient response trials, established in newly planted fields with the best available clonal planting material, irrigation, and optimal management practices.

Currently, there are ten two-hectare Core Trials in six countries, varying in age from three to almost six years after planting (Table 1). Trial 11 (Cameroon) was discontinued in 2024.

The Core Trials are designed as a reduced factorial with four levels (Figure 1a). Each field has a unique blocking structure, which captures the field heterogeneity (Figure 1 b,c). Trials are managed according to the CocoaSoils Core Trial management protocols, following agronomic best practices. Data are routinely collected according to the CocoaSoils Core Trial measurement protocols using ODK software on tablets
or mobile phones

Code	Country	City	Host	Funder	Planted (date)	Age (y)
COCA002	Cameroon	Mbalmayo	IITA	NORAD	10/2020	4
COCI001	Côte d'Ivoire	Divo	CNRA	NORAD	05/2020	5
COCI002	Côte d'Ivoire	Tiassale	Barry	Barry	11/2020	4
COCI003	Côte d'Ivoire	Aboisso	Nestlé	Nestlé	11/2020	4
COGH001	Ghana	Maabang	CRIG	NORAD	10/2019	5
COGH002	Ghana	Buako	Mondelez	Mondelez	06/2022	3
CONI001	Nigeria	Owena	CRIN	NORAD	01/2020	5
CONI002	Nigeria	Ibadan	IITA	NORAD	07/2019	5
COEC001	Ecuador	Guayaquil	Espol	Cargill	11/2020	4
COIN001	Indonesia	Jember	ICCRI	Mondelez	08/2020	4

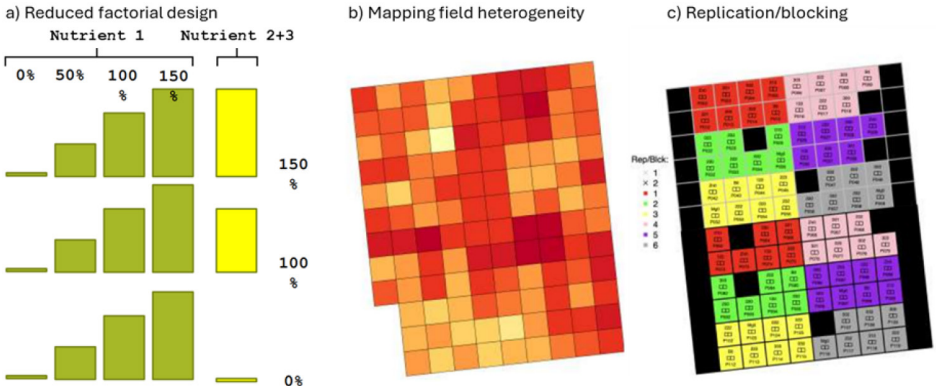

Figure 1: a) The statistical design of the Core Trials (three nutrients with four levels; one nutrient varies at 0%, 50%, 100% or 150% of the estimated nutrient offtake, while the other two are kept the same, at either 0%, 100% or 150%);

b) Visualisation of field heterogeneity in one of the trials, based on results from a maize uniformity crop, and c) The individually designed blocking structure in the same trial..

- Collected data include vegetative growth variables (height, trunk diameter, canopy size), flower abundance scores, cherelle abundance scores, pod counts, and pod weights. Dry bean weights are collected for sub-samples.

- Collected data are pre-cleaned and stored in a database accessible for all consortium members (https://cocoasoils.containers.wur.nl). CocoaSoils Core Trials Fact Sheets July 2025

Key findings

- Plot yields (trials >4 y) vary between <100 kg and >3500 kg dry beans per hectare equivalent.
- Yields of >1000 kg dry beans per hectare are observed in Mbalmayo (Cameroon), Tiassale (Côte d'Ivoire) and Guayaquil (Ecuador).
- Significant yield responses to N + K, N, and N + P are observed in Mbalmayo, Tiassale and Ecuador, respectively.
- For the remaining trials, yields are still < 1000 kg dry beans per hectare equivalent. Yield responses to nutrients are expected to increase in the coming years, as the trees become more productive and deplete and require more of the available soil nutrients.