

The CocoaSoils nutrient offtake model: preliminary results from on-farm trials

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Overview of the talk

- Introduction to CocoaSoils
- Part 1: Offtake model
- Part 2: Application in CocoaSoils Satellite Trials
- Concluding remarks

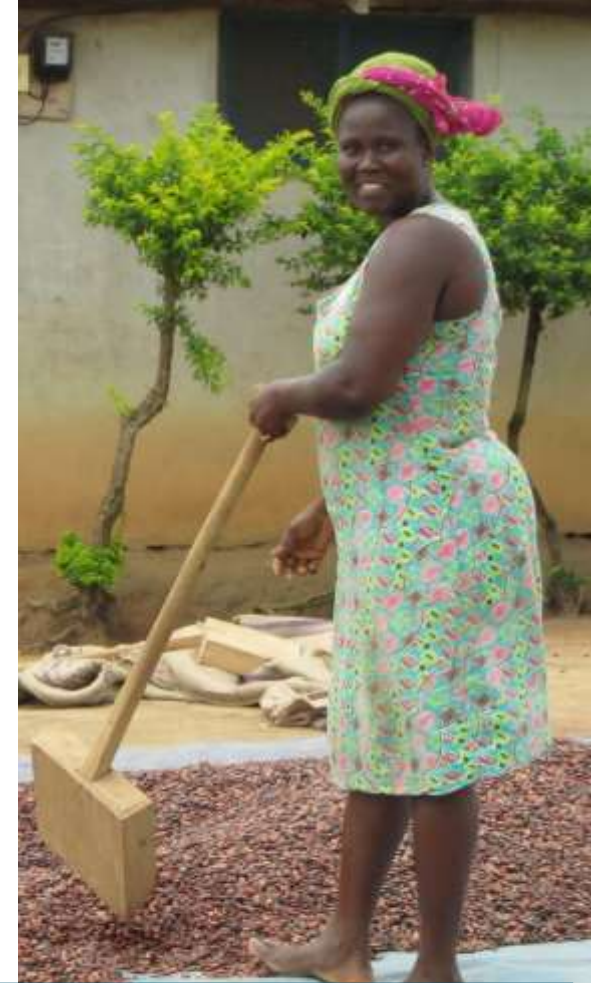


Introduction to



CocoaSoils

- Implementing ISFM to improve cocoa yields
- Consortium of private partners and national and international research institutes
- Funded by Norad
- In six countries (CdI, Ghana, Nigeria, Cameroon, Indonesia, Ecuador)
- On-station and on-farm research and dissemination



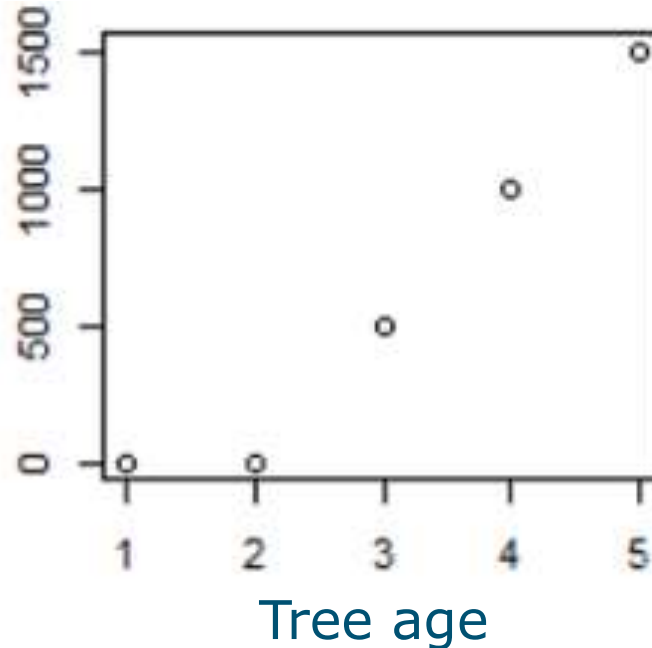
Part 1: The offtake model

- Calculates nutrient requirements based on nutrient offtake and immobilisation
- Calculations based on five components:

YIELD	BIOMASS ACCUMULATION	NUTRIENT CONCENTRATIONS	RECOVERY RATES	EXPERT OPINION
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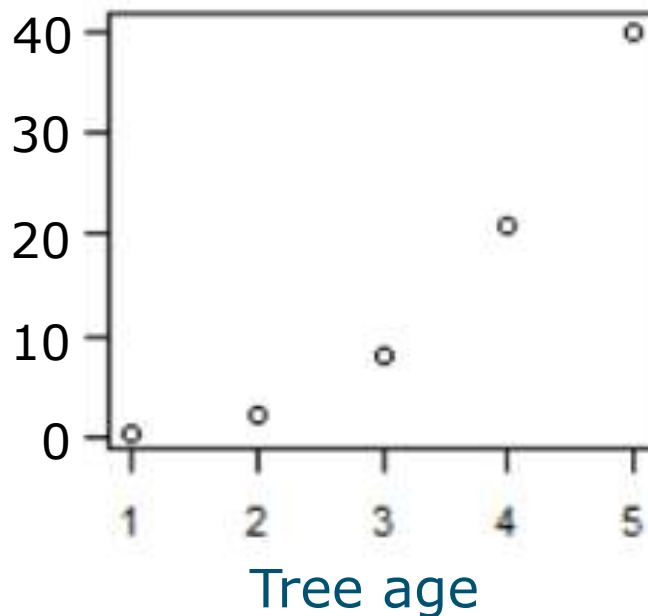
YIELD	BIOMASS ACCUMULATION	NUTRIENT CONCENTRATIONS	RECOVERY RATES	EXPERT OPINION
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Target yield (kg dry beans ha⁻¹ year⁻¹)



YIELD	BIOMASS ACCUMULATION	NUTRIENT CONCENTRATIONS	RECOVERY RATES	EXPERT OPINION
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Cumulative wood DM (t ha⁻¹)



YIELD	BIOMASS ACCUMULATION	NUTRIENT CONCENTRATIONS	RECOVERY RATES	EXPERT OPINION
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Nitrogen concentrations (%)

n_bean = 2.2 # In beans
n_husk = 1.0 # In husks
n_leaf = 2.5 # In leaves
n_trbr = 0.67 # In trunk and branches
n_root = 0.75 # In roots

YIELD	BIOMASS ACCUMULATION	NUTRIENT CONCENTRATIONS	RECOVERY RATES	EXPERT OPINION
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Recovery rates (kg/kg)

recovery_n = 0.75 # For nitrogen (N)
recovery_p = 0.30 # For phosphorus (P)
recovery_k = 0.80 # For potassium (K)

YIELD	BIOMASS ACCUMULATION	NUTRIENT CONCENTRATIONS	RECOVERY RATES	EXPERT OPINION
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Expert opinion (Yara)

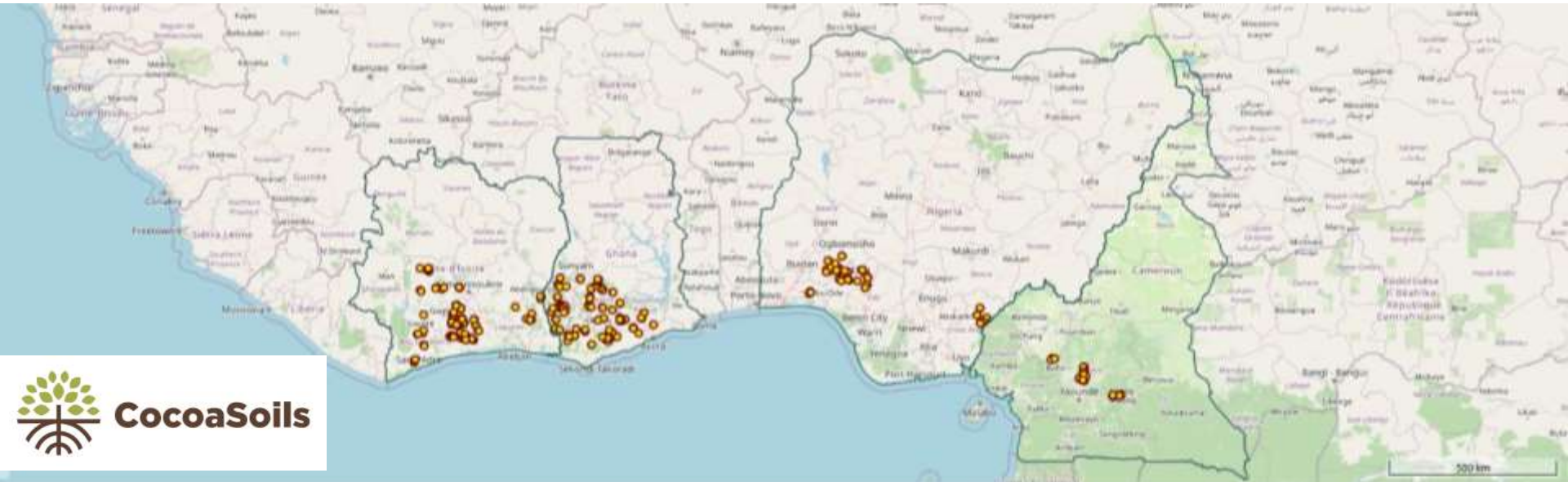
Requirement per additional ton above 1 t dry bean yield

8.8 kg P

58 kg K

Part 2: Satellite trial preliminary results

- ~350 farms across four countries



Satellite trials: treatments

- 21 x 21 m plots, four per farm
- Treatment layout:
 - T1: Farmer practice + insecticide application
 - T2: Farmer practice + GAP
 - T3: GAP + national fertilizer recommendations
 - T4: GAP + offtake model fertilizer recommendations

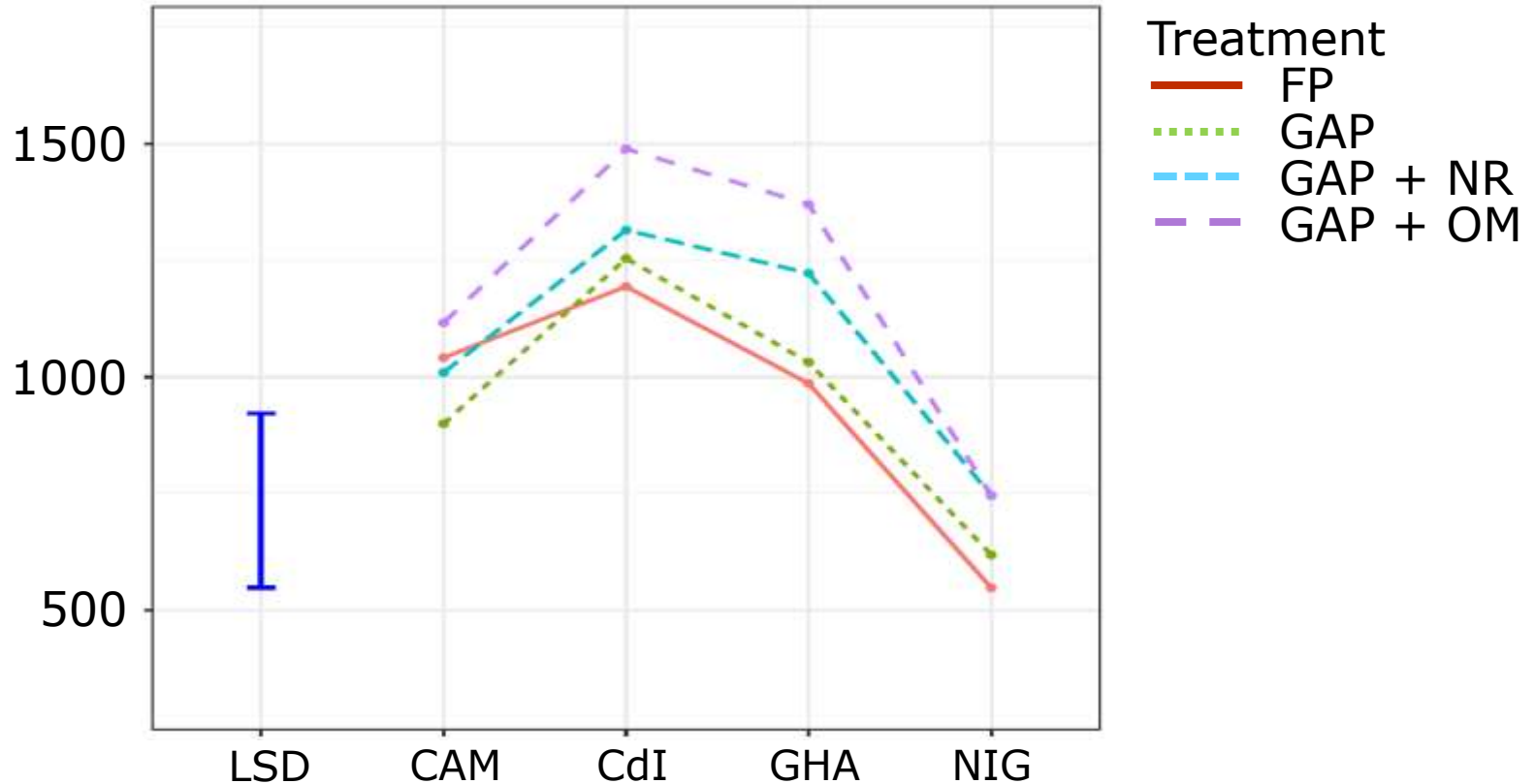
Fertiliser recommendations

Country	National recommendations (kg ha ⁻¹ year ⁻¹)			Model 1000 kg yield, 8-22 YAP (kg ha ⁻¹ year ⁻¹)		
	N	P	K	N	P	K
Cameroon	0	22.3	35.0			
CdI	0	33.5-44.7	52.6-70.1			
Ghana	0	26.0	59.1			
Nigeria	50.0	21.8	52.6			

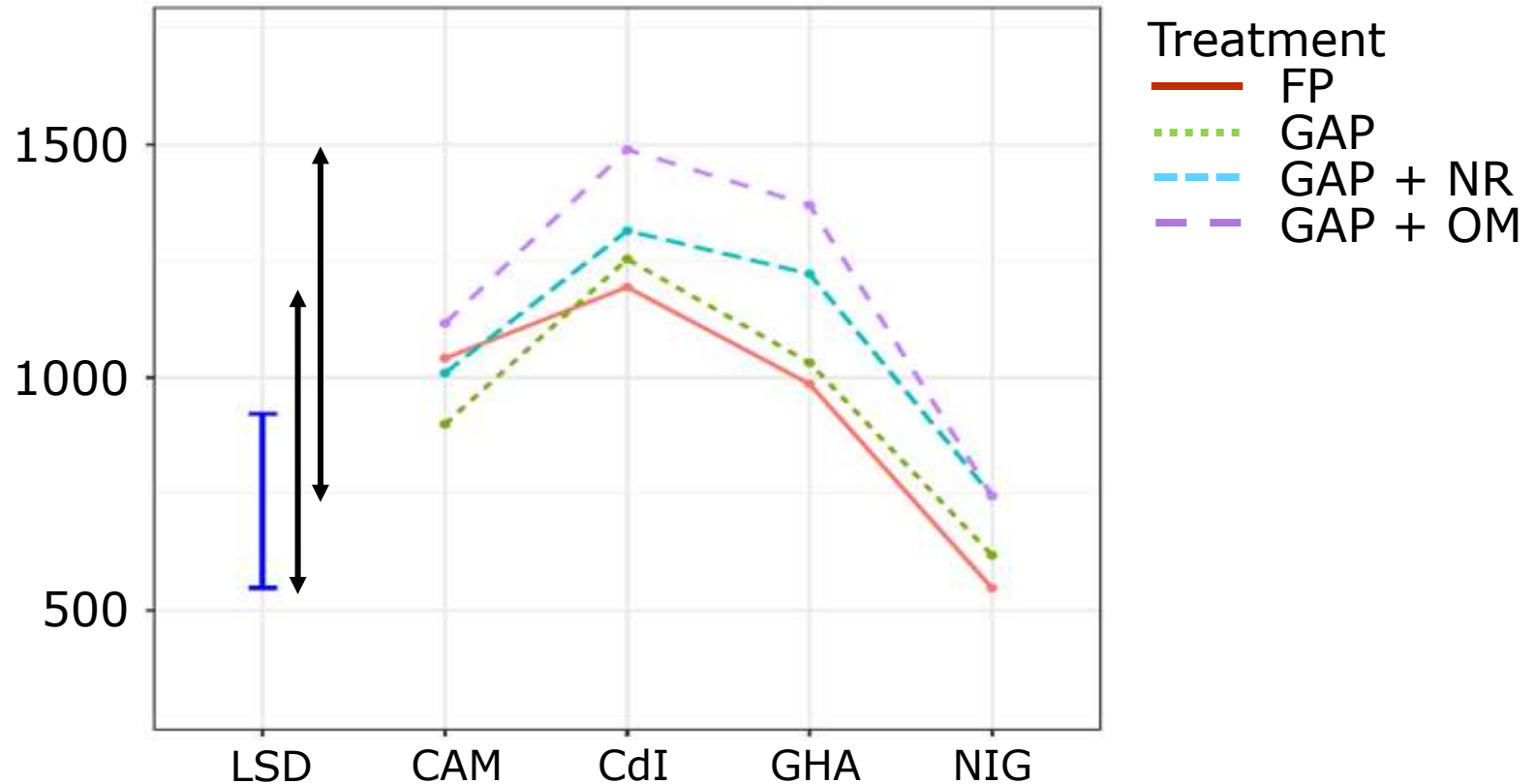
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CdI	0	33.5-44.7	52.6-70.1	58.5 ↑	46.1	96.3 ↑
Ghana	0	26.0	59.1	58.5 ↑	46.1 ↑	96.3 ↑
Nigeria	50.0	21.8	52.6	58.5	46.1 ↑	96.3 ↑

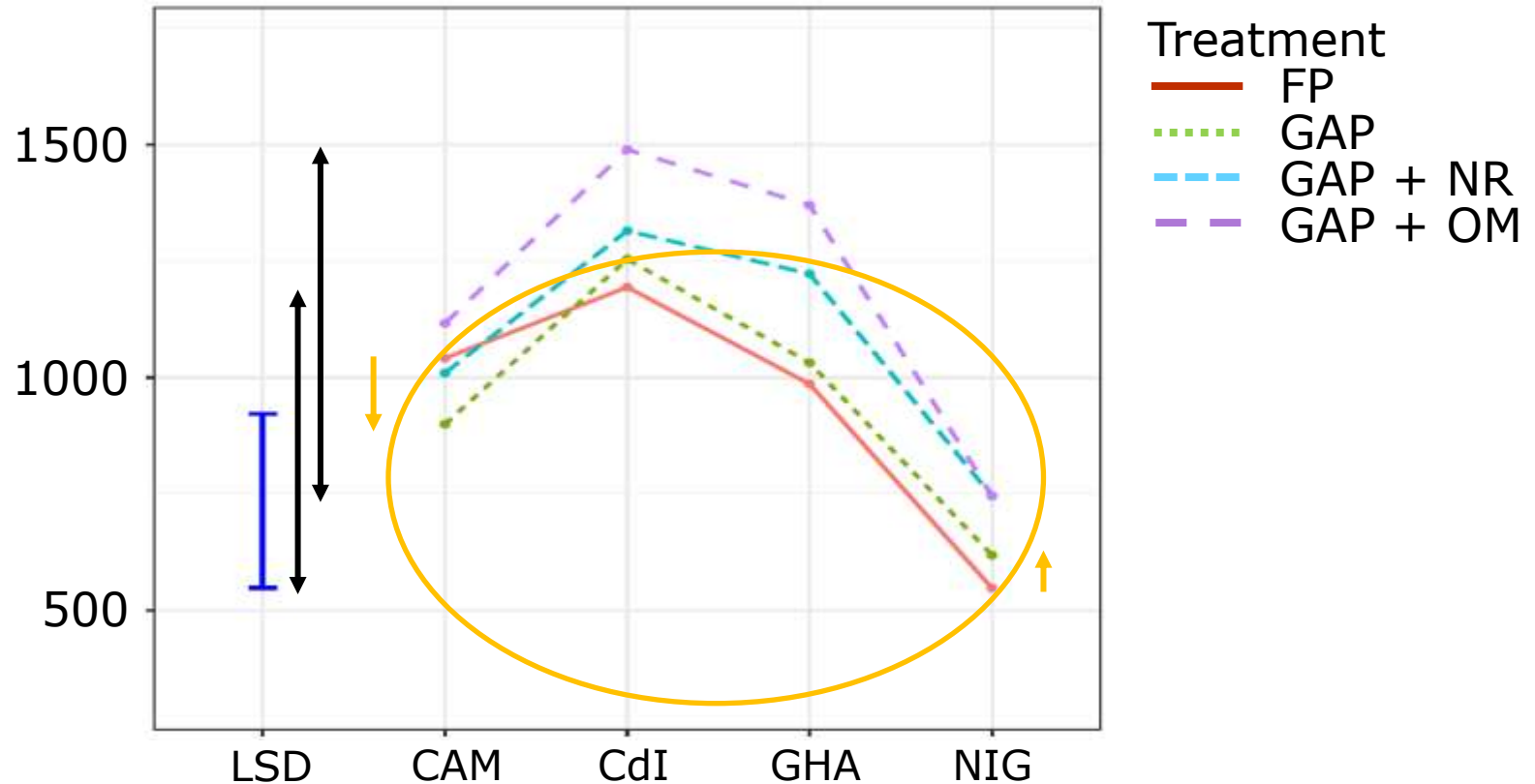
Satellite trials: preliminary results of treatments



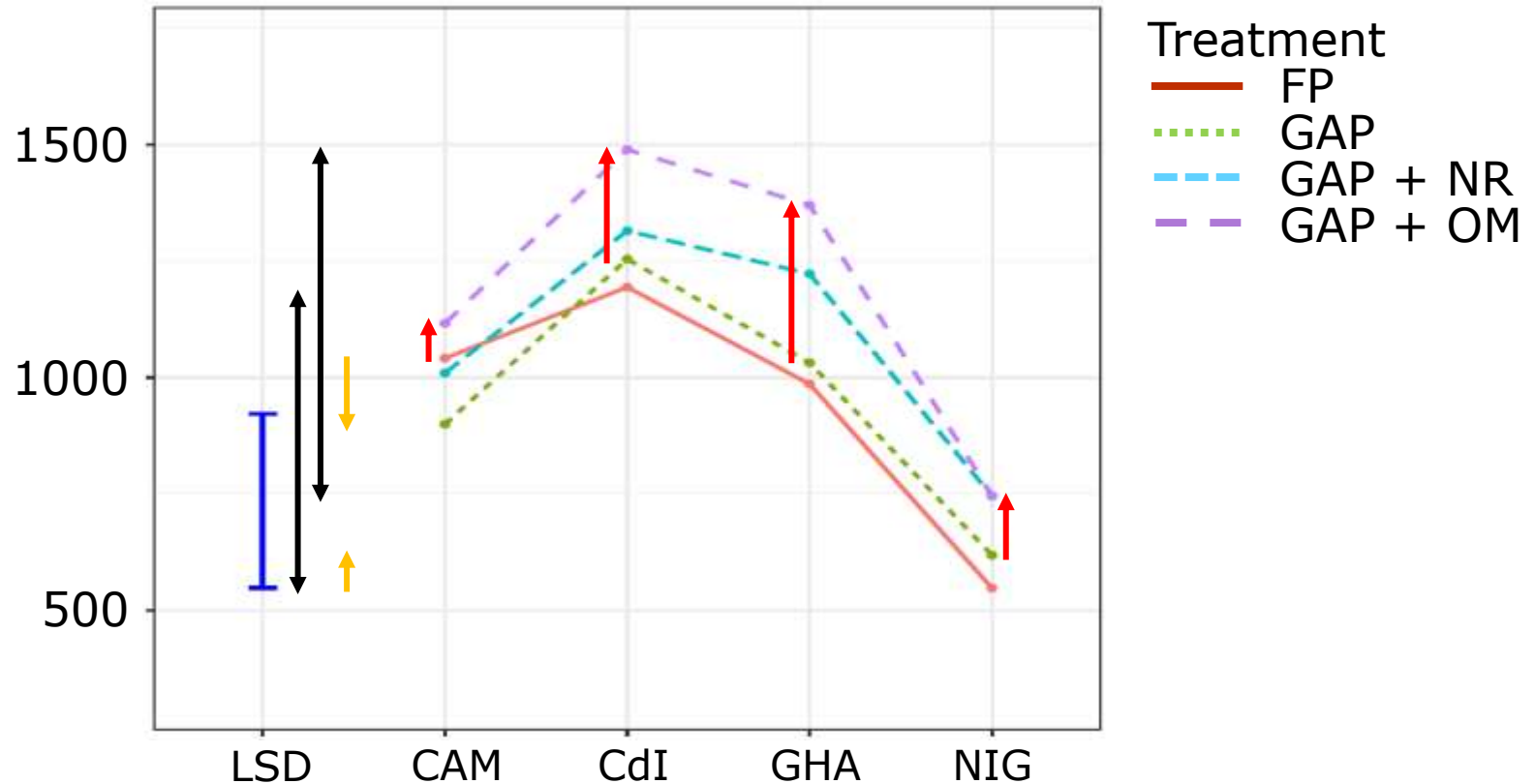
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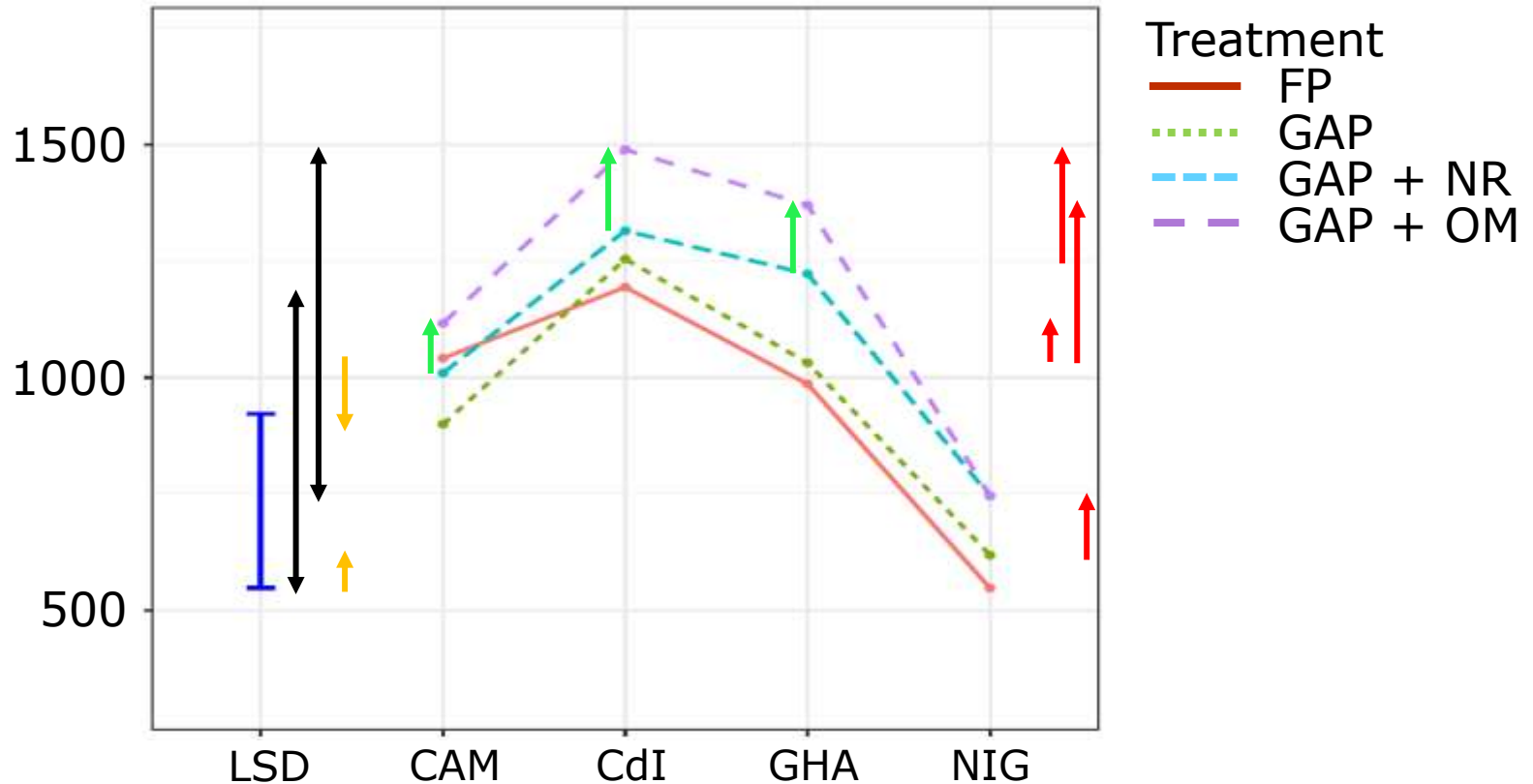
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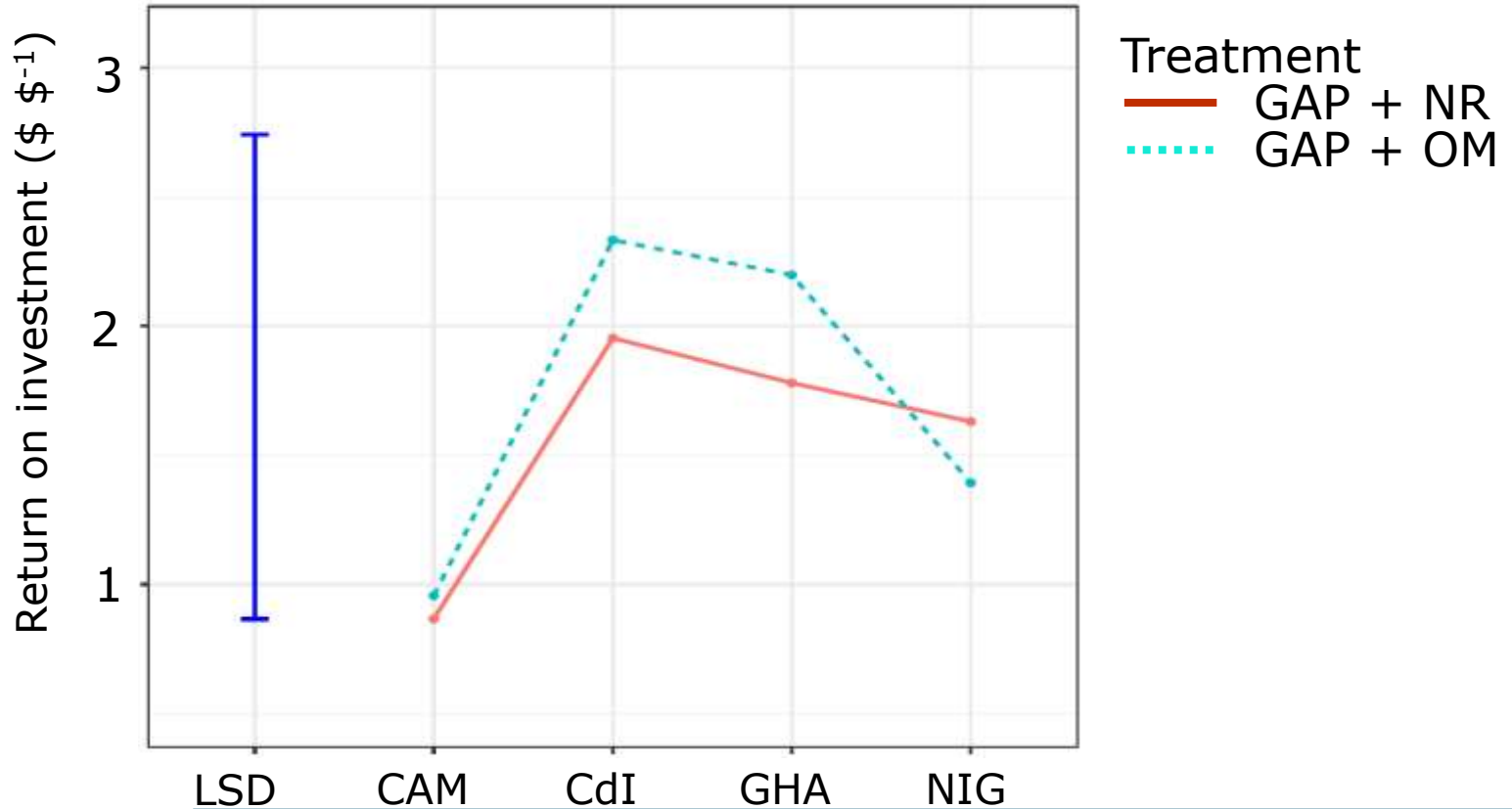
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Satellite trials: preliminary results of treatments



Return on investment



Concluding remarks

- Offtake model predictions outperform national recommendations
- Large variability between countries
- Large variability between farms
- Higher ROI from offtake model recommendations
 - Despite modest yield increases
- Call to prepare optimum blends for different cocoa growing regions

Acknowledgements



- NORAD (funding) & project administration (IDH)



- Company partners



- National research institutes (CNRA Côte d'Ivoire, CRIG Ghana, CRIN Nigeria, IRAD Cameroon)



- International research centres

- IITA (Bernard Vanlauwe, Richard Asare)



- Wageningen team



Thank you

Questions?



CocoaSoils