

TERMS OF REFERENCE FOR Ph.D. AND MSC STUDENTS

Project

UPSCALE: UPSCALING THE BENEFITS OF PUSH-PULL TECHNOLOGY FOR SUSTAINABLE AGRICULTURAL INTENSIFICATION IN EAST AFRICA

Background

Closing the yield gap in African smallholder agriculture is a critical challenge, which must be met to achieve food security goals for millions of farmers. In sub-Saharan Africa, this challenge is compounded by the need to adapt cultivation practices to extreme dryness and ongoing climate change, and by the recognition that conventional methods of agricultural intensification are environmentally costly, unsustainable, and poorly adapted to low-income farming. Nature-based solutions that harness the benefits of biodiversity and the environment for productive, low-input, and climate-resilient agriculture are increasingly suggested as promising avenues for sustainable intensification of agriculture in Africa and beyond. One such solution is the systems approach offered by push-pull technology in mixed livestock-cereal farms in Eastern Africa. Push-pull is an integrated cropping system that involves driving pests away from the main crop using a repellent intercrop (the push) while attracting them out of the crop with trap plants (the pull). Adoption of push-pull technology by over 200,000 farmers since its development in 1997 has led to maize yields more than tripling, from 1 t/ha to an average of 3.5 t/ha. Push-pull also increases soil health and water retention, provides economic and high-value livestock fodder and a recently developed climate-smart variant making use of traditional cereal varieties increases system resilience to climate change. Through its increasing success in staple cereal crops, push-pull has enormous potential to be the most important discovery for food security and environmentally friendly agricultural management of the 21st century.

To harness its potential as a key to sustainable intensification in African farming, push-pull must be brought beyond its limitations to the next level. Currently, push-pull shows large, unexplained variability in yield increases across regions. Understanding is limited to the scale of fields or households, and adoption is restricted to maize and traditional cereals. Few attempts have been made to scale up understanding and applicability of push-pull at the level of farms, landscapes, and regions with widely different water, soil, climate, land use, and socio-economic conditions, and attempts to expand push-pull to cropping systems outside cereal are in their infancy. Implemented in five (5) countries (Kenya, Tanzania, Uganda, Rwanda, and Ethiopia), the UPSCALE project seeks to address these gaps (<https://upscale-h2020.eu/>).

In support of research and academic collaboration, the project wishes to recruit one (1) Ph.D. and two (2) Master students to work within the following project activities;



1. Assessment of barriers to push-pull adoption (Ph.D. student)

The objective is to identify the **barriers to push-pull adoption and opportunities for improvement**. Current adoption of push-pull continues at a steady rate in parts of Kenya, Uganda, Tanzania, and Ethiopia and on a small scale in Rwanda. UPSCALE will apply both proven and novel approaches to reach out to as many actors as possible, and the factors that would enhance or hinder its adoption on the larger scales envisioned in this proposal must be assessed. These critical factors which may include socio-economic, environmental, gender, biotic and abiotic, and institutional factors such as credit, input, and output markets will be evaluated. The project wishes to recruit a Ph.D. to carry out this activity using data from all 5 case countries. The objectives of the study will be to identify socioeconomic and policy barriers to push-pull adoption, including gender-based barriers, and strategies to address them. The project seeks to hire a Ph.D. student to address the objectives of this study. The successful candidate is expected to review relevant literature, together with other project partners design and implement the study (including field surveys), write a thesis and publish at least 3 peer-reviewed journal articles and communicate research findings to project partners and stakeholders and the global research community through internationally recognized forums.

Requirements/qualifications for the Ph.D. Student;

1. MUST be a Kenya citizen
2. MSc. degree in agricultural sciences; preferably agricultural economics
3. MUST already have registered in a Kenyan university and pursued the course work where necessary
4. The Ph.D. student will be engaged for 36 months and will be supported with research funds. PLEASE NOTE that the project does not provide funds for tuition fees.
5. Knowledge in Econometrics related to adoption and impact analysis.
6. Strong knowledge of analytical software (STATA, SPSS, and R).
7. Excellent oral and written English communication skills
8. Published papers or presented paper at conferences
9. Strong experience in designing and programming survey instrument using an electronic data collection system is an added advantage



2. Value chain analysis for push-pull products for increased market integration (Masters student)

The project wishes to recruit a Masters student to carry out this activity using case **country data**. Market integration is vital for sustainable technology adoption. The push-pull technology provides farmers with surplus products such as cereals, fodder, milk, and even more livestock for the market. To design sustainable market linkages for these products, there is a need to understand the existing value chains, including identifying the main actors, the activities they undertake, where and how they operate, their interests, challenges, and potential solutions. This will be achieved through a value chain analysis that will involve all the relevant actors and support services. The successful candidate is expected to review relevant literature, together with other project partners design and implement the study (including field surveys), write a thesis and publish at least 2 peer-reviewed journal articles and communicate research findings to project partners and stakeholders and the global research community through internationally recognized forums.

Requirements/qualifications

1. MUST be a Tanzanian citizen
2. Has a background in agricultural/ sciences; (Agricultural economics, Agricbusiness Management)
3. MUST already have registered in a Tanzanian university and pursued the course work
4. The MSc student will be engaged for 12 months and will be supported with research funds. PLEASE NOTE that the project does not provide funds for tuition fees.
5. Excellent oral and written English communication skills



3. Socio-economic and governance impacts of push-pull technology (Masters student)

The objective of this study is to evaluate the impact of push-pull accounting for time since the implementation of technology in the fields farmed by different gender and age-groups. The assessment will evaluate the impacts of PPT on selected socio-economic indicators, which will be obtained through both qualitative and quantitative interviews in coordination with the relevant project's stakeholders at the national and regional levels. The project is looking for a highly motivated candidate to carry out this study in 12 months. The successful candidate is expected to undertake a comprehensive literature review and develop a concept/proposal for the study, participate in the design and implementation of community and household-level surveys, writing a report, a thesis, and at least one manuscript, and communicate research findings to the project partners and other stakeholders as instructed.

Requirements/qualifications

1. MUST be a national of Rwanda
2. Background in Agricultural/ Developmental economics, economics, or related discipline.
3. MUST already have registered in a university in his country or elsewhere, completed and passed course work before commencing the research study.
4. The MSc student will be engaged for 12 months and will be supported with research funds. PLEASE NOTE that the project does not provide funds for tuition fees.
5. Knowledge in analytical software (STATA, SPSS, and R)
6. Excellent oral and written English communication skills

Interested candidates to submit a motivation letter and latest their CV to UPSCALE@bayfor.org with a copy to alicemurage@gmail.com; b.muriithi@icipe.org; fredah.maina@gmail.com, as soon as possible, latest by 31st January 2021.

