Gates Agronomy Grant Learnings: Executive Summary

March 2021

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Overview

The Bill & Melinda Gates Foundation (BMGF) invested $124.8 million between 2008 and 2019 in five agronomy grant projects under its Soil Health and Agronomy portfolio, which supports the scaling of solutions to increase productivity-led growth in the smallholder sector and spur rural sector economic development. The strategic focus of the current grant projects has evolved to build on work achieved through previous grant projects. The purpose of this summary is to provide the main conclusions and recommendations from the *Gates Agronomy Grant Learnings: Final Report* (Boyle, Johns, Meijerink & Jones, 2020)[1] prepared for the Bill and Melinda Gates Foundation.

To date, the foundation had not completed a comprehensive assessment of its agronomy portfolio, and therefore contracted with Abt Associates to do so. This strategic assessment included five agronomy grant projects, which are a subset of the foundation's agronomy portfolio. These agronomy grant projects span over a decade, cover diverse geographies in both sub-Saharan Africa and South Asia, and work across different cropping systems. These grant projects are Cereal Systems Initiative for South Asia (CSISA) Phase 2 (2012–2016) and 3 (2015–2020); N2Africa Phase I (2009–2014) and Phase II (2013–2019); Taking Maize Agronomy to Scale in Africa (TAMASA; 2014-2019); African Cassava Agronomy Initiative (ACAI; 2015–2020); and Sustainable Banana Productivity in East Africa (SBPEA; 2016–2020).

Grant Projects

- **Cereal Systems Initiative for South Asia (CSISA)**
  - Phase 2 (2012-2016)
  - Phase 3 (2015-2020)
- **N2Africa**
  - Phase 1 (2009-2014)
  - Phase 2 (2013-2019)
- **Taking Maize Agronomy to Scale in Africa (TAMASA)** (2014-2019)
- **African Cassava Agronomy Initiative (ACAI)** (2015-2020)
- **Sustainable Banana Productivity in East Africa (SBPEA)** (2016-2020)

The foundation selected these projects because they share several characteristics that allowed an assessment of common challenges, successes, and opportunities:

- Their research agendas are informed by demand-driven use case development.
- Their research designs are based on sound scientific principles, with strong geospatial components in both research and implementation.
- They have focused on alliances with scaling partners from the beginning.
- They employ user-centric (primarily for farmers and extension agents) and appropriate tool development for agricultural advisory services.

After a preliminary review of project activities, Abt Associates developed a framework to represent the common steps grantees took to conduct project activities and to work toward target outcomes. The study team further refined the initial framework based on evaluation findings to better reflect grantee activities. The study team used this framework to help guide the analysis and presentation of evaluation findings. The chapters in the Final Report are organized by each step in the framework: Needs and Demand, Development, Scaling, Policy Development, Institutionalization and Sustainability, and Impacts.

Under **Needs and Demand**, we found that factors influencing research priorities included target users' needs, productivity constraints, return on investments, partner resources, and existing expertise and capabilities. Within and across grant projects, key stakeholders had differing views on who the target users of the agronomy research were. Grantees also faced challenges in designing agronomy solutions that could adapt to target users' evolving needs over time.

In **Development**, grantees found success in capacity building by expanding upon existing capabilities and agronomic systems within countries. The most transformative part of grantees' research was the inclusion of innovative research concepts and data-driven approaches to research. This use of data enabled grantees to rapidly develop location-specific agronomy solutions. This evaluation, however, was not a scientific review and was not designed to determine the scientific validity of the grantees' approaches to development. Grantees faced challenges in budgeting and balancing enough time for all grant priorities, including conducting the research, translating research into agronomic solutions, and assessing and incorporating the need to address potential constraints. Additional challenges included capacity for digital data management. While all grant projects produced global public goods (GPGs), the number and type of GPGs produced varied by grantee, and the impact of these public goods on agronomy was unclear.

For **Scaling,** we found that involving scaling partners, both public and private, was a key part of the grantees' work, and that all grantees used similar methods to increase partners' capacity to use technologies and tools, including training of trainers workshops, demonstration trials, and collaboration with farmers' groups. For several grantees (N2Africa, ACAI, SBPEA), market system and value chain challenges affected their ability to scale their work. Grantees often started scaling activities later than originally scheduled, due to longer than planned time needed for research activities, and faced challenges in trying to scale their approaches before their grant period ended (ACAI, TAMASA, SBPEA). These challenges were particularly pertinent to the scaling of decision-support tools (DSTs). Grantees that focused on one crop (the single-phase grantees – SBPEA, TAMASA, ACAI) might have missed the opportunity to approach scaling through a more systematic lens.

For **Policy Development, Institutionalization, and Sustainability,** grantees that could build on work conducted in previous funding periods (N2Africa, CSISA, and ACAI) were better able to show achievements in policy development than other grantees that had only one funding cycle (TAMASA, SBPEA). Grantees built linkages with public and private sector partners, and engaged in building a market for their agronomy solutions to better sustain their

work. Most granteess lacked a clear plan for institutionalization, and began exploring options and undertaking active measures to institutionalize only after they had reached the final stages of the funding period. Capacity building was considered an important step to facilitate institutionalization, but grantees expressed concern about the capacity of the institutes designated to adopt the agronomy solutions, particularly with respect to sustaining the data management, maintenance, and updates of data sets and technologies.

Under **Impacts,** all grant projects developed agronomic insights or innovations that led to increased yields, and most grant projects reported some adoption of agronomic innovations among farmers. During in-depth interviews, most grantees discussed their impact on the field of agronomy research in addition to or instead of their impact on target users (such as farmers). Grantees did not comprehensively measure impact, and all encountered unanticipated challenges during implementation that may have affected their ability to realize impacts.

Data Sources and Methods

We used four main data sources to collect data and answer the research questions.

Desk Review: to assess program-level documents, supplemented with key grantee evaluation reports and literature.

Review of M&E Data: to analyze grantee results frameworks, results trackers, and indicator performance to assess the grantees' achievements against their targets.

Online Survey: to capture stakeholder experiences with each grant and provide more-standardized cross-grant perspectives.

Key informant interviews: to elicit information on successes, challenges and lessons learned from foundation staff, agronomy experts, key grantee staff and partners for each grant project.

Conclusions and Recommendations from Gates Agronomy Grant Learnings

The following sections summarize the main conclusions and recommendations from the • *Gates Agronomy Grant Learnings: Final Report* and did not cover all aspects of their work in detail. It is worth noting that the individual grantees have conducted separate studies and evaluations of their grant-specific findings.

Recommendations for Better Understanding and Meeting Existing Research Demand and Target Users' Needs

Use Demand-Driven Approaches to Agronomy Research

The success of agronomy research depends on the extent to which it meets the needs of partners and target users. A deep engagement of potential partners and target users during the design stage is essential to develop a demand-driven agronomy research agenda and co-create agronomy solutions that are rooted in a clear understanding of the user's characteristics, needs, and challenges. The information gathered during the design stage feeds into identification and prioritization of agronomy research, but testing and development of agronomy solutions requires continuous engagement of partners and target users to develop demand-driven solutions. Demand-driven agronomy research thus relies on both a comprehensive needs assessment as well as the integration of feedback loops throughout the life-cycle of the project.

Grantees must also balance the requirements of the foundation with needs of partners and target users. While grantees did focus on a data-driven approach to their grant activities, particularly with the focus on developing DSTs, many grantee organizations and their partners did not have the experience, capacity or knowledge on how to manage large data sets, conduct digital data collection and develop and maintain digital data platforms. The beneficiaries, farmers, also often did not have the digital capacity to directly use tools, requiring grantees to rethink the target user for DSTs. As part of the demand-driven approach to research, grantees and the foundation should work together to assess grantee, country and beneficiary capacity and demand for digital approaches.

Conduct Comprehensive Needs Assessment as a Driver for Demand-Driven Agronomy Research

A comprehensive needs assessment at the design stage of the project will help to ensure that the agronomy research is aligned with target user needs and to warrant the use of results. Needs assessments should include targeted stakeholders such as scaling partners, private and non-profit sector partners, NARS scientists, and farmers or farmer associations.

As the ultimate beneficiaries of the agronomy research, farmers should be directly consulted about their perception on key constrains, hurdles to profitability, and proposed agronomy solutions. This will not only ensure that agronomy research will lead to solutions that reflect the true demand of target users, but will also build farmers' trust in the tools and technologies developed by the grantee. SBPEA, for example, viewed farmers as partners and prioritized their agronomy research with inputs from a baseline survey with the aim to profile constraints and opportunities to tailor agronomy solutions to specific segments of farmers.

The deep involvement of scaling partners, private and non-profit sector partners, and public sector institutions would also provide opportunities to identify scaling pathways and potential challenges to reach sustainability. While the inclusion of these partners in needs assessments is critical to identify key bottlenecks to farm productivity, and adoption of technologies, their early involvement also allows a grantee to assess the extent of their capacity and available resources to support the agronomy research. Moreover, most grant projects identified NARS institutes as playing a key role in mainstreaming and institutionalizing agronomy solutions; creating buy-in is therefore important.

Integrate Feedback Loops

Grant projects should consider systematically integrating feedback loops to help ensure the delivery of demand-driven and high-value products to target users and to provide opportunities to test and adjust agronomy solutions. N2Africa developed this approach in Phase I and implemented it in Phase II. Following ex ante needs assessments, some grant projects sought subsequent feedback from partners and target users throughout the project cycle. Incorporating feedback from partners and target users on, for example, results from agronomy research, prototypes versions of DSTs, or best ways to communicate recommendations, not only guarantees that agronomy solutions meet the needs of target users, it also fosters relationships with partners whose extensive engagement would increase buy-in to actively participate in scaling technologies. Seeking feedback from partners and target users, however, is time consuming and could slow down progress. Grant projects would have to require partners to invest time and resources in this process and eventually integrate the solutions offered into their operational strategies.

Commit to Gender Equality in Prioritization of Agronomy Research

Grant projects need to integrate gender perspectives into ex ante assessments and prioritization of agronomy research. Most grant projects recognized gender inequalities in access to agricultural inputs, technologies, and extension services and aimed to address the needs of women. N2Africa, in particular, aimed to empower women by focusing on production of nutritionally improved legumes

and labor-saving technologies. However, during the project design stage, grant projects did not explicitly identify challenges and opportunities women face or identify underlying causes of gender inequality in agronomic outcomes. Gender perspectives need to be integrated into ex ante assessments to identify how agronomy research and agronomy solutions could contribute to reducing gender gaps and how they will contribute to gender outcomes. The use of a theory of change may be considered to critically assess how a grantee's proposed activities could impact women differently than men and how it could contribute to better outcomes for women. With a better idea about the gender-differential impact, grant projects could consider adopting approaches that better address women's needs.

Recommendations on How to Better Innovate Ways to Do Agronomy at Scale and Increase the Return on the R&D Investments

Build linkages with a Broader Ecosystem of Service Providers

Linking farmers to a broader ecosystem of service providers such as credit services and input suppliers is critical for uptake and use of the grant's recommendations. Some grant projects (ACAI, TAMASA) were primarily focused on delivering agronomy recommendations to farmer communities using DSTs but with less consideration of the need to create market linkages. Apart from recommending farmers adopt agronomy practices (e.g. inter-cropping), DSTs and other technologies may also provide recommendations that require financial investments (e.g. fertilizer, labor, hybrid varieties). Grant projects that provide recommendations to farmers requiring inputs and/or financial investments, should more actively link farmers to other service providers, such as credit and input suppliers. At the dissemination and scaling stage, grant projects should consider facilitating market access to farmers as these grant projects start to provide recommendations to for example use a new fertilizer blend. Partners' extension networks, especially in areas with poor market infrastructure, may play a role in linking farmers to credit and inputs markets. This could not only lead to an increase in adoption of recommendations by farmers, but also to an increased interest in DSTs and recommended technologies which would ultimately increase the return on R&D investments.

Identify and Engage with Regulatory Dimensions and Assess Enabling Environments to Conduct Agronomy

Early identification of potential regulatory hurdles to the development and scaling of agronomy solutions is critical. During the project design stage, grantees recognized the necessity of a conducive enabling policy environment in target countries to be able to achieve intended agronomy outcomes. Hence, grantees, to varying degrees, involved policymakers and government institutions at different stages of the project. Grantees

rarely conducted assessments, however, of constraints in the regulatory environment that may hamper R&D or scaling and/or areas for policy reform at the design stage of the projects. Difficult regulatory environments in some cases delayed the development of innovations. ACAI, for example, worked on a use case to develop a cassava fertilizer blend, but due to the government's regulatory restrictions on the import of bulk fertilizer materials, the development of a suitable fertilizer blend for cassava was delayed. CSISA, and to a lesser extent N2Africa, were notable exceptions as they dedicated considerable resources to the identification of policy reform opportunities, developed communication strategies for policy reform, and engaged in partnerships to reform policy. Nevertheless, while CSISA contributed to the evidence base to address India's fertilizer subsidy policies and aimed to develop a partnership to support policy reform efforts, they indicated that relatively low subsidies on zero tillage may have caused a lower than expected demand.

Recommendations on Efficiencies That Could Be Gained by Having a Common Platform or Shared Approach

Streamline Approaches to Data Collection and Management

Grant projects would benefit from a common approach to data collection and data management. As grant projects conduct innovative agronomy research, collecting data on a large scale across geographies and in complex environments, future investments should build on proven approaches to data collection, management, and storage. Grant projects that worked on developing DSTs, requiring large scale data collection, in particular faced challenges developing efficient ways to collect, manage, and store data. TAMASA, for example, noted that working with national research institutions on data collection and cleaning was substantially more difficult than anticipated, while ACAI encountered challenges with the capacity and willingness of national research institutions to use digital data collection tools (Open Data Kit). These examples show that grant projects intending to work with national research institutions on data collection must consider limited funding, capacity gaps, and the risk of shifting institutional demands on available resources that are difficult to foresee. Despite these challenges, grantees have developed a range of research protocols for multi-locational field experimentation and sampling frames, data processing procedures, data management systems, and approaches to data sharing (e.g., FAIR data principles). SBPEA demonstrated that there is an interest in utilizing proven approaches, working with ACAI and TAMASA to learn from their experience handling and managing data across a large number of field trials.

Similarly, grant projects would benefit from a common approach to M&E data collection with shared definitions and indicators to measure output and outcomes (see Section 9.5 below).

Create a Platform or More Centralized Approach to Facilitate Cross-learning

While grantees worked in unique contexts, focused on diverse value chains, and followed different implementation timelines, they faced common challenges in conducting agronomy R&D. A shared platform could facilitate more systematic and intensive collaboration across grantees and research centers. Our review provided very limited evidence of learning and collaboration across grant projects, which may have limited grantees' ability to use proven practices, increase efficiency, and potentially improve outcomes. Some grantees, for example, faced similar challenges in conducting large-scale agronomy research, including field and validation trials, and developing site-specific recommendations. Similarly, for the development of decision support frameworks, grantees spent resources on content generation, developing software codes to generate site specific recommendations, and developing approaches to data management.

Apart from challenges to the implementation of agronomy research, a common platform could also facilitate more efficient ways to share best practices to implement comprehensive needs assessments, insights into effective approaches to scale agronomy solutions, or lessons learned from institutionalizing agronomy R&D. Furthermore, a common platform, housed in one or more of the participating research

centers, could provide an opportunity to centralize tools, datasets, digital innovations, or literature which could promote learning and use across grants or research centers. Increased collaboration across grant projects or research centers, may also facilitate the sharing of technical expertise and make it easier to share resources to build capacity.

Recommendations on Increasing Sustainability, Efficiency, Scalability, and Mainstreaming the Outputs from the Grant Projects

Allow for Sufficient Time to Scale and Institutionalize Agronomy Solutions

Grant projects worked on a range of agronomy solutions, with some grant projects adapting proven solutions to new geographies, farming systems, or crops, and others developing new agronomy products. Given that these products have different time-lines to reach maturity, it is important to allow for sufficient time to scale and institutionalize agronomy solutions. In particular the commodity-specific grant projects, which commit to time-consuming R&D efforts, including extensive data collection, analysis, and generation of site-specific recommendations, emphasized the limited time to scale and institutionalize agronomy solutions. So while these grant projects deliver valuable products and recommendations, they face challenges with regards to achieving sustainability, partly as a result of time constraints. Hence, the length of investments should be considered in relation to the timing of scaling activities for future grant projects which aim to develop new products as these tend to have longer and often less predictable ways to mature.

Identify Pathways to Institutionalize and Sustain Agronomy Solutions at Project Design Stage

Findings showed the importance of identifying pathways to institutionalize agronomy solutions at the early stages of the grant projects. Institutionalization not only requires early identification and engagement of potential research institutes (e.g., NARS) who can maintain and potentially further develop agronomy solutions, these institutes also need to have the capacity, resources, and commitment to institutionalize the innovations. Although grant projects engaged research institutes in the agronomy research and conducted capacity development activities, there were concerns about the level of skills these research institutes could offer to maintain the agronomy solutions, or if they were sufficiently committed. An assessment of the capacity, resources, and commitment of institutes during the design stage as well as continuous engagement of these institutes to create ownership is critical. Grantees would need to determine whether they have the capacity and resources to conduct an assessment of potential institutionalization pathways. Furthermore, to ensure the interest of research institutes to institutionalize the agronomy solutions at the end of project, grant projects should seek to align their priorities with research priorities of these institutes.

Leverage Business Models and Private Sector to Reach Scale and Sustainability

Ensuring sustainability often requires securing an alternative source of resources by the time funding expires. To sustain agronomy solutions beyond the life-span of the grant project, grantees need to identify business models that provide a route to sustainability. This may not only involve developing markets and building linkages and partnerships that feature the private sector for existing agronomy solutions, but also identifying a route to commercialization for newly developed agronomy solutions. All grant projects, to a varying degree, worked on building vertical linkages between farmers and scaling agents, agro-dealers, processors and other stakeholders to develop a sustainable market but were often confronted with challenges of bringing supply and demand together. On the supply-side, for example, N2Africa had difficulties developing a local market for inoculants as a result of low-profit margins and strong international competition, while on the demand-side, CSISA encountered lower than expected demand for zero tillage. When investing in new agronomy solutions, such as DSTs, grant projects would also benefit

from laying out a route to commercialization to further improve access and continue dissemination. Developing an effective business model is challenging, especially in the relatively short times frames of the grant projects, but the development of an appropriate business model during the project design stage increases the potential to achieve sustainability.

Clearly Articulate Potential Sustainability Pathways in Project Designs

Following on the recommendations above, a sustainability plan and exit strategy should be embedded in the project design stage. Grant proposals often lacked specificity regarding strategies to reach sustainability. The foundation should consider requiring prospective awardees to include more detail on their strategies to achieve sustainability focusing on pathways through which the grant will affect long-term change. Future grantees could for example draw on lessons learned from existing conceptual frameworks for sustainability in planning exit strategies.

Translate Agronomy Advisory Materials into Multiple Local Languages to Encourage Uptake

To encourage uptake of agronomy advice and increase impact, timely translation of agronomy advisory materials in the appropriate local languages is recommended. Some grant projects translated materials late which led to a delay in dissemination of agronomy recommendations, or extension agents translating English materials in an attempt to share recommendations with farmers. This may pose challenges to scaling efforts, as a lack of content in local languages could inhibit effective communication of agronomy recommendations to farmers and may neglect the cultural context of the beneficiaries.

Improving the M&E Process

The study team used a manual process to review the M&E data, although a properly designed M&E system could be set up in such a way as to make these transformation functions automatic. For example, if grantees had been instructed from the beginning of the projects to break down their "blocks of text" into discrete outputs corresponding to different rows, the data would have been in a much better state for quick analysis. Additionally, the current Results Framework template the foundation uses with grantees is already set up with macros; a better template would have included macros that quickly consolidated any data inputted into numerical tables.

Improve M&E Reporting Practices

These approaches could include the following:

- Create common indicators across projects.
- Develop specific protocols or procedures for collecting and calculating indicators.
- Put greater focus on "difficult to measure" impact indicators.
- Tie funding to the achievement of milestones that are further downstream.
- Incorporate legacy objectives.

Develop an Improved Platform for M&E reporting (as detailed in Appendix A) to enable improved, timelier M&E reports that are easier to analyze and visualize, and that better feed into project learning and adaptation.

Set Meaningful Targets

Review of the M&E data indicates that few programs collected data on impact indicators. Discussions with foundation staff indicate that the foundation did not necessarily want to hold research grantees responsible for impact indicators. Collecting and reporting only on output-level indicators is unsatisfactory, because it does not show whether or not the activities of a program are meaningful, only whether the program did the activity.

We recommend that grantees tie the M&E framework to the needs of the target audiences for the research or agronomy solution. For example, a grantee might undertake research to determine appropriate fertilizer use or some other agronomic solution, but not have the resources to disseminate the findings from that research widely. In that case, a target user – such as an NGO, or extension agents – should be defined as the mechanism for using

and/or disseminating the agronomy solution, and the M&E framework should measure whether or not the research met the needs of the target user(s). The foundation may then, if they choose, consider evaluating the extent to which the target user used/disseminated the agronomy solution, and, then, whether or not farmers' behaviors changed.

Further, research is inherently an uncertain activity – timelines needed to achieve results are hard to predict, and in some cases it is difficult to assess ahead of time whether or not grantees can even achieve intended results. Allowing grantees to assess "risk" or "uncertainty" associated with targets, along with stating the assumptions made when they were setting targets, at the beginning of the program can provide a framework for documenting what was learned about the research process itself (and not just the learning associated with the end results of the research). Over time, this approach may improve the research process itself.

Shift the Approach to M&E to Include Demand-Centric Information

Current M&E systems are useful for project reporting and internal management. Respondents to the in-depth interviews reported using M&E data in meetings with foundation staff to help determine, discuss, and adjust program implementation. This is a useful function of M&E data. However, it is an inward-looking use of M&E data, focusing on the degree to which grantees are implementing plans, while allowing some adjustment for changing circumstances. Grantee staff from two different programs, when prompted about M&E, discussed meeting or having field visits with stakeholders and target users on a regular basis as the M&E method for their project. This "outward-looking" method of assessing the progress of implementation is also referenced in the discussion of "Recommendations to Improve M&E of Grantees" – collecting data on how stakeholders and target users of agronomic solutions view, understand, and use the data would enable more impact-level indicators to be collected.

The study team recommends that the foundation incorporate, in a formal way, learning into the M&E framework. This will require that grantees define target audiences and target users for agronomy research and solutions, and solicit feedback from these groups on outputs, outcomes, and, potentially, impacts. Facilitation of feedback loops, when done correctly, enables continuous learning and adjustments, feeds into program planning and management decisions, and allows reported lessons learned to become a reported outcome in their own right.

Finally, external environments often have an influence on the outcomes and usefulness of M&E data, and it may be difficult to capture the effects of events such as political instability or droughts and how they impact grant outcomes.

Limitations

Many of the recommendations that focus on systematic approaches or recommend certain frameworks, as presented in chapters four through eight of the Final Report, did not explicitly emerge from the evaluation findings. These are recommendations that could be useful and advantageous for the foundation when thinking how to move from asking individual grant projects to work on activities in each step of the framework to a more systematic funding strategy, but these recommendations have limited support from the evaluation findings, as they were not specifically stated in grantee documents or during interviews.

The other major limitation to this evaluation, as described briefly in Chapter 2 of the Final Report, was the inability to conduct site visits and in-country interviews with key stakeholders and grantees due to travel restrictions from COVID-19. Spending a week or longer, as originally planned, in-country with each grant project would have allowed the evaluation team to have a more nuanced understanding of the work of the grant projects. While the single, hour long remote interviews with grantee staff and key stakeholders did provide valuable information for the evaluation, the evaluation team most likely could have gained better and more detailed insights from time spent in-country with grant projects.

1 Boyle, M., Johns, B., Meijerink, M., & Jones, R. (2020). *Gates Agronomy Grant Learnings: Final Report*. Report prepared for the Bill and Melinda Gates Foundation. Abt Associates. Available at: https://gatesopenresearch.org/.

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Bill & Melinda Gates Foundation:

https://www.gatesfoundation.org/What-We-Do/Global-Growth-and-Opportunity/Agricultural-Development

BMGF contracted Abt Associates to conduct an independent comprehensive assessment of its agronomy portfolio. Full report results: https://gatesopenresearch.org/