A stepwise approach to achieve the best agronomic management practices and sustainable fertilizer use in West African cocoa production

Background

Smallholder farmers face severe resource limitations

Sub-optimal application of BMPs (inability to purchase fertilizer)

Wide yield gaps

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The best returns to fertilizer applications are achieved when yield limiting factors such as pests and diseases are eliminated.

What is the most sustainable approach to achieve best agronomic management practices (BAMPs) and enable resource constrained farmers to apply needed nutrients in cocoa?

How do we deal with susceptibility to climate variability and change?

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Up to 50% of farmers were not using fertilizer

Among those who used, they did not apply the recommended rates

Farmers were not achieving the best management (weeding, pruning, pest and disease control)
What is stepwise approach?

Stepwise approach breaks down the recommended best practices that many farmers cannot afford to implement at once:

Smaller, more affordable packages

Can be implemented in phases to enhance adoption of agricultural technologies.

Vanlauwe et al. (2015)

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A stepwise approach: on-farm trials

- **Current farmer practice + insecticide applications (C+ I)**
- **Weeding + pruning + insecticide applications + fungicide applications, no fertilizer**
- **GAP + no F**
- **GAP + NF**
- **GAP + OF**

Weeding + pruning + insecticide applications + fungicide applications + current national fertilizer recommendations

Weeding + pruning + insecticide applications + fungicide applications + improved fertilizer recommendations based on offtake model*

Increased Investment & Yield

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A stepwise approach – where is the starting point?

- Farm diversity largely driven by land and other resource limitations
- What are the investment needs and the outcome, and for whom?

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• An additive approach of four plots (T1-T4) representing increased intensities of management.

• Established on 389 cocoa plantations over two years (2020 and 2021)

• Cameroon, Cote d’Ivoire, Ghana, and Nigeria.
Field design considerations

- Restricted density, (950 - 1900) trees per hectare
- Restricted age (8-22) years, age of most trees in a plantation
- Shade level – was considered as a continuous variable

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Preliminary results: On-farm validation Trials

- Best agronomic practices including structural pruning (T2) gave no significant increase in yields (702 kg/ha) above that of the T1 control (670 kg/ha)

- Application of fertilizer (T3 and T4) resulted in the largest yield increase above current farmer practice

- **Preliminary results prove the "stepwise" concept in terms of yield benefits but work in progress on $$**

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Development of decision support - Work in progress

Field trials

Analytics:
Spatial Crop + Economic models

Advisory apps/field guides

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Conclusions

• There is need for judicious use of fertilizer (right quantity × correct formulation) in cocoa production systems of West Africa

• A stepwise approach may help to overcome the high demand on labour and capital

• Need to fully quantify the costs and returns of fertilizer user especially at farm level

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Thank you to all our partners!!

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Thank you for listening!

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