Agricultural Innovation: Do We Understand Who Wants What?

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Introduction

The Agricultural Technologies and Marketing Strategy Exhibition was organised by the Bureau of Agriculture and Rural Development (BoARD) of Tigray Region and the IPMS (Improving Productivity by Marketing Success) project of the International Livestock Research Institute (ILRI). Many private-sector, governmental and non-governmental organisations participated and brought farmers with whom they are collaborating. The organisations included: BoARD, Relief Society of Tigray (REST), Institute for Sustainable Development (ISD), Bio-Farm, Kalamino Dairy Project, Dima Honey Processing Private Company, Agricultural Colleges, Research Centres etc.

BoARD experts and farmers from different districts of Tigray Region presented agricultural products, mainly cash crops such as pulses, oilseeds, spices, vegetables, fruits, honey and dairy products. Also processed products were exhibited by the Women's Department of the BoARD, NGOs and some private enterprises. Many people were buying, selling and sometimes testing (eating) the products. In another corner, appropriate technologies were exhibited related to beekeeping, water pumping, drip irrigation, ploughing, biogas production etc. These were demonstrated by innovator farmers, government extension workers, private companies and NGOs. Many visitors, particularly farmers, were attracted by the exhibits of prickly pear cactus processing, solar technology, silk worms and apple production – the last-mentioned coming from in the Southern Region of Ethiopia. Photographs, videos, brochures and pamphlets were used as media of communication. More than half of the participants were women, which was very encouraging.

Prolinnova is an NGO-initiated programme to build a global learning and advocacy network on promoting local innovation in ecologically-oriented agriculture and NRM.

Prolinnova seeks to:

- demonstrate the effectiveness of user-led innovation for sustainable development
- build strong farmer-extension-researcher partnerships
- increase capacities of farmers, researchers, extensionists and policymakers in participatory approaches, and of trainers who can continue facilitating the process
- integrate participatory approaches to farmer-led innovation and experimentation into research, extension and education institutions
- pilot decentralised funding mechanisms to promote local innovation
- stimulate national and regional policy dialogue to favour local innovation
- set up platforms for reflection, analysis and learning about promoting local innovation.

For further information visit: www.prolinnova.net

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After the exhibition of agricultural technologies and products, there was a workshop in which many papers were presented and the various stakeholders discussed issues of marketing, agricultural institutions, research and policy.

Farmers' innovations

Some of the selected local innovations which were presented by the farmer innovators are:

1. **Water-lifting device** developed by Qeshi (Priest) Malede Abreha. He is a well-known innovator in water-lifting technologies who was identified already during the Indigenous Soil and Water Conservation Project (ISWC) coordinated by Mekelle University in the late 1990s. Qeshi Malede did not stop after trying his first technology to lift water from wells; he kept on modifying it to make it better (cheaper and easier to use). His innovation solved many problems in his life. He used to be a poor farmer. His innovation gave him a chance to earn more money by selling vegetables and fruits. He changed the lives of many people in his area, who copied his idea, and he is serving as a local engineer for his community in helping other farmers to design and construct their own water-lifting devices. At a recent PROFIEET workshop, his innovation was selected for further research in a Participatory Innovation Development (PID) process.
2. **Subsurface drainage technology** developed by Ayte (Mr) Abadi Redehey. He has a small farm but more than half of his land was waterlogged during the long rainy season, so it was useless. When he was visiting Axum town, he saw the sewage canal being constructed. He decided to try to use this system in his land during the long rainy season. Thanks to his drainage technology, his land is serving him not only during the rains but also in the dry season, because he dug water reservoirs into which his drainage canals lead the excess water. He uses the collected water for irrigation. This technology was also selected at the Axum workshop to be further explored and possibly improved in a PID process.
3. **Traditional drip irrigation technology** developed by Ayte Weldu Gebrewahid and his wife. He is locally known as the "erosion challenger", because he literally built his fields by catching soil and water in deep pits on an eroded hillside. His innovation involved modifying the introduced system of drip irrigation and making a local technology out of it. He hangs gourds filled with water on each fruit tree; the water drips down the trunk through small holes at the bottom of the gourds. He also buries pots with small holes beside each tree and fills the pots with water. He has been observing how the growth of his orange trees and the extent of insect infestation differ according to the way they are watered, including the conventional pouring of water directly to the base of each tree.
4. **Queen-bee rearing technology** by Weizero (Mrs) Gidey Aregawi and Ayte Gebrehiwot Mehari. Queen-bee rearing is highly useful in the region because many people earn much money from honey, and there is a high demand for new honeybee colonies. Therefore, colonies sell for a high price and are a lucrative source of income. The innovation is not easy to explain, but is documented and has also been selected for a PID process.
5. **Single-ox plough**. In Ethiopia, ploughing is normally done using a pair of oxen and the traditional ploughs are made of wood. Ayte Gebrehiwot developed his innovation because he has only one ox and he does not want to cut trees for the plough. The technique he used for making his plough are fascinating. During the exhibition, many farmers were visiting his innovation.
6. **Keeping tsadena bees** (a special wild bee that lives in the ground and does not sting people). The honey made by this bee has a medicinal value for many sicknesses like asthma, common cold, fever, but also more serious ailments. Ayte Birhane decided to rear this bee after his mother became sick with heart disease and died because he could not easily find the medicinal honey needed to treat her. Many people search for this bee and they destroy the underground beehive in order to extract the honey. Over the years, he collected several entire

tsadena beehives, complete with surrounding earth, and put them in the ground around his house. Through experimentation, he has developed a way of harvesting the honey without destroying the hives. He extracts the honey regularly and sells it as medicine but sometimes gives it free to community members.

7. **Agro-biodiversity practices** by Weizero Yehanusu Atsbeha. Because the long rainy season now starts later and stops earlier than it used to, she started to diversify by including the traditional long-season crop of finger millet among her crops. An agricultural advisor suggested trying to raise seedlings in nurseries and then transplant the finger millet to overcome the problem of the short rainy season. She is carrying out further experiments of her own: she has compared the yield of transplanted and broadcast finger millet and got results of 7.8 and 2.8 tons/ha respectively.

How farmers assess innovations

The Northern Typical Highlands Team is trying to bring innovative farmers together so that they can solve their local problems more quickly. It also tries to bring them together with other research and development agents who are interested in supporting the local innovation processes.

At the exhibition, which lasted 5 days, it was amazing to see – perhaps for the first time – small-scale farmers' technologies side-by-side with "modern" technologies developed by research centres and private enterprises. The farmers invited to the exhibition were lead farmers showing introduced technologies and innovator farmers showing their own technologies. The formally educated "experts" gave much more prominence to the productivity of the new technologies in quantitative terms than to the technical qualities of the technologies. It was also very interesting to observe how systematically the farmers took in the new information that was made available to them by the exhibition:

1. During the first round on the first day, the small-scale farmers looked at all the new technologies, regardless of their origin, i.e. they only visited the technology, not the technology developer.
2. During the second and third rounds on the first day, they sought information about who developed the technologies and they gathered and discussed with other farmers. This was in two steps: first, they met with their own friends, i.e. the farmers they already knew; then they started talking with other farmers they had not met before (new friends). They exchanged information about the technologies being exhibited. They wanted to know if the innovation is easy to apply, if anyone has tried any of these technologies already and what their experiences were.
3. On the second day, the farmers selected and focused on the new technologies, whether "modern" or local innovations, that seemed good and interesting to them.
4. After the second day, they spent their time trying to find out more about the techniques involved and the skills and inputs needed for the technologies they had selected, giving most time to the most important technology in their view and least time to the least important.
5. After they had gained all the information they wanted, the small-scale farmers regarded it as a waste of time to stay longer at the exhibition and in the workshop.

Differences in interest and perceptions

In these rounds of visiting and gathering information, most of the farmers showed more interest in the local innovations than in the technologies produced in modern workshops. The few farmers with some formal education visited both types of technologies almost equally. The people working in the modern production workshops seemed reluctant to visit what the small-scale farmers had developed. Thus, there is a gap between the so-called "educated" people and the small-scale farmers. This creates a great challenge to the Northern Typical Highlands Team's aim of bringing all these actors in agricultural innovation together

to help create sustainable livelihoods. The actors in an effective innovation system need to believe in and trust each other; otherwise, they will not be able to combine forces to improve the agricultural potential in the Tigray Region.

It was the small-scale farmers rather than the formally educated experts and officials who could identify the useful innovations and the true innovators. This is because the farmers are drawn to the technologies that are effective, easy to apply and cheap, while the formally educated are drawn to the newness and appearance of the technologies. The farmers were very much interested not only in the productivity of the technologies but also in the quality of the knowledge behind them, and they were keen to ask the farmer innovators many questions about their innovations. For example, many farmers visited the water-lifting model of Qeshi Malede Abreha, although many of the so-called educated people regarded it almost as a joke. The farmers who visited Qeshi Malede asked: How did you learn this? How long did it take to make it? Are the materials you used easy to be found? Does your family understand and like this? What are the main problems you observed? What is the average cost? However, when the small-scale farmers visited the "modern" products of, for example, the Selam Workshop, they saw and appreciated what they saw, but the experts and technicians asked many more questions than the farmers did.

In the discussions among themselves, the farmers appreciated technologies that lead to higher production, e.g. of honey, but also raised questions about the market for the products, especially for more perishable food products such as tomatoes. With respect to fruits, they did not see any serious problems regarding markets; not even transport is considered to be a problem.

The challenge of pressure treadle water pumps

The need for simple, relatively inexpensive water-lifting devices has grown very fast. The most popular modern technology is the treadle water pump. As long as the water source is near to the surface, these pumps are proving popular and effective.

However, the drive to get water is leading farmers to dig deeper wells, down to as much as 12 m depth. The BoARD has also been promoting the use of sweat tubes for drip irrigation. These require water to be raised into a container about 2 m above the ground to provide the pressure to feed water into the sweat tubes. Thus, it can be necessary to lift the water up to 14 m from the water table in the ground to the raised tank. This requires a pressure treadle water pump, a modification of the simple treadle pump adapted to give the extra lift needed.

The BoARD asked ISD to help to obtain 11 pressure treadle water pumps for a group of farmers who were starting irrigated vegetable production. There was only one source of supply in Addis Ababa. When the pumps were delivered to the farmers, none of them worked effectively and most of them did not work at all. This was partly due to faulty workmanship, particularly in making the cylinders that lift the water, and partly because there had been no contact between the manufacturer and the intended users. For example, both the inlet and outlet pipes were too short and too wide in diameter to connect to the hose, so there was constant leakage. The specific problems were explained to a local entrepreneur, who made the required modification and re-made the cylinders. All the pumps were tested in a real-life setting before they were given back to the farmers. ISD will follow the life and efficiency of these pumps as part of its Water for Food Security Project.

This is a sad reflection on the lack of communication between farmers – the users of the technology – and the manufacturers of introduced technologies. This experience could easily lead farmers to be more reserved when offered other new technologies and demonstrates the vital importance of a participatory approach to technology development.

Conclusion

Observing how small-scale farmers learn from the new technologies exhibited in Mekelle by their peers and by modern workshops and research centres made us realise how little the majority of "educated" people in agricultural research and development understand what interests the farmers. We need to observe more closely what they are doing in developing their own innovations and what type of information they are seeking from others to continue their own process of agricultural development. The exhibition provided a good opportunity to learn how information exchange can be improved to support this process.