

# “No one asks for a meal they’ve never eaten.” Or, do African farmers want genetically modified crops?

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**Abstract** This article reflects on the relative silence of African farmers within debates around the potential for genetically modified (GM) crops to transform agriculture on the continent. It proposes two strategies for amplifying these voices—one focused on research methodologies, the other on outreach—in order to transform the conversation around GM’s potential in Africa into one that revolves around farmer preferences and priorities.

**Keywords** Genetically modified crops · Farmers · Uganda

## Introduction

Enthusiasm is brimming over the potential for genetically modified (GM) crops to improve agriculture in Africa. Proponents suggest that GM offers the only viable solution for overcoming the continent’s intractable environmental obstacles to production, which cannot be properly addressed through conventional breeding (Elbehri and MacDonald 2004; Smale et al. 2009). Economic models suggest that GM crops will result in increased yield and labor

savings (Vitale et al. 2008), with potential economic benefits calculated to be as high as US \$200 million annually (de Groote et al. 2004).

Currently three African nations (South Africa, Burkina Faso, Sudan) are growing GM crops commercially, with a combined total of over three million hectares under GM [though it is important to note that almost all of this acreage is focused on commercial crops genetically engineered for insect and herbicide resistance, and almost all of it is located in South Africa (James 2012)]. A dozen more nations have established experimental programs in an effort to widen this narrow geographical and crop base. Current experimental trials are focused predominantly on traits and constraints considered especially salient for African farmers including drought resistance, disease resistance, accelerated growth rates and bio-fortification. What’s more, these traits are being explored within staple crops that account for the majority of the continent’s caloric intake such as maize, sorghum, cowpea, cassava, sweet potato, and cooking banana.

But most of the hype surrounding the potential for GM crops to transform African agriculture is coming from outside, rather than inside, the continent. Indeed, in a continent where the vast majority of producers are small-scale farmers, the voices of the farmers themselves remain largely muted within this debate. This article reflects on the relative silence of African farmers and proposes two strategies for empowering these voices—one focused on research methodologies, the other on outreach—in order to transform the conversation around GM’s potential in Africa into one that revolves around farmer preferences and priorities.<sup>1</sup>

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The quote in the title comes from a scientist interviewed on June 12, 2010.

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### Why are farmer voices so hard to hear?

The east African nation of Uganda is at the forefront of the debate over the potential for an African ‘Gene’ Revolution. Uganda’s experimental program with GM crops is now one of the largest on the continent, with projects underway investigating the potential of six GM crops: banana, maize, cotton, cassava, sweet potato and rice. The National Biotechnology and Biosafety Bill—which would facilitate the commercialization of GM crops currently under experimentation—is currently under debate by Parliament; most observers expect it to be passed into the law by the end of the year. The widespread adoption of GM crops has emerged as a key element of the government’s strategic commitment to expanding the use of agricultural technology throughout the country (Republic of Uganda 2010).

Yet Ugandan farmers remain virtually shut out of this contentious debate, which has been dominated by research scientists, policy officials, and development experts. Biotech boosters argue that farmers need not figure prominently within this discussion because many Ugandan farmers are semi- or illiterate and thus cannot understand the complexities of genetic modification. As one farmer leader points out: “What is a gene to a farmer? ... a gene it is too advanced for the farmer” (Policy Official #1, June 15 2010). Other advocates argue that it is too soon to bring farmers voices into the debate because the technology is not yet available to them: ‘Farmers cannot understand because they have not seen it’ (Biotech Booster #1, June 6 2009). They suggest that farmers need to be brought into the conversation once the technology is ready for commercialization, ‘in the final stages of testing the technology, when we have something in hand, that’s when we involve the farmers’ (Research Scientist #2, May 31 2009). Other proponents complain about the amount of misinformation being propagated, arguing that farmers do not have sufficient capacity to distinguish accurate reports from misleading ones (Biotech Booster #2, May 12 2011).

Thus far, outreach efforts have focused primarily on talking *to* farmers rather than talking *with* farmers. Talking to farmers about GM crops usually involves educating and advocating on behalf of the myriad benefits associated with GM crops. Conducted under the banners of ‘sensitization’ and ‘demystification’, existing consultative strategies are predominantly one-sided; these are venues in which farmers are encouraged to listen rather than to speak (Policy Official #3, May 8 2012). Some examples: proponents cite the Open Forum on Biotechnology as one of the most important consultative mechanisms for integrating farmer input. But these monthly luncheons held at Kampala’s glitziest hotels target the urban elite, making them too intimidating and expensive for rural farmers. Another initiative that focuses on incorporating farmers’ priorities

into the experimental breeding program is the National Agricultural Research Organization’s ‘demand articulation process’, whereby farmers’ groups are convened to discuss their concerns in an effort to create breeding programs that reflect farmer priorities (Research Scientist #3, May 9 2012). But such meetings are convened irregularly (the most recent was convened in 2010), and tend to privilege the voices of select farmers with whom the National Agricultural Research Organization (NARO) in Uganda is already collaborating.

There are, we believe, two major barriers to bringing farmer voices to the fore of this debate over the potential for GM crops to transform agricultural production in Uganda. The first is methodological. The only studies that investigate farmer perceptions of GM technology in Uganda rely primarily on econometric modeling and surveys, which assume that farmers are rational actors seeking only to maximize profits (Edmeades and Smale 2006; Smale and Tushemereirwe 2007; Horna et al. 2009). More recently, agricultural economists have incorporated choice experiments and attitudinal statements in an effort to measure farmer demand for these soon-to-be-released GM varieties (Kikulwe et al. 2011a, b). While these more recent interventions do a better job of identifying the key issues that determine farmer decision-making around GM crops, these studies continue to rely exclusively on quantitative, deterministic methods that portray Ugandan farmers as rational actors who favor increased yields over all other characteristics.

Elsewhere, scholars have experimented with broader methodological programs that better capture the complexities of farmer decision-making around GM technology. For instance, Daniela Soleri and David Cleveland’s research findings in Latin America refute the two critical assumptions that underlie economic assertions surrounding the adoption of GM crops: (1) that farmers will choose GM over other crop varieties because they offer the greatest profit, and (2) that farmers are risk neutral (Cleveland and Soleri 2005; Soleri et al. 2005, 2008). Their results suggest that farmers in poorer nations are more risk-averse than their wealthier counterparts due to lower savings and smaller surplus food stores, leading most to prefer traditional varieties with lower overall yields but greater yield stability. They conclude that economic analyses relying on models and surveys ignore the multiplicity of characteristics that determine variety choice such as storage, food preparation, taste, appearance, attitudes towards technological change and long-term effects of genetic diversity. This research underscores the need for greater consideration of these value-based preferences in context-specific studies that reflect the particularities of the people and place where GM technology is being considered (Soleri et al. 2005: 159).

The second barrier to elevating farmer voices in this debate relates to outreach, and in particular to knowledge dissemination. Elsewhere, we have described the calculated and coordinated public relations campaign being undertaken in Uganda, designed to convince citizens of the benefits associated with the adoption of GM crops (Schnurr 2013). This campaign has many strands: regular luncheons designed to update relevant parties on new developments in research and policy, 'seeing-is-believing' tours where key decision-makers are flown to a country that is already growing GM crops (past destinations include South Africa, India, Burkina Faso, and the United States) to allow these individuals to see the benefits of GM production first-hand, site visits to the various Confined Field Trials currently underway at experimental stations across Uganda, and media outreach including print, radio and television allowing scientific and policy experts a platform to extol the virtues of GM cultivation. Such communication strategies are geared towards elites such as Members of Parliament, high-ranking civil servants and media representatives. The organizations behind this highly synchronized communications strategy argue that it is premature to target farmers until the technologies are available for purchase: 'most of the decisions are made by leaders, like politicians, government leaders, those are the key people that will make the decision about a particular GMO, and those are the one that preliminarily understand what is going on... so those are the ones we are primarily targeting' (Biotech Booster #1, June 6 2009). Even radio programming—a medium that is favored because it offers the widest reach among the country's farmers—is directed at elite rather than ordinary farmers. Almost all of the programs focused on GM are conducted in English; when asked why, an official responsible for outreach explained that, 'translating those GMO things into local [languages] is very difficult' (Biotech Booster #1, June 6 2009).

### Do farmers want genetically modified crops?

The first suggestion for moving beyond this impasse is methodological. Our current research in Uganda is premised upon challenging two critical assumptions that underlie much of the scholarly, policy and public debates in this arena. First is the conviction that it is impossible to communicate the complexities of genetic engineering with semi-literate and illiterate farmers. Second is the belief that farmers are rational actors who prioritize yields over all other criteria. This project utilizes a broad methodological program in order to assess the full range of value-based preferences that impact variety choice, including its agro-ecological 'fit' with its surroundings, ginning ability, water uptake, associated inputs, and market demand (Bellon

1996; Brush 2004; Veteto and Skarbo 2009). Widening the range of factors that influence decision-making should provide insight into whether GM crops constitute an appropriate technology for Ugandan farmers (Graff et al. 2006).

The methodology utilized in this project emerges out of the theoretical framework of participatory plant breeding, which is guided by a desire to integrate farmers directly into the agricultural innovation process (Bellon and Reeves 2002; Witcombe et al. 2005; Ceccarelli and Grando 2007; Thompson and Scoones 2009). It consists of a progression of exercises that relies heavily on visual aids and scenarios to help to bridge the gap between hypothetical exercises and farm-level realities. The methods are adapted from those employed by Soleri et al. 2005, 2008 and consist of five components: (1) *Collection of basic data*: a series of questions designed to elicit demographic information on farm and farmer characteristics with a particular focus on age, wealth, land size and labor dynamics, (2) *Ranking of crop attributes*: farmers are presented with a series of cards, each listing an attribute that influences the choice of planting material, and asked to rank the attributes from most to least important, (3) *Future scenario*: farmers are read a paragraph that depicts the benefits and risks associated with GM technology and asked for their response towards this process, (4) *Choice experiments*: farmers are presented with side-by-side comparisons of two varieties, differing only in their yield stability, source of planting materials, and cost, one representing the traditional farmer variety, the other representing the transgenic variety. Each variety has accompanying yield estimates for years 1, 3, and 6.<sup>2</sup> Farmers are then asked how important each predictor variable—yield stability, saving of planting materials, and cost—is to their decision-making, (5) *Ranking of varietal types*: Four types of planting materials are physically placed in front of the farmer: a traditional farmer variety, a modern variety improved through conventional breeding techniques, and transgenic versions of these same varieties. Farmers are asked to rank these four varieties in terms of what they would sow and what they would eat.

After using ranking exercises to determine farmer attitudes and intentions, focus groups are used to understand *why* farmers feel the way they do. Each focus group begins by undertaking the same series of exercises described above as a collective, prompting members to question, listen, and disagree as they work to achieve consensus. Follow-up questions explore differences among farmer

<sup>2</sup> Yields are represented by accompanying size of bunches that range from small to large. The specific yields for Variety X and Variety Y depend on the particular variable under investigation, though all depict Variety Y (simulating the GM variety) as having a larger yield than Variety X (simulating the conventional variety).

responses based on geography, market and credit access, and demographic characteristics.

We have completed farmer ranking exercises with 167 farmers from across the three major growing regions in Uganda, and completed ten focus groups with an additional 94 farmers. While quantitative data are still being analyzed, existing qualitative data suggests that this methodological program does help farmers to grasp the technology of genetic modification, and that farmers are able to offer intelligent and thoughtful perspectives on the benefits and limitations of these technologies. For example, many farmers express support for the process of GM in principle, and are particularly enthusiastic about it being used as a technique to produce resistance to overcome pernicious pests or diseases, 'If it is the new technology that will cause remedy of the disease, then we shall accept it' (farmer in Buikwe district). Others see benefit in the precision of GM techniques, which allow scientists to target those genes that code for the desired trait, 'I like GM because it has more specific results' (farmer in Nakaseke district). Male farmers in Kamuli district praise GM as the latest in a long-series of breeding technologies designed to help them improve yields and livelihoods. Said one farmer there: 'Modifications are made to achieve a much better product. If GM comes, we will have much better food security'.

Farmers further demonstrate a sophisticated understanding of the potential risks associated with GM technology and the government's ability to mitigate these. One male farmer in Nakaseke district puts his expectations of the government's risk management process in the following terms, 'before you start building a house, one first finds out the risks associated with the construction. Therefore, before researchers release the products they are expected first to consider all risks'. But others are more skeptical of the potential dangers associated with GM and the government's ability to regulate them. One male farmer in Kamuli district reflects on this, 'I'm having a fear that it is coming from where we do not know. And something that is being brought to me, it may be bad, and affect me as a result of the researcher's hidden agenda'. A male farmer in Buikwe district also expresses skepticism over the government's ability to anticipate the potential effects associated with GM varieties, 'we do not trust that GM varieties can be regulated by government. So if researchers are not exactly certain of the outcome then we should use our old varieties, other than the GM products.' Others remain confident that existing government protocols are sufficient to regulate any potential health and environmental consequences: 'Let us try, if the government sees no side effects, but if trouble results later, government should be able to fix it' (farmer in Nakaseke district).

Two other concerns are particularly prescient for farmers. First are the long-term implications of the release of

GM varieties. Farmers are particularly anxious about loss of characteristics over time. A female farmer in Wakiso district articulates these concerns over the long-term stability of genetic transfer, 'I do not support it because it changes the genetic nature of the plant, and this, will in turn change the behavior of the crop...if you have changed the nature of that plant, they must be other things that will change, which you will not know about that plant'. A male farmer in Nakaseke district is similarly worried that GM varieties will perform differently in his farm than they will in the experimental field, 'we have been experiencing these issues with the research products. Often, crops behave and yield differently on the research centres than they do on our farms. In addition sometimes crops may change behavior after release and so we do not know who has changed. The researcher creates products that are different from what we have now, and sometime they change after they are released'.

Another farmer questions the long-term implications of GM and whether they will be vulnerable to declining traits over time, 'sometimes when we get genes from two varieties, the variety over time goes back to its original form and looks like its parent' (farmer in Nakaseke district). A female farmer in Buikwe reports back that many of her neighbors are fearful of GM varieties breeding with traditional varieties: 'when you did the first round of surveys, we shared this information with other farmers. The other farmers became very scared that the new varieties will cause extinction of our old varieties'. Other farmers are more fearful about the long-term health implications. As one female farmer in Kamuli district puts it, 'this might harm human life. When they make genetic modifications, this could make changes in the food which could harm our bodies when we eat them because the food will be new in our bodies'.

The second concern is ethical. Many farmers are anxious over the moral and spiritual implications of genetic modification. One male farmer in Buikwe district articulates this concern as follows: 'I prefer the old methods of breeding, because when God did create, he had no regrets. But the new system worries us'. Others are vexed over the source of the donor genetic material, suggesting that they would only adopt GM if they were sure the new genetic material came from something edible. One female farmer from Kamuli district argues that '[GM crops cannot harm them, if they get genes from crops that are edible. But if the genes from different animals or plants that we normally do not eat then I would not eat them'. Another female farmer in Buikwe district echoes these concerns, 'we don't know the origin of the genes that they have used. But for other technologies like using pollen transfer, we know they have picked from Kibuzi to Kisansa [two traditional varieties]'.

The second element for amplifying farmer voices in this debate is a plan for knowledge dissemination that seeks to reaffirm farmer perspectives within these debates. This project aims to influence both policy and public debates by bringing farmers' voices to the forefront. The dissemination plan for this project is two-fold. First, daylong community meetings are scheduled to allow all farmers who participated in the study to provide feedback on the final recommendations. Local leaders—including the heads of farmers associations, District Commissioners, community leaders—will be invited as well, to allow farmers an opportunity to voice their perspectives directly to local decision-makers. Second, a one-day workshop will be convened in Kampala that will bring together the country's most important decision-makers around the science and policy of GM crops, including representatives from the National Council on Science and Technology, the National Agricultural Research Organization, and relevant Ministries and civil society organizations. Dozens of farmer participants will also be transported to the event. The aim of this workshop is to bring policy makers, research scientists and farmers together in a single room to strategize over how best to operationalize research findings. Small-group exercises will allow these diverse groups of stakeholders to listen and learn from one another, in the hopes of transforming research programs and policy directives around GM crops into ones that reflect farmer priorities and concerns.

While this knowledge dissemination plan is not yet complete, our progress thus far makes us skeptical that the activities outlined above will succeed in elevating farmer voices to the fore of this debate. First, we have begun communicating research results back to farmers and the response is unanimous: farmers universally corroborate our results, stating emphatically that our research accurately captures their perspectives on GM. But what do you expect them to say when the project is paying for their travel, accommodation and meals? Offending a host is an offence in Ugandan culture, and the power relations that frame these interactions seem unlikely to produce reactions that would contradict our presentation of results. Second, we recently convened the policy workshop in Kampala, which succeeded in bringing together farmer participants, research scientists, civil society and policy officials, including thirteen Members of Parliament. These decision-makers listened attentively to our presentation of farmer perspectives and to the voices of the farmers themselves, who spoke eloquently on the advantages and disadvantages of GM technology. But listening is not the same as hearing (after all, it is quite easy to get high-ranking officials to attend such events as long as there is a per diem attached). MPs, scientists and policy officials were all respectful and deferential to farmers, but they were also able to steer the

conversation towards their own agendas: many of these more powerful actors reminded us that they were farmers themselves, making it easier for them to appropriate this voice and speak on behalf of end users. Everyone—farmers, politicians, scientists—came away from the event telling us that it was useful and valuable. But it seems unlikely that such interactions will meaningfully contribute to agricultural programs and politics that prioritize farmer perspectives.

## Conclusion

This article has summarized the major obstacles to increasing the prominence of farmer perspectives within the debate over GM crops in Uganda, and proposed two strategies—one related to methods and the other to outreach—for amplifying these voices. Our protocols consist of a participatory approach that includes visual aids, side-by-side comparisons and hypothetical scenarios, which aim to make these discussions accessible to semi-literate and illiterate farmers. Qualitative findings suggest that our mixed methods program succeeds in making the complexities of genetic modification accessible to farmers, underlining the importance of communicating GM in a straight-forward manner that allows farmers to understand these complex processes and participate in this contentious debate (Lewis et al. 2010; Ezezika et al. 2012). Farmers are extremely interested in these discussions and offer thoughtful and considered opinions on the merits of GM crops, including their role in increasing food security, potential environmental and health consequences, and ethical considerations. But our plan for outreach was less successful, underlining the crucial power relations that preclude farmers from meaningfully contributing to conversations about the trajectory of agricultural technological development.

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