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Endogenous and Modern Innovations: Differing Perspectives

In Tigray Region, northern Ethiopia, people from government and NGOs are seeking local innovations as starting points for participatory development and extension. Ethiopia is one of nine countries involved in the international network PROLINNOVA (Promoting Local Innovation). The Ethiopian programme set up multistakeholder teams in different agroclimatic zones. In Tigray, the Northern Typical Highlands (NTH) team includes Mekelle University (MU), Bureau of Agriculture and Rural Development (BoARD), Institute for Sustainable Development, Relief Society of Tigray (REST), Adigrat Diocese Catholic Secretariat and Tigray Agricultural Research Institute. The NTH team brings innovative farmers together around common interests to solve local problems and links them with formal researchers and extensionists wanting to support local innovation processes. Observations by NTH team members at a recent exhibition of farmers' and modern innovations revealed how differently the farmers and the "educated" perceive new technologies.

Exhibition of local and modern innovations

The Agricultural Technologies Exhibition was held in Mekelle, the capital of Tigray Region. It was organised by the Improving Productivity by Marketing Success (IPMS) project coordinated by BoARD's Department of Agricultural Extension (part of the NTH team) and the International Livestock Research Institute. Many government agencies, NGOs, private firms and research organisations took part. Some brought farmers with whom they work: either "model farmers" showing introduced technologies or innovative farmers showing their own technologies. Of the 2500 participants, over 200 were innovative and model farmers.

In one area of the exhibition, BoARD experts and farmers from different parts of Tigray presented agricultural products, mainly cash crops such as pulses, oilseeds, spices, vegetables, fruits and honey. Some processed products were also exhibited and sold. In another area of the exhibition, appropriate technologies related to beekeeping, water pumping, irrigation, ploughing and biogas production were demonstrated by farmer innovators, extensionists, entrepreneurs and NGOs. Many visitors, especially farmers, were attracted by the exhibits of silk worms, solar energy and processing prickly pear cactus.

The exhibition of technologies and products was followed by a workshop. Many papers were presented and participants discussed marketing, agricultural institutions, research and policy. The exhibition and workshop lasted five days.

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Examples of local innovations

At the exhibition, numerous farmers (about 30% women) displayed technologies they had developed themselves. These included:

- **A water-lifting device** developed by Priest Malede Abreha and displayed as a model he built himself. The Indigenous Soil and Water Conservation (ISWC) project coordinated by MU identified this innovator in the late 1990s. After developing his first technology to lift water from a self-dug well, Malede modified the device to make it cheaper and easier to operate. A PROFIEET workshop organised in Axum for Tigray farmers and extensionists selected his innovation for further research in a Participatory Innovation Development (PID) process.
- **Subsurface drainage** developed by Abadi Redehey. More than half of his 0.5 ha farm was waterlogged in the main wet season, so he could use the land only during the short rains. When visiting Axum town, he saw a sewage canal under construction. He decided to use this system to drain his land during the main wet season. He leads the excess water into reservoirs and uses it for irrigation in the dry season. At the Axum workshop, his technology was also selected for PID.
- **Drip irrigation** developed by Weldu Gebrewahid and his wife Hawaria Berhe. Weldu 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. The couple modified the introduced drip-irrigation system and made it into a local technology. They hang gourds with water on each orange tree; the water drips down the trunk through small holes in the gourds. They bury pots with small holes beside each tree and fill the pots with water. They observe how tree growth and insect infestation differ according to watering technique.
- **Improved beehives and queen rearing** developed by Giday Aregay (see Box 1), another technology selected for PID at the Axum workshop.
- **Domesticating wild bees for medicinal honey**, an innovation developed by Birhane GebreMariam (see Box 2).

Box 1: Improved beehives and queen rearing

In Maysuru village, REST fieldstaff identified a woman who experiments and innovates in beekeeping. Giday Aregay is in her late 40s and has eight children: two are married. Her husband has been ill for many years, and she supports the household through farming and beekeeping.

Traditional beehives in Tigray are made from wood, dung and mud. Government extension and REST introduced wooden top-bar beehives. Giday's oldest son, a schoolteacher, bought her one for 450 Birr. She earned 200 Birr with the first honey harvest and was convinced that beekeeping could bring good income, but wondered why the hives had to be so costly. She told her son she could make one using local materials but he said: "Don't waste your time." She told him: "There is no penalty or debt incurred if someone wants to experiment. I will try". After measuring the modern beehive with a stick, she made a replica out of cowdung and mud. She made wooden frames all the same size, so they could fit into any beehive she made. To hold the honey combs, she used thread from old tyres (sold on the market) instead of wire used in the modern frames. By trying different frame spacings, she found she could harvest in total more honey with fewer frames than in the modern hive. She harvested 40 kg of honey from her adapted hive, 5 kg more than from the modern one. She also built houses for queen-bee rearing. She attributes her better honey harvest and higher production of bee colonies to the insulating effect of the mud and dung during the cold and warm season.

Today, Giday has 15 beehives: seven to produce honey and eight to produce bee colonies, for which demand on the local market is high. Each colony fetches 450–500 Birr. Honey and bee colonies are now her main source of income. Giday would like to make a business of beekeeping, but is not sure about the optimal number of beehives for this and the best balance between honey production and queen rearing.

Box 2: Domesticating wild bees for medicinal honey

Experts in BoARD's Degua Tembien District office identified the 35-year-old local innovator Birhane GebreMariam. Five years ago, while herding goats, he discovered a nest of *tsedina* – wild bees that live underground. This bee's honey is used as medicine, e.g. for asthma, fever and heart ailments. The entrance to the *tsedina*'s underground nest is very narrow and not easily seen. Many people seek *tsedina* and destroy the nest by digging it up and extracting the honey. This practice has made them rare in some areas.

When Birhane was young, his mother died of a heart ailment; the medicinal honey needed to treat her could not be found on the local market. Remembering this, when he discovered the *tsedina* nest, he decided to shift it to his farm. In the evening when the bees were home, he and two friends dug out earth which held the intact nest and moved it to the ground near his house. A year later, he started harvesting by lifting a soil layer and putting it back again so the hive was not destroyed. The initial harvest was 2.5 litres of honey, which he sold for 60 Birr per litre. Over the years, he moved three more *tsedina* nests, complete with surrounding earth, to his homestead.

Now Birhane extracts honey regularly. Elders say that nobody had tried to domesticate *tsedina* before. Because of his initiative, the traditional medicine is now available locally whenever needed. He sometimes sells it and sometimes gives it to community members. He has experimented with moving the hives in different seasons and harvesting at different times. He learned that the nests should not be moved during drought and that a nest can be harvested only once yearly.

Birhane would like to know whether other farmers have experience with *tsedina* and wants to learn more about the bees' behaviour and queen rearing. He realises that wild bees normally live in widely spaced nests in secluded areas with little disturbance, unlike a homestead with many people and animals. He would like to participate in research into issues of appropriate siting of nests and competition between *tsedina* and normal bees.

How farmers assessed innovations

The Mekelle exhibition provided the farmer innovators with new information. It was fascinating to observe how systematically they took this in.

- During a first round on Day 1, they looked at all innovations, whatever their origin. Individually, they visited only the technologies, not the technology developers.
- During the second and third rounds on Day 1, they sought information about who developed the technologies and other farmers' views. First, they met with the farmers they already knew, and then started talking with other farmers. They discussed the technologies exhibited: which ones looked easy to apply, if anyone had tried the

technology and what the experiences were.

- On Day 2, the farmers selected and focused on the new technologies – whether "modern" or "local" innovations – that interested them particularly.
- They spent the rest of their time trying to find out more about the skills and inputs needed for the technologies they had selected. They visited the exhibits according to their importance. The more important the technology in their view, the more time they gave to it.
- After they had gathered all the information they wanted, they felt it was a waste of time to stay longer at the exhibition and workshop. They stressed that the exhibition was very useful for exchanging experiences and learning about new technologies.

Differences in interests and perceptions

In these rounds of gathering information, most farmers showed more interest in the local innovations than in the technologies from modern workshops. The few farmers with some formal education visited both types of technology almost equally.

The formally educated experts were reluctant to visit what smallholders had developed, were drawn to the newness and attractiveness of "modern" technologies, and looked mainly at their productivity. It was the farmers who could identify the innovations most useful for smallholdings. They were drawn to technologies they regarded as effective, easy to apply and inexpensive. They appreciated technologies that brought higher production, but asked about markets for the products, especially for the more perishable ones like tomatoes. Besides productivity, they asked about other qualities of the technologies and the knowledge behind them. They posed numerous questions to the local innovators. For example, many farmers visited Priest Malede's water-lifting model, although many "educated" people regarded it as a joke. The farmers asked Priest Malede: How did you learn this? How long did it take to make it? Are the materials you use easy to find? Does your family understand and like this? What main problems did you observe? What is the cost? In contrast, when farmers saw the "modern" implements from industrial workshops, they did not ask as many questions as the experts did.

There is obviously a gap between the "experts" and the smallholders in Tigray. This creates a big challenge for the NTH team, which tries to bring all these actors in agricultural innovation together. For an effective innovation system, the actors need to believe in and like each other. Otherwise, they cannot combine forces to make the most of Tigray's agricultural potential.

Observing how farmers learn from new technologies exhibited by their peers and by modern workshops and research centres made us realise that most "educated" people in agricultural research and development understand little about what interests smallholders. They do not know what farmers want to give their time to see. We need to observe how farmers are developing their own innovations and what type of information they seek from others to continue their own development process. The exhibition provided a good opportunity to learn how information exchange to support this process can be improved.

This note was prepared by Hailu Araya, Institute for Sustainable Development, and Yohannes GebreMichael, Geography Department, Addis Ababa University. Both are involved in PROFIEET (Promoting Farmer Innovation and Experimentation in Ethiopia), a multi-stakeholder platform for learning about local innovation in ecologically-oriented agriculture and natural resource management (see www.prolinnova.net). A longer version of this article appeared in the *LEISA Magazine*.