

Evidences

Study #2291

Contributing Projects:

- P250 - Bringing CSA practices to scale: assessing their contributions to narrow nutrient and yield gaps

Part I: Public communications

Type: OICR: Outcome Impact Case Report

Status: On-going

Year: 2019

Title: Use and institutionalization of field-specific nutrient management Decision Support Tool (DST) by NARES in Tanzania and Ethiopia

Short outcome/impact statement:

To increase productivity and efficient fertilizer use, African smallholders need tailored, field-specific advice. A new mobile phone application 'Maize-Nutrient-Manager' piloted in southwestern Tanzania, resulted in ~1,000 smallholder farmers receiving field-specific, balanced nutrient management advice for their maize fields. Advice was provided by the district extension service, supported by the regional Agricultural Research Institute. Bringing this productivity-enhancing, and greenhouse gas emissions reducing, advisory tool to scale, institutionalizes field-specific advisory in national agricultural advisory systems in Tanzania and Ethiopia.

Outcome story for communications use:

From blanket recommendations to field-specific advice: Using mobile phones to improve Tanzanian farmers' fertiliser use and productivity while reducing emissions

Fertilizer advice for African smallholder farmers generally takes the form of blanket 'high- input' recommendations, whereas smallholders are often cash-constrained and their use of fertilizer variable. To increase productivity and the efficient use of fertilizers, African smallholders need more tailored, field-specific fertilizer management advice. This project focuses on understanding and improving the tools and institutional conditions for delivering such advice.

Our research into existing tools and approaches for fertilizer advisory has shown that delivering field-specific advice critically hinges upon, largely lacking, field-level management data, as farmer's agronomic management is key to efficient fertilizer use. The Maize-Nutrient-Manager (MNM) mobile phone application was developed to collect such data at scale, and to directly convert this data into actionable advice for the farmer. Application use prompts farmers to be observant and keep a record of how they manage their maize field. Meanwhile, the collected field-level management data is analyzed to identify additional local management practices that enhance smallholder farmers' efficient use of fertilizers. Thus, the application is part of a learning system for farmers, extensionists and researchers, in which progressive insight into local efficiency-enhancing fertilizer management practices is incorporated into application updates, thereby increasing productivity while reducing greenhouse gas (GHG) emissions.

The project works on institutionalizing field-specific advice delivery at scale by conducting agronomic experiments that inform design of field-specific advisory applications (in Ethiopia) and implementing advisory pilots at scale, together with national partners (in Tanzania), such as the district extension service and agricultural research organizations. The generated evidence is presented and used to influence relevant (inter)national stakeholders and fora in the domain of fertilizer provision and advisory (AGRA, IFA). Thus we strive to institutionalize field-specific advisory that enhances smallholder farmers' productivity and fertilizer use efficiency, while reducing emissions.

We are to find out in 2020 how many farmers will be using the app. Farmers received advice in November 2019, just before the start of the season. In 2020, uptake and impact will be evaluated, including estimation of avoided emissions.

Links to any communications materials relating to this outcome:

- <https://www.cimmyt.org/blogs/are-advisory-apps-a-solution-for-collecting-big-data/>
- <https://youtu.be/g8kMDEWt9Cs?t=505>

Part II: CGIAR system level reporting

Link to Common Results Reporting Indicator of Policies : No

Stage of maturity of change reported: Stage 1

Links to the Strategic Results Framework:

Sub-IDOs:

- Enhanced institutional capacity of partner research organizations
- Reduced net greenhouse gas emissions from agriculture, forests and other forms of land-use (Mitigation and adaptation achieved)
- Closed yield gaps through improved agronomic and animal husbandry practices

Is this OICR linked to some SRF 2022/2030 target?: Yes

SRF 2022/2030 targets:

- Increased rate of yield for major food staples from current 1%/year

Description of activity / study: This study contributes to enhanced institutional capacity to use field-specific decision support tools for nutrient management that is climate-smart in Ethiopia and Tanzania. It will contribute to higher productivity and efficient use of nutrients, and, ultimately, to less area expansion to meet cereal demand. We therefore anticipate net positive effects for GHG emissions.

Geographic scope:

- Multi-national

Country(ies):

- Tanzania, United Republic
- Ethiopia

Comments: <Not Defined>

Key Contributors:

Contributing CRPs/Platforms:

- CCAFS - Climate Change, Agriculture and Food Security
- Maize - Maize

Contributing Flagships: <Not Defined>

Contributing Regional programs: <Not Defined>

Contributing external partners:

- EIAR - Ethiopian Institute of Agricultural Research
- ARI - Agricultural Research Institute - Tanzania

CGIAR innovation(s) or findings that have resulted in this outcome or impact:

Development of Maize-Nutrient-Manager (MNM) mobile phone-based application that collects field-level management data and provides field-specific fertilizer management advice to smallholder maize growers, enabling more efficient fertiliser use and reduced Greenhouse Gas (GHG)-emissions

Innovations: <Not Defined>

Elaboration of Outcome/Impact Statement:

As outlined in the project's impact pathway, research focused on building field-based evidence of scaling readiness of field-specific nutrient management applications. Workshops with users of existing applications revealed that whereas the application's design principles of balanced nutrient use and field-specific nutrient management appear to be scalable, tool use proved demanding. This has resulted in data input errors, and subsequently, in inaccurate yield predictions and possibly, inappropriate fertilizer recommendations for smallholder maize farmers in pilot sites. These findings, which point towards problems of innovation readiness, shifted the emphasis from evaluation towards defining design principles and application re-design to improve its scalability.

In the context of the project's focus on understanding of institutions to strengthen service delivery, our research revealed how different institutional constraints limit the scalability of field-specific advisory applications. For instance, selective deployment by users tended to exclude resource-poor farmers (who use little fertiliser), and consequently, undermined the tools' scaling potential. Further, low extensionist:farmer ratios impede the scaling potential of advisory tools that require trained, expert users. The development of more simple advice protocols is needed. The project has therefore increasingly focused on design principles for scalable field-specific advisory tools and embarked on a strategy to develop a re-designed application for field-specific management advice at scale.

Ethiopia

As in many areas smallholder farmers have access to only two fertilizer blends, application re-design focuses on establishing appropriate N:P balance in the applied fertilizers. Experiments were conducted in diverse landscapes (in fields with different slopes, soil types and varying management), in order to inform application design for two major maize growing areas.

Tanzania

In Tanzania, where fertilizer use among smallholder farmers is highly variable, research into existing use practices and fertilizer markets informed the design of a field-specific fertilizer management application for the Southern Highlands of Tanzania. A pilot of the developed innovation, the Maize-Nutrient-Manager application, resulted in field-specific fertilizer management advices for ~1,000 farmers in 2019. The (impact) evaluation of this advisory application is planned for 2020.

Project activities on institutional readiness to reach scale, focus on influencing (inter)national stakeholders in the domain of fertilizer provision and advisory. Generated evidence on field-specific advisory was presented to Ethiopian government institutions, AGRA, AGRF and an expert meeting of the International Fertilizer Association (IFA). This expert meeting is to evolve into an IFA-supported consortium on Site-Specific-Nutrient-Management (SSNM) that will support the institutionalisation of field-specific fertilizer management advisory in extension services in Africa.

References cited:

T.S. Sida, Andersson, J.A., R. Hijbeek. 2020. Analysis of performance of on-farm trials with different levels and ratios of N and P fertilisation, Ethiopia (project report, D20880)

<https://hdl.handle.net/10568/107757>

Andersson, J.A., R. Hijbeek, T.S. Sida, M. Kilakila. 2020. Maize-Nutrient-Manager: A mobile phone application for field-specific, balanced nutrient management advisory, (project report, D5725)

<https://hdl.handle.net/10568/107749>

Rurinda, J., Zingore, S., Jibrin, J.M., Balemi, T., Masuki, K., Andersson, J.A., Pampolino, M.F., Mohammed, I., Mutegi, J., Kamara, A.Y., Vanlauwe, B., Craufurd, P.Q., 2020. Science-based decision support for formulating crop fertilizer recommendations in sub-Saharan Africa. *Agricultural Systems* 180, 102790. doi:10.1016/j.agsy.2020.102790

Quantification: <Not Defined>

Gender, Youth, Capacity Development and Climate Change:

Gender relevance: 0 - Not Targeted

Youth relevance: 0 - Not Targeted

CapDev relevance: 1 - Significant

Main achievements with specific **CapDev** relevance: Regional Tanzanian Agricultural Research Institute and district extension service are capacitated to implement and support field-specific nutrient management advisory

Climate Change relevance: 1 - Significant

Describe main achievements with specific **Climate Change** relevance: Project will enable evaluation of GHG emissions reduction due to improved field-specific advisory.

Other cross-cutting dimensions: No

Other cross-cutting dimensions description: <Not Defined>

Outcome Impact Case Report link: [Study #2291](#)

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