3. Chapter III. Article II: Improving access to vegetable seeds for diverse and resilient farms: Lessons learned from coffee farmers in Turrialba, Costa Rica
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A group of coffee farmers in Turrialba, Costa Rica, is successfully exploring diversification options with horticultural food crops. This is being done in collaboration with two vegetable genebanks that allow farmers to use varieties freely under the MultiLateral System of FAO’s International Treaty on Plant Genetic Resources for Food and Agriculture.

Experiments with tomato and sweet pepper varieties were successful and show promise for helping farmers gain access to genetic resources of horticultural crops. The resulting diversity could be the basis for diversified farming systems that are more resilient in progressive climate change and price volatility, while providing nutritious food crops at the same time. This case study therefore calls for the inclusion of more horticultural crops in the Annex 1 list of species covered by the Multilateral System (MLS, Annex 1, p. 46–47), such as tomato and sweet pepper.

3.1 Why mix coffee production with tomato and sweet pepper crops?

In Turrialba, Costa Rica, climate change and low coffee prices motivated small-scale coffee farmers to spread risk and diversify their farms by integrating new crops. Eight small-scale coffee farmers in Turrialba chose to participate in an experiment with tomato and sweet pepper led by CATIE. These crops were chosen for the experiment for the following reasons:

1) These horticultural crops are of great interest to farmers in this region as alternative cash crops that are complementary with coffee, as well as for domestic consumption

2) The genebanks of the Tropical Agricultural Research and Higher Education Center CATIE and The World Vegetable Center (AVRDC) maintain highly diverse collections of these two crops, providing the necessary variety for selection of interesting materials. They are also openly accessible under the Multilateral System (MLS) established by FAO’s International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRA).

The experiment’s premise is that diversified farming systems are often ecologically and economically more resilient than those with less components. Diversified systems provide farmers with a range of resources, including stabilization of income and production and diverse food for consumption. This diversity has been shown to result in systems becoming more resilient to climate change and price volatility.

However, farmers often do not have access to appropriate seed material to diversify their systems with food and/or cash crops compatible with their interests. In this project,
we explore how access to diverse genetic material can improve a farmer’s ability to effectively diversify his or her farm in a way that makes it resilient and sustainable.

3.2 How did farmers conduct the experiment?

Eight farmers, four organic and four conventional, were invited to participate in the study based on their interest in diversification and willingness to participate. The farmers evaluated three types of tomato and sweet pepper seeds. These included 1) popular commercial varieties, 2) traditional varieties from CATIE’s genebank in Costa Rica that were selected according to farmers’ preferences indicated in initial interviews and 3) new varieties that were developed by breeders from AVRDC in Taiwan to respond to specific biotic and abiotic conditions in Central America.

Seeds from CATIE’s genebank were ordered using the Standard Material Transfer Agreement (SMTA) developed by ITPGRFA. Seeds of the AVRDC varieties were obtained by CATIE after signing a Material Transfer Agreement (MTA) to test them in Central America. In addition, the most common commercial varieties of tomato and sweet pepper were ordered from a local greenhouse.

After the seedlings were transplanted on each farm, plastic bands were installed as protective roofs above each variety. Conventional and organic seedlings were given to each producer, along with a management guide that was used to ensure the same management approaches were used on all farms.

Each farm was visited once a week from the time the transplant began, April 2015, until the end of the field experiments, November 2015. During the visits, the following data were taken: 1) morphological and evaluation data of each variety; 2) site characterization of each farm; 3) management evaluation of each producer; 4) climate data; 5) yield data; 6) participatory evaluations with the producers and 6) individual interviews with the producers about their preferences.

3.3 Farmers’ preferences

Many factors affected variety preferences of each farmer, including the type of management used on the farm, local market factors and local biotic factors. Although many farmers appreciated the commercial varieties because of their pest and disease resistance and high yields, several CATIE accessions as well as a few AVRDC varieties were ranked as equally or even more preferred.

Most producers involved in this project expressed satisfaction with the new varieties brought to their farms, which they had never seen. Rosa Hernández Céspedes, a coffee farmer who has been trying to diversify her 7-hectare farm for the past eight years, is very excited.
“These new varieties also give us something new to sell,” she said. “The local people want new kinds of vegetables, new options, but I never knew where to find the seeds. So I have started saving the seeds from the new varieties and I can now sow my own seedlings and produce these great vegetables again.”

What started out as strictly a coffee plantation had already been converted by Rosa into a diverse, organic farm that includes a vegetable greenhouse, a restaurant and a nursery of tree species. Yet, before her involvement in this project, Rosa had little success in diversifying with vegetables, as expressed in the following statement:

“I always planted the same commercial varieties of vegetables, including commercial varieties of tomato and sweet pepper. But with this project, I have discovered many traditional varieties of great quality, some of which are more resistant to the increase in rain we have had this year. It’s great to have all of these new options on the farm.”

For farmers like Rosa who are searching for diverse products with unique characteristics, the traditional CATIE accessions were of most interest. Many of the traditional varieties tested in the study showed characteristics that were appealing to these farmers, such as high resistance to pests and diseases as well as fruit forms that were uncommon but often preferred. The commercial varieties were often most preferred by producers selling strictly to the conventional market.

3.4 What lessons can be drawn from this study?

This study shows the importance of facilitating farmers’ and breeders’ access to the genetic resources of horticultural crops and the key role that accessible collections could fill, such as those of CATIE and AVRDC. Tomato and sweet peppers, as well as other important vegetable crops such as cucurbits, are not yet part of the list of crops covered directly by the Multilateral System. This means that having access to improved varieties to these crops is very hard for small-scale family farmers because of the bureaucracy, cost and intellectual property rights involved.

Although the resources contained within genebank collections are important, without proper access to particular information by farmers, breeders and agronomists, the material cannot be used efficiently. In this study, for example, morphological data of genebank accessions was used to select the varieties according to farmers’ preferences and their on-farm potential was evaluated under different conditions. It is important that such morphological characterization and evaluation data is made accessible by genebanks to enhance its use by different actors.
On the basis of this study, we propose six measures to improve access to growers and breeders once the crops are included in the MLS:

1. A clear documentation system with relevant information on agronomic and other commercial properties of the crops covered by the MLS collection is made available in accessible language and media
2. An online system to directly request seeds, which also includes contact information for farmers in case of questions
3. Active assistance to farmers in negotiating an SMTA
4. Establishment of straightforward payment systems that cover the costs for regeneration of the material by the genebank, which should remain economically accessible to farmers and other breeders
5. Distribution of hardcopy catalogues that include the most promising materials and contact information for farmers and relevant organizations
6. Increase in the number of on-farm participatory varietal-validation research projects with farmers

When farmers have better access to information and seed material that is currently available in genebanks, they can broaden the genetic base of their crops. Our research shows that this is of interest to individual farmers and organizations who seek to diversify their farms in response to climatic or economic shocks and to strengthen their management of crop varieties by developing participatory evaluation and breeding programs.

3.5 Farmer-based experimentation

Farmers like Rosa are motivated to seek out new varieties and new markets to enhance their adaptive capacity. However, many producers have lost essential knowledge about ecosystem resilience and the way that diverse, traditional seed systems contribute to this resilience. Therefore, knowledge sharing must also be enhanced in addition to improved access to genebank material under multilateral seed systems if the material is going to be used effectively.

However, bringing this genetic material to farms cannot depend solely on outside intermediaries. Rather, we have seen that knowledge sharing works best when innovative smallholder farmers like Rosa encourage other producers to seek out new material and multiply and breed diverse varieties. Such horizontal learning and farmer-based experimentation should be at the center of knowledge-sharing processes, in which other parties (scientists, NGOs) can play a supportive role. This will contribute to the effective use of genetic resources for more resilient and sustainable farming communities.