

ISFM: FROM CONCEPT TO IMPLEMENTATION IN COCOA

A glimpse of a PhD project

Outline

- Context
- Aim of study
- Key findings
- Outlook



- Sustainability challenges in the cocoa industry
 - Declining productivity and increasing demand
 - Environmental sustainability: deforestation, GHG emissions
 - Living income to farmers, child labour, climate-smart thinking, etc.
- CocoaSoils for a sustainable cocoa production through ISFM
 - A promise to reach 90,000 smallholder farmers
 - A clear emphasis on soil fertility management
- What knowledge is required to achieve better cocoa nutrition ?

Objectives

Better understand nutrient cycling in smallholder cocoa farms and explore the potential of ISFM to increase yields

- Discuss principles and application of ISFM in cocoa
- Evaluate nutrient cycling with current farming practices
- Estimate yield response to N-fertilizers under farm management

Research Questions

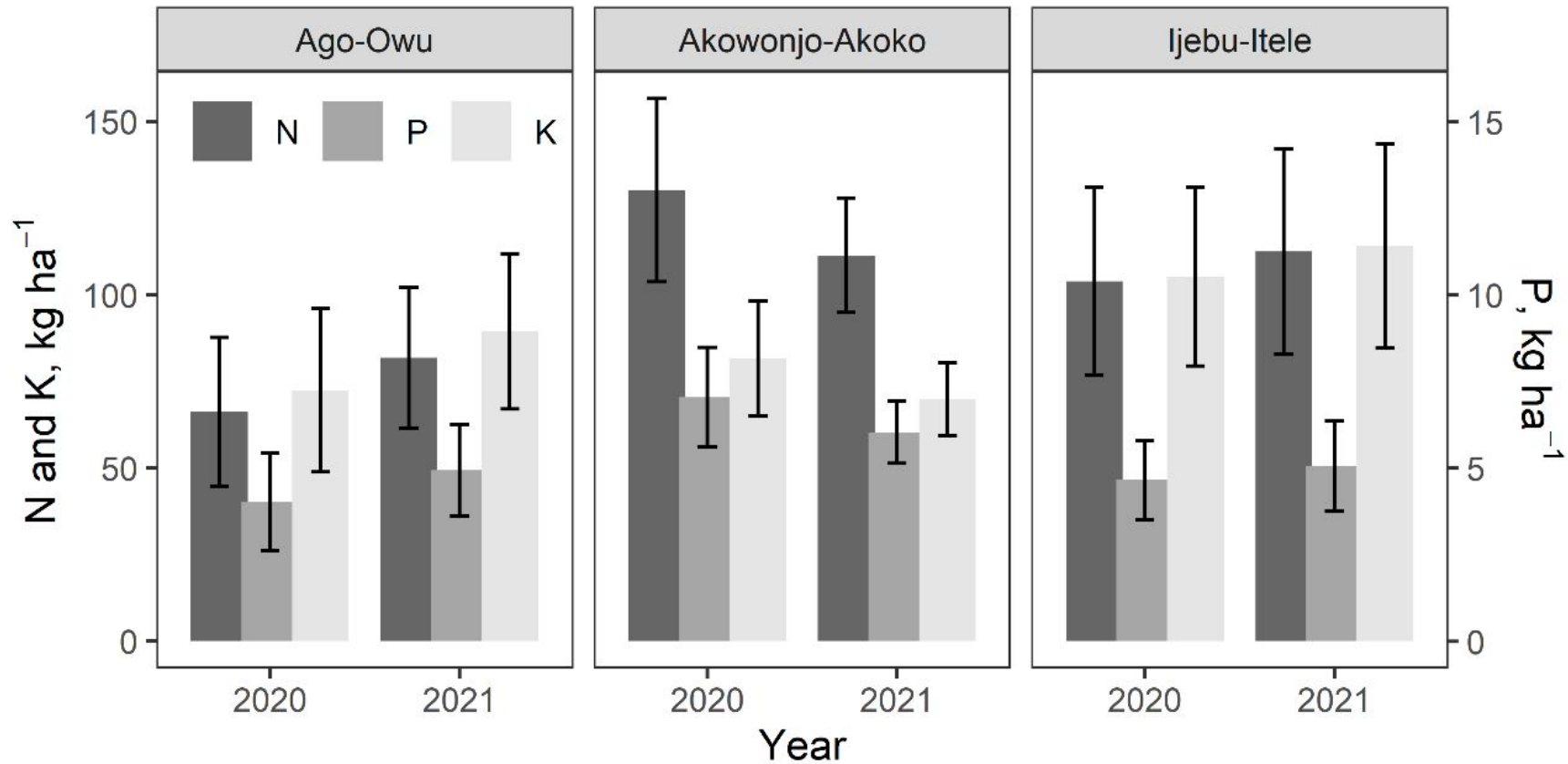
- What is ISFM in perennials?
 - Are the principles stated in arable farming equally applicable in cocoa?
 - What does the implementation entail in current farms?
- What amount of nutrients flows through litter, and how long are they retained?
- How fast are nutrients lost from decaying cocoa pod husks submitted to different simulated rainfall regimes?
- What yield increases are expected from N-fertilizer application under current farm management?

ISFM in tropical perennial crops

- Re-interpreting the principles in a different setting
 - Contrasts between agroecosystems: perennials operate a larger amount of C
 - Crop nutrient demand poorly understood
 - Emphasis on nutrient cycling within the system, rather than correcting presumed nutrient deficiencies
 - Crop-specific challenges and opportunities to manipulate stocks and flows
- Implementation challenges
 - Preconditions to efficient nutrient uptake are often not met by smallholders
 - Disputable reasons and little scope to utilize on-farm organic resources on cocoa

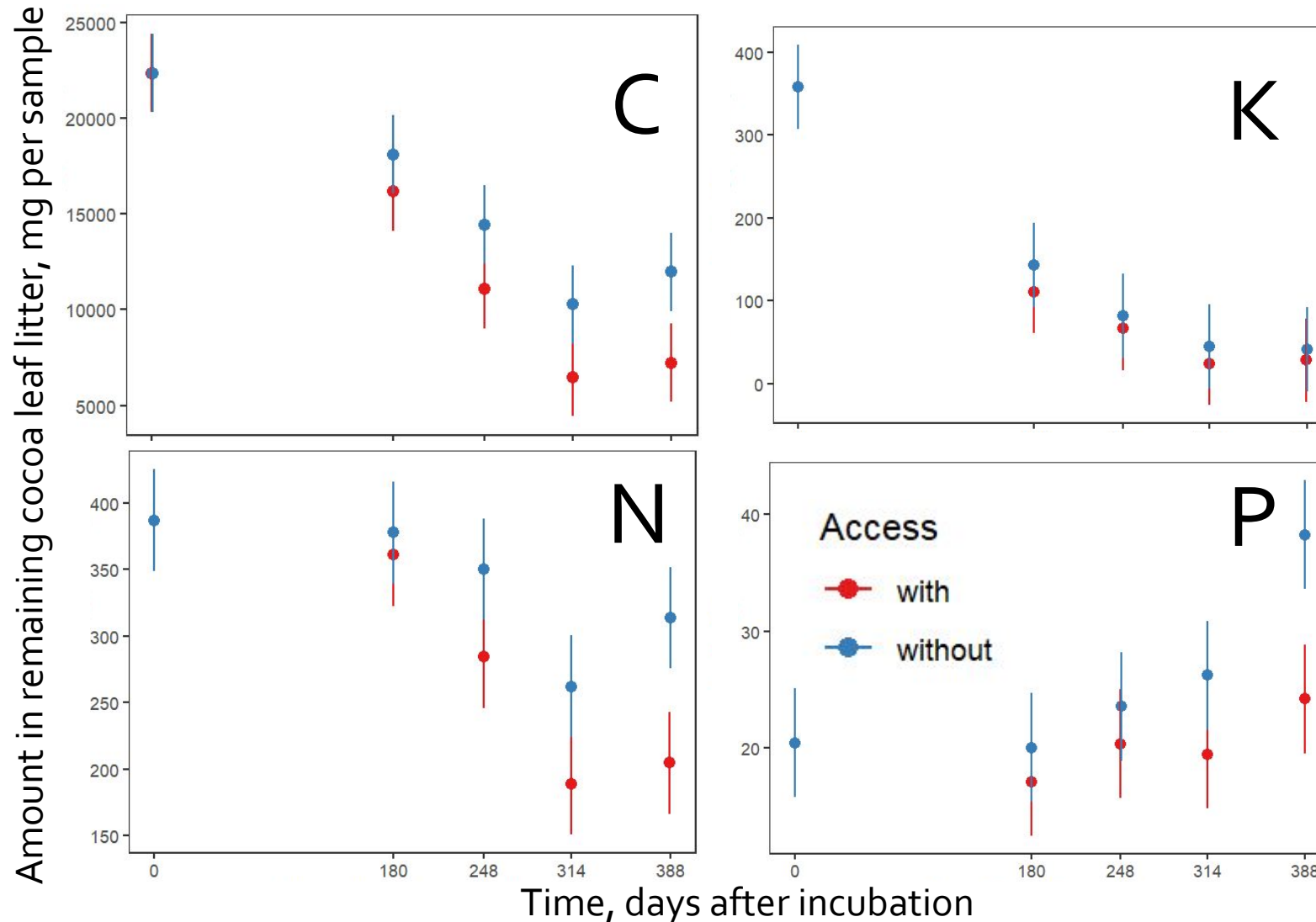
Nutrients in the litter layer

Estimated annual nutrient flows through litterfall in smallholder cocoa fields in Nigeria



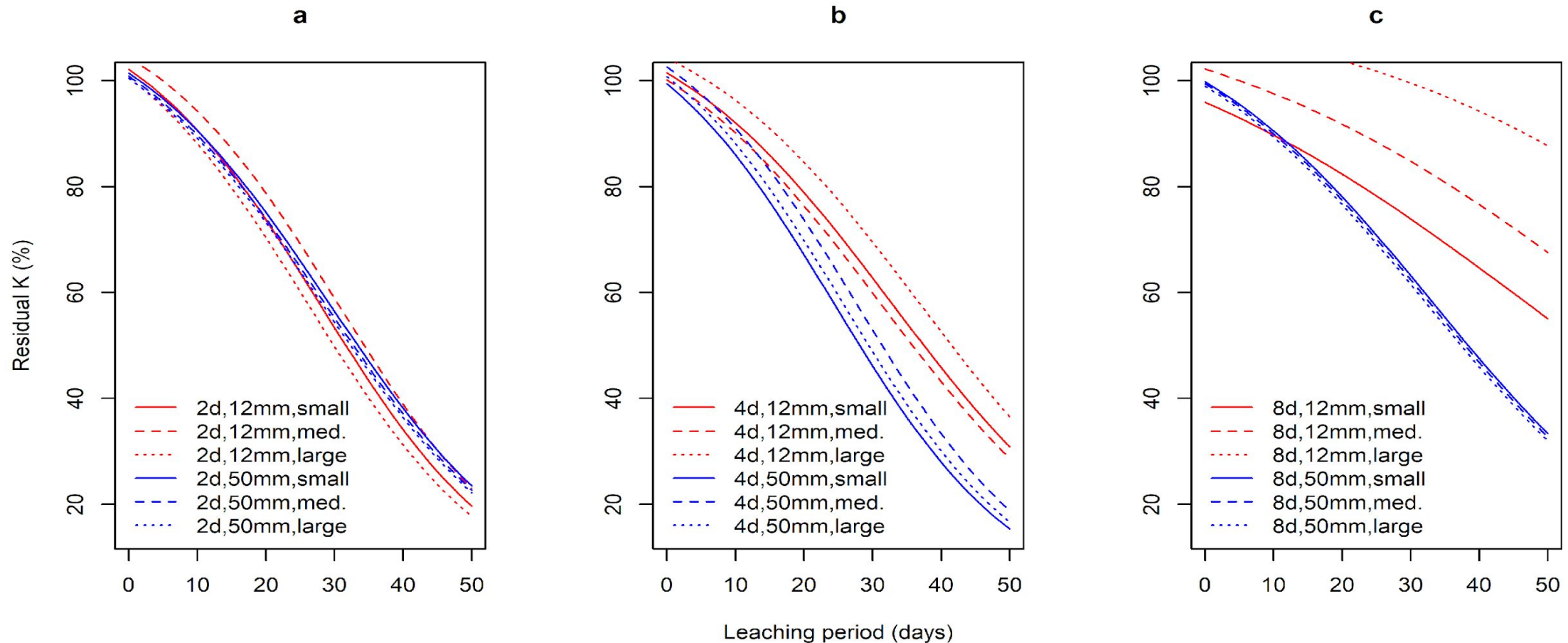
Nutrients in the litter layer...

Mass loss and nutrient loss rates of cocoa leaf litter: the effect of macrofauna



Nutrients in decaying cocoa pod husks CocoaSoils

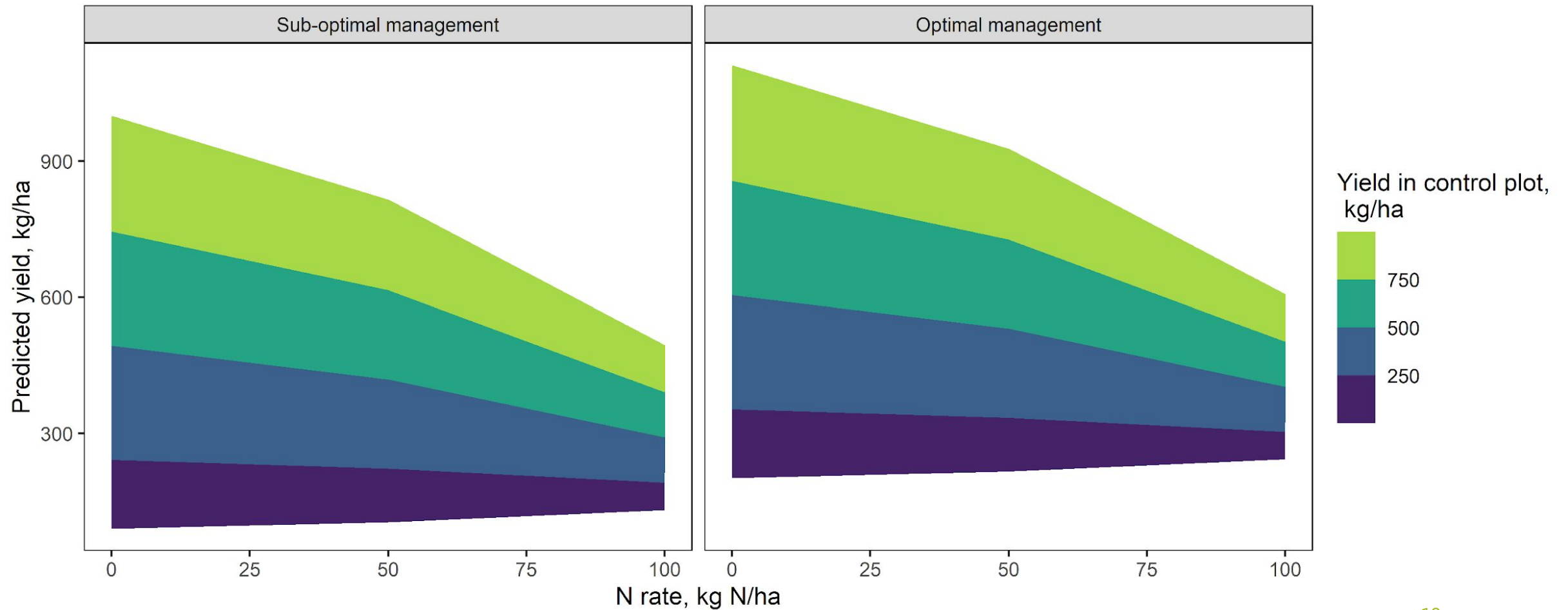
Potassium losses under different rainfall regimes



Limited to negative benefits of N application

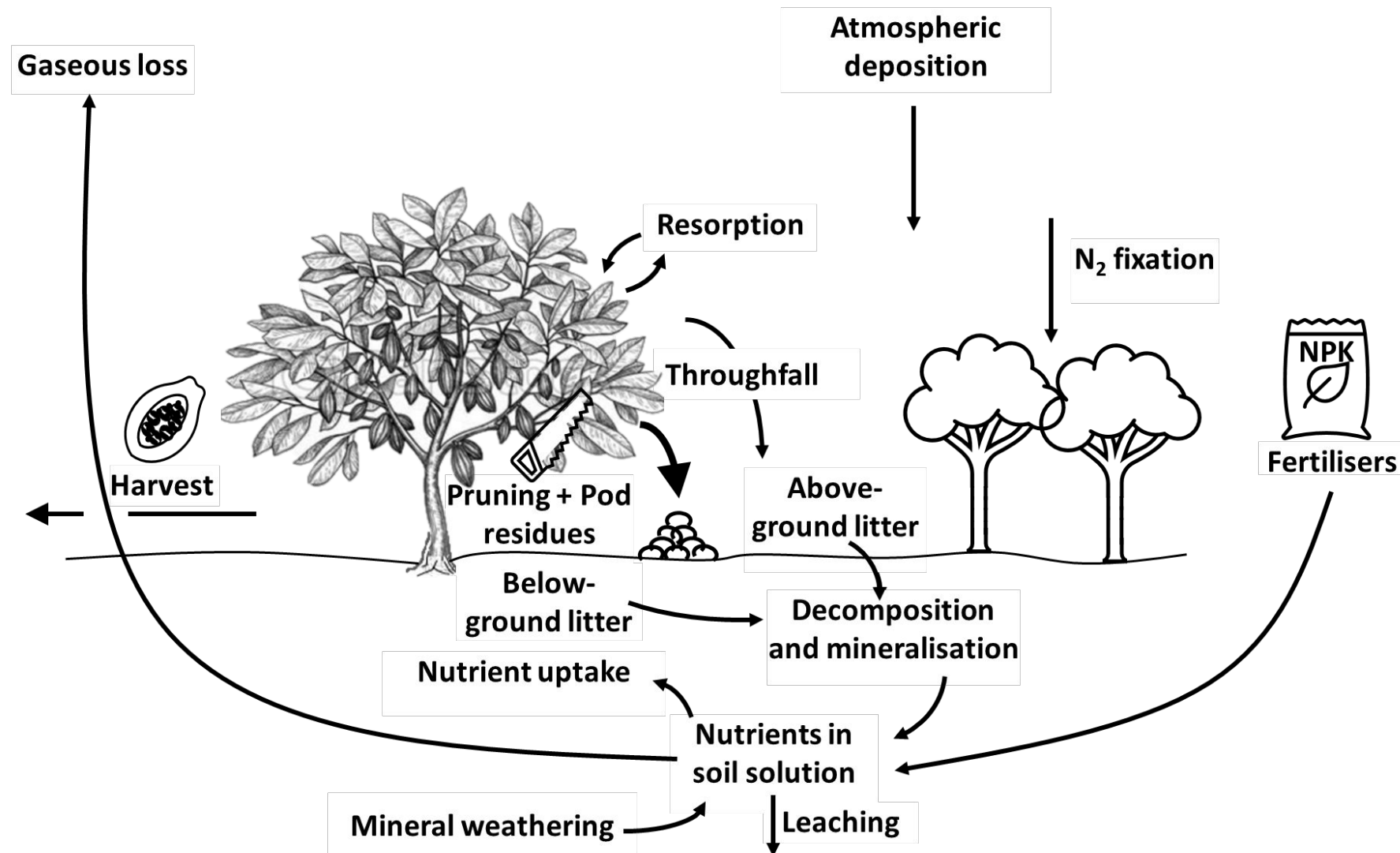


Effect of increasing N rates on cocoa yields under variable management and field fertility



Too complex a system

Overview of nutrient cycling in cocoa agroforestry system



Partnership

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



CocoaSoils

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