Farmers' innovation–decision processes and adoption dynamics surrounding push-pull technology in Western Kenya

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1 Introduction

- Pests are a significant threat to global food security, destroying up to 40% of crops and costing the global economy at least $220 billion annually. Invasive species alone cost around $70 billion each year.
- Smallholder farmers in Sub-Saharan Africa (SSA) face growing challenges from pests and climate change**.** International agricultural research for development (R4D) often focuses on developing and scaling up techniques and technologies that bolster resilience.
- **Push-Pull Technology (PPT)**, developed by ICIPE and partners since 1997, offers a biological control method by intercropping cereal crops with pest-repellent legumes ("push") and planting pest-attractant fodder ("pull") along the field perimeter (See Fig 1 and 2). Although PPT has proven effective in reducing pest prevalence (See Fig 3), its adoption remains low among farmers in SSA.

<u>This study aims to answer two key questions:</u>

- How is innovation experienced, and in what ways do farmers engage with and make decisions regarding PPT practices in different and changing contexts?
- What implications does this study have for agricultural innovation research and development practices aimed at supporting smallholder farmers in SSA?

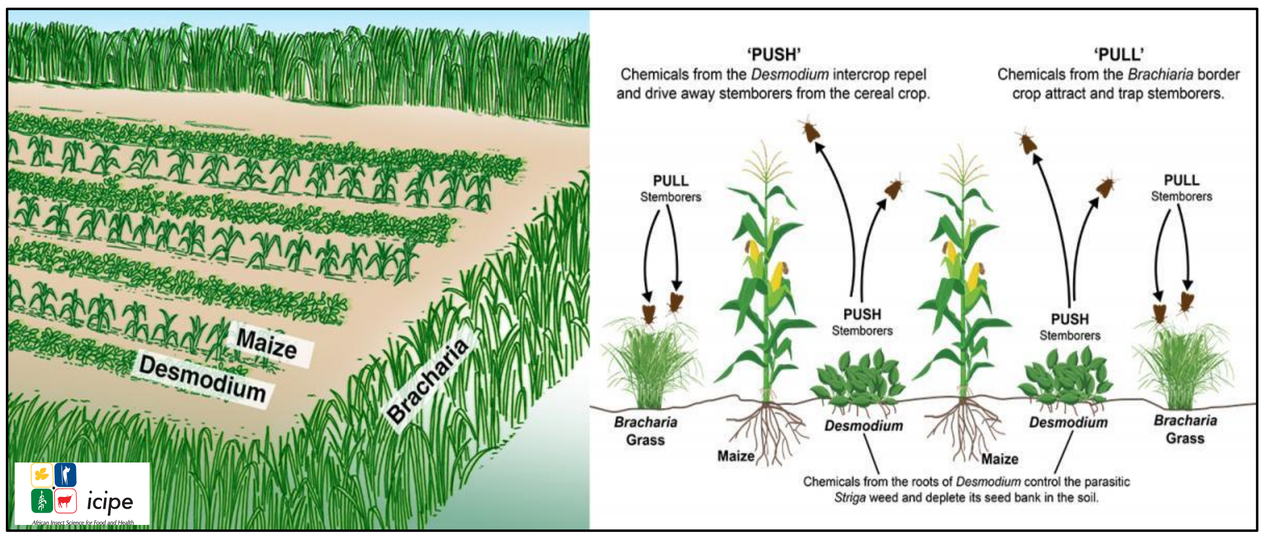

Fig 1: Diagram of PPT mechanisms for suppressing Striga weed and pests.

Fig 2: ICIPE guide: The rows of the Maize should be 75cm apart. Only 2 maize seeds in one hole.

Fig 3: Benefits of PPT include control of stemborer, fall armyworm, and Striga weed, alongside improvements in soil fertility.

2 Methods – Qualitative Ethnography

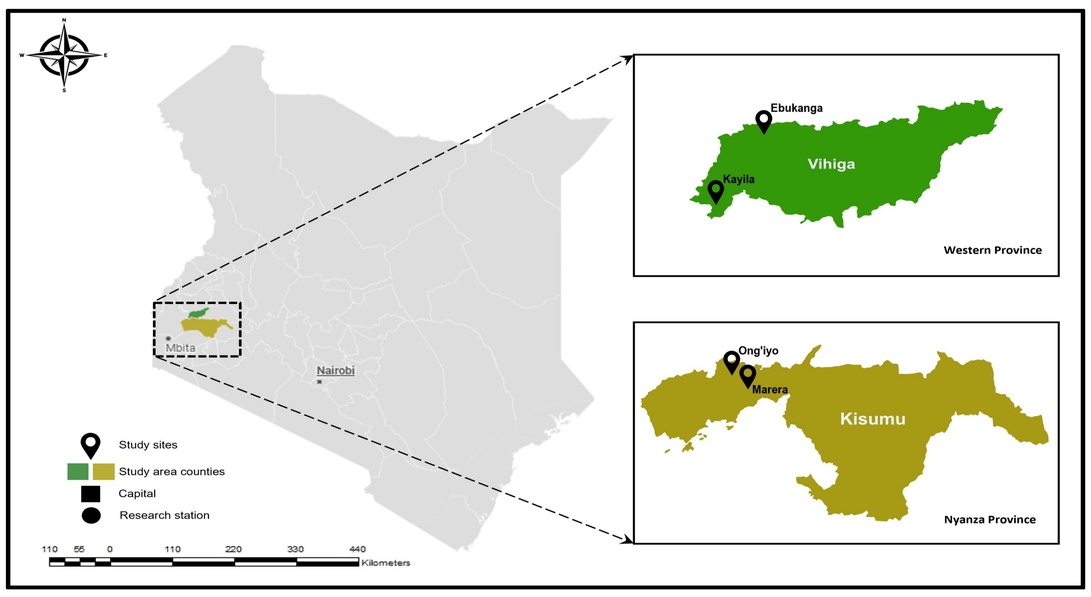

Fig 4: Map of the study area – Western Kenya

25 farmers interviewed

4 Focus Group discussion (28 participants) and participatory action research

Observing Field days

Participants included lead farmers, trial farmers, partial/non-adopters and discontinued users of PPT in 4 study sites across 2 Kenya counties (See Fig 4)

3 Results – Thematic Analysis

Theme 1

Adaptation through experimentation and evolving motivation

Farmers experiment and modify practices (e.g. integrating beans and vegetables into PPT plots): **To meet dietary needs, and take economic advantage**

Theme 2

Responding to changing contexts and circumstances

Farmers respond to diverse and changing contexts like **health, land tenure, jealousy and theft risks, costs and trade-offs**

Theme 3

Navigating group dynamics and social relationships

Social and power relationships between farmers and within groups can **make or break engagement with technology (e.g. unintended exclusion of a farmer from groups)**

Sylvester (male, married) Lead farmer and farmer-teacher

Matilda (female, widow) Adapts different aspect of PPT

Simon (male, married) Aged farmer with health issues

Paulina (female, widow) Roadside Trial plot

Emmanuel (male, married) Follower farmer

Justina (female, married) Not practicing PPT

"I also put sukuma wiki in the push-pull and told ICIPE to allow it because other farmers want vegetables and beans too." – **Sylvester**

"…I wanted to try if the beans would do better in the push-pull…" "… They [ICIPE] learned it [bean integration] from us." – **Matilda**

"…My health didn't allow me to continue the farming, I left farming for my wife and children to handle…" – **Simon**

"…But I couldn't harvest anything, somebody stole my maize. After that, I decided not to plant maize again..." – **Paulina**

"Sylvester and those people in charge of maintaining it took those things...It was used for their own business, and they neglected others." – **Emmanuel**

"I was not informed to continue since I was not in that group..." "I only went there that day, but I was not in that group..." – **Justina**

4 Conclusion and Implications

- Innovation is an ongoing process, deeply influenced by local contexts, social knowledge, and group dynamics.
- Innovation research should move beyond simple adoption metrics to capture the complexities of on-farm realities.
- The study highlights the importance of inclusive participation and collaboration with farmers from the outset of any agricultural innovation project.
- There is a need to foster multi-stakeholder collaboration, ensuring that farmers are treated as partners in knowledge creation.
- Recognise and accommodate farmer diversity, rather than seeking universally applicable technological solutions.
- Strengthen farmers' capacities for innovation, enabling them to adapt and refine technologies to suit their specific contexts.

References

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