Using a Community of Practice to learn from smallholders in South Africa

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Genetically modified (GM) maize has been used by commercial farmers in South Africa since 1998, but evidence of its use by smallholder subsistence farmers is lacking. Some 40 per cent of South Africa's subsistence producers farm in KwaZulu-Natal (KZN) province, so this was an appropriate place for a Community of Practice (CoP) to examine the conditions under which GM crops could be used by smallholders and gain insights on the appropriateness of these technologies for them as well as for smallholders in other contexts.

Over the course of two cropping seasons (2012–2014), three groups of smallholders used GM maize and, through the CoP, interacted with leaders of the provincial farmer's organisation Kwanalu,[1] input suppliers, non-governmental organisations (NGOs), researchers and government officials. By putting smallholders first we found that they were enthusiastic about the benefits of GM maize, particularly for saving labour through weed control. However, we found their knowledge of the difference between traditional maize varieties and hybrid and GM

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varieties to be limited. We also found that smallholders appreciated workshops and training in better maize production techniques, particularly in managing soil fertility, and that they could benefit from the development of improved market, transport and storage infrastructure.

Community of Practice

CoP is a co-learning environment created by researchers, educators and smallholders (Table 1), who can analyse technologies and organise knowledge systems in a way that avoids the unintended negative consequences that often accompany traditional technology transfer. For this project, the CoP connected smallholders, researchers, educators and community members possessing different sets of knowledge and practice. Each group evaluated potential innovations from their own perspective, and all worked together to develop solutions through regular interaction. In forming the CoP in KZN, we built on Kwanalu's long-standing relationship with the farmers who became part of this project. While many of the non-farmer participants in the CoP had used participatory methods before, our CoP was a new experience for them

Table 1. Members of the Community of Practice

Sector	Organisations/institutions
Smallholders	Members of farmer associations from Dannhauser, Estcourt and Hlanganani
Researchers	Agricultural Research Council, University of KZN, KZN Department of Agriculture (Cedara), University of Missouri
NGOs	Kwanalu, Grain SA, Lima and Farmer Support Group
Private business	Monsanto and Pannar (seed companies)
Government	Extension educators from the provincial Department of Agriculture

Table 2. Laboratory testing for the presence of GM traits in maize germplasm and meal

Variety	Test for GM
Open pollinated (commonly available smallholder variety)	3 No, 2 Yes
Hybrid (commonly available)	1 No, 4 Yes
GM	5 Yes
Maize meal (purchased at supermarkets)	All tested positive

Note: *Maize kernels were obtained from the farms of smallholders expressing interest in participating in the CoP in each of the three locations, while maize meal was purchased from supermarkets in Pietermaritzburg and surrounding towns at the beginning of our research. Laboratory analysis was done at the University of Missouri, Division of Biochemistry.*

because it put smallholders at the forefront. This strengthened farmers' voices in the process of technology adoption and influenced the behaviour and decision making of other stakeholders.

We also collected data about the presence of GM traits in the maize germplasm used by smallholders in the project areas, as well as in commercially available maize meal (Table 2). Given that genetic modification has already been in widespread use among the commercial farmers who produce more than 90 per cent of the province's maize crop, GM traits were expected to be present in both meal and open-pollinated varieties. These results, as well as our reports about South African consumer impressions of GM maize and prior smallholder experience with GM crops, contributed to our database of literature and information on the use of GM crops among South African smallholders. This information is now available through our Community Commons hub (www.communitycommons.org/groups).

Prior to establishing the CoP, members of the University of Missouri team visited commercial and smallholder farmer-members of Kwanalu and learned that the smallholders were unable to participate fully in discussions about GM crops because of their lack of experience of the technology, financial constraints and poor access to the inputs necessary for commercial maize production. They also had a limited voice in local or provincial government decisions. Based on these visits, we selected three different areas of KZN in which to establish demonstration trials with smallholder members of farmer associations.

At each site, seed from conventional hybrids, *Bt* (insect-resistant) and HT (herbicide-tolerant) maize was provided by project personnel for smallholders to plant in a demonstration plot that also included the type of seed that they normally used – generally open-pollinated varieties. Activities included workshops with all participants to explain the CoP and to develop plans for demonstration trials. Over two planting seasons, smallholders received training on soil fertility, maize production systems, weed management and seed varieties. In the second season, a no-till plot – leaving the soil undisturbed by tilling – and stacked GM maize carrying both insect-resistance and herbicide-tolerance genes, were included in the trials. Additional activities included planting days, tastings of green mealies (immature maize as roasting ears), harvest days and debriefing on the knowledge smallholders had gained from the trials.

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Additionally, we hosted two conferences attended by smallholders, non-farmer stakeholders and interested parties from

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NGOs, the University of KZN and the Department of Agriculture. These conferences helped non-farmer stakeholders and others understand the smallholders' experiences with GM crops. Some 75 farmers and a dozen or more non-farmers participated over the course of the CoP.

What did we learn?

Despite the long history of GM crops in South Africa, there was little comprehension of GM technology among smallholders. During pre-planting visits, smallholders were specifically asked about their experience and knowledge of genetic modification, and only one group expressed an understanding of the differences between GM, hybrid and open-pollinated seeds. Their leader was very knowledgeable about maize production and often interacted with commercial farmers and seed company representatives, but questions asked by group members suggested that this awareness was not shared by all. Most smallholders in the CoP were confused about the differences between seed types, such as open-pollinated varieties and hybrids with or without GM traits, and were unaware that GM seeds were used in nearby fields. Despite this, GM crops, especially with herbicide-tolerance traits, were enthusiastically embraced because of significant issues with labour and weed management. Much to the surprise of non-farmer stakeholders, smallholders indicated that they would continue to try to acquire and plant GM maize.

These plans may be difficult to implement, however. Access to inputs is limited and chaotic. Seed distribution happens in two primary ways: municipalities supply free seeds and other inputs to recognised farmer associations, or small-

holders purchase seed on their own through a network of agricultural input stores. Smallholders noted that they often buy the cheapest seeds and fertilisers, and just ask shopkeepers for yellow or white maize. Shops stock only what the seed suppliers provide and have difficulty regularly procuring seeds that meet the needs of smallholders. Given the difficulty of storage and transport to markets, the economic benefits of GM maize may be limited to what local markets can absorb.

Project outcomes

Smallholder farmers showed consistent learning through the CoP process, from fertility management to weed management to differences between GM, hybrid and conventional seeds. For instance, one group realised they had been over-applying fertiliser because they had never understood soil testing and the interpretation of results, while in another group some subsequently found the money to buy backpack sprayers in order to use herbicides. In addition, smallholders have accessed new networks by meeting with researchers and resource providers and by joining Grain SA, an association of grain farmers focused on improving grain production methods.

Another significant outcome was the foundation laid for future cooperation between Kwanalu and other organisations serving smallholders in KZN. Sandy LaMarque, Chief Executive of Kwanalu, expressed satisfaction that their organisation had a better understanding of the wants and needs of smallholders as a whole, not just in terms of their access to GM maize. Kwanalu and Lima, a rural development

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organisation, have again partnered on a Rural Development Desk, in part due to their experiences of this CoP.

It is also clear that the CoP facilitated non-farmer stakeholders to learn from smallholders. Many stakeholders noted with surprise that smallholders are interested in GM seed or weed management, and have come to realise the holistic nature – from both the production and marketing side – of the issues facing smallholders. For instance, an extension provider observed: "The farmers are involved … and it is better than just planting and showing them what they must see. Here they are involved and must decide for themselves." A stakeholder from agribusiness said that the CoP helped him look at the whole smallholder system and that his company may have to make changes now because "they will know why the farmers are doing what they do".

Conclusion

The CoP's emphasis on putting smallholders and researchers in a co-learning environment resonates beyond the project. For instance, researchers from the University of Pretoria have proposed working with one of the communities for three to five years on maize virus diseases. While some view a CoP as time-intensive, it is doubtful that a demonstration trial alone would have built such relationships between smallholders, organisations and resources, or encouraged the networking that we have seen from this project. Moreover, as one of the authors noted, the CoP showed the importance of involving a whole range of stakeholders who help shape the context in which technology is deployed, particularly because it is easy as researchers to assume a pre-packaged solution to complex problems.

We close with how the CoP lifted up the voices of smallholders in our project. An extension provider said: "I've learned that once the farmers are organised they can go far." The CoP has given farmers both organisation and a voice about their farming needs.

As a rural development stakeholder noted, the CoP "has been done in an open environment of sharing without being overly prescriptive and in a non-arrogant and non-authoritative environment where the farmers are at the front of that decision-making system. You have created a very participatory environment and the relationships between stakeholders smell very strongly of equality."

Note

1. In 1997, Kwanalu emerged from the merger of the 107-year-old Natal Agricultural Union, which represented white commercial farmers, with the Madadeni Branch of the National African Farmers Union and the South Coast Indian Farmers Association.

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