

Diversifying diets to improve nutrition and incomes in Bangladesh



Working in partnership with the Asian Vegetable Research and Development Center (AVRDC), Worldfish, and Bangladeshi partners, CIP recently launched a bold program to raise incomes and improve nutritional health through greater use of potato, sweetpotato, and vegetables in disaster-prone southern Bangladesh. Its aim is to generate positive impacts for 100,000 families in this highly vulnerable area over the next four years.

Poverty affects 40 percent of people in Bangladesh. Malnutrition is among the highest in the world, with 56 percent of preschoolers underweight. This project aims to address poverty and food insecurity through innovations in the production, marketing, and consumption of potato, sweetpotato, and high-value vegetables, such as tomato, pumpkin, eggplant, and gourds.

The project has a two-pronged approach, involving both homestead gardens and more commercial production. Training for homestead garden producers is focused on nutrition, improved subsistence production, and potential for income generation. Like the commercial production component, which targets small-scale producers, it incorporates models and lessons learned from CIP and AVRDC experiences in the region and in other parts of the world.

Gordon Prain, who is one of the project leads, cites some examples:

"Together with our partners at Worldfish, we will apply lessons learned from CIP's work to promote orange-fleshed sweetpotato in Africa, including seed multiplication and outreach to pregnant women with vouchers for planting material and nutrition counseling through prenatal care services. We are implementing lessons from India and earlier work in Bangladesh on how to incorporate potato into rice-based systems. We also plan to adapt the Farmer Business Schools approach used by CIP in Indonesia, which itself derived basic ideas from the Participatory Market Chain Approach originally developed in Latin America through CIP's Papa Andina Program."

One of the challenges of the project has been its fast pace. "There was urgency in getting this project up and running quickly to plant and harvest a season of potato and sweetpotato in the fallow period before the 2012 planting season for rice," explains Mohinder Kadian, Regional Potato Specialist. Within two weeks of the project's approval, the team was planting potato and sweetpotato and starting a series of intensive trainings with farmers and technicians on topics such as seed multiplication, varietal evaluation, and integrated pest management.

Another aspect of the project's fast track has been how it has exemplified the importance of cross-center collaboration at CIP. "Not only does this project rely on cross-linkages between our global and regional programs," notes Prain, "it also has benefited from close collaborations between research and operational areas required to get the needed people and resources into place, particularly in a country where we did not have a permanent presence already."

The program aims to reach 30 percent of potato, sweetpotato, and vegetable producers in four districts of southern Bangladesh over the life of the project, with the goal of ensuring their nutrition and food security needs and increasing their incomes by 20 percent.

The project is being implemented with the Asian Vegetable Research and Development Center. Other key partners include Worldfish, BRAC, the Bangladesh Agricultural Research Institute (BARI), through its Tuber Crops and Horticulture Research Centers and the Entomology Division, the Department of Agricultural Extension (in target districts), Bangladesh Agricultural Development Corporation, and other Bangladeshi organizations.



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New advances in repatriation and conservation of native potatoes

A decade ago, Andean farmers noticed that the rich diversity of their native potato varieties was dwindling due to changes in traditional farming practices. This was leading to a low supply of quality potato seed, resulting in poorer yields and increased susceptibility to pests and diseases. Concerned farmer groups appealed to CIP for help, and thus began the collaborative repatriation of more than 400 different native potato varieties to the Andean highlands. This year, for the first time, native potato varieties are being repatriated to the communities of the Potato Park in Pisac, Peru as in-vitro potato plantlets.

"Repatriation through in-vitro seedlings offers the highest quality of clean seed compared to other planting material," says Rene Gomez, the native potato curator at the CIP's genebank. "It took us 10 years to build the infrastructure and train the communities so that they could receive potato samples as in-vitro plantlets," adds Gomez, "Of course, if you look at it from the big picture perspective, 10 years is just a dent in the history of potato farming, which dates back 10,000 years in the Andes."

Gomez also has been working with farmers at the Potato Park to clean and prepare botanical seeds from native potatoes so that they can be sent to the Global Seed Vault in Svalbard, Norway. Carved into a frozen mountainside north of the Arctic Circle, the vault is designed to preserve seeds in perpetuity. The seeds they send will represent the first collection of in situ potato material to be included in the vault's protected collection. CIP has previously sent native potato seed to Svalbard from its ex situ collection.

The preservation of the remarkable diversity of native potatoes depends on a dynamic relationship between in situ and ex situ conservation. In situ refers to the preservation and use of the potatoes in farmer fields, where the varieties originate and are exposed to natural stresses and evolution. Ex situ conservation is conducted by CIP's genebank, which holds the world's largest collection of native potato samples in an earthquake-proof state-of-the-art facility. In the genebank, accessions are conserved for research and development, and for long-term safeguarding as in vitro plantlets, cryo-preserved shoots, and botanical seed (stored at -20°C).

CIP initiated its collection 40 years ago to conserve the genetic resources of potato and widen the selection of desirable traits for breeding improved varieties. The collection now serves as backup to the biodiversity lost in the fields and provides material for use by farmers, breeders, and researchers worldwide.



Farmers at the Potato Park receiving in vitro plants with Rene Gomez

Adapting Ahipa in Africa

Giant African snails, considered a delicacy and sold in gourmet restaurants, crawl around a cement enclosure in Benin the size of a large dining room table. Animal production scientist, Charles Pomalegni, pulls up two of them to show to CIP researchers. They are as big as his fists. In parts of Africa and Asia, these snails are raised by small-scale producers in plots behind their home or work compounds. Today, they are thriving on an unusual source of feed, a root crop called ahipa, which originates in the high Andes of South America.

The CIP researchers are in Benin for a project designed to introduce ahipa, a highly nutritious root crop, as a promising food staple in drought-prone regions of Central and Western Africa. They are discovering that beyond its potential as a healthy food alternative for people, it may become valuable as livestock feed that not only improves farmers' diets, but also their bottom line.

Ahipa is the legume root produced by the American yam bean (*Pachyrhizus* spp.). Shaped like a very large radish, there are two types. The low dry matter one has a crunchy, juicy texture and is usually eaten raw. It is a good source of protein, supplies potassium and vitamins C and K, and has a high water content that makes it easy to digest. There is another high dry matter type which is more suitable for cooking and processing.

"Ahipa is an excellent complement or alternative to other common staples. It offers more nutrients than cassava, and it pairs well with vitamin-A rich orange-fleshed varieties



Animal production scientist, Charles Pomalegni, demonstrates ahipa feeding trials with giant snails

of sweetpotato," says Wolfgang Gruneberg, a CIP breeder and geneticist who leads the ahipa program. Ahipa will grow in dry, marginal conditions. And because the plant fixes nitrogen in the soil, it does not require nitrogen fertilizer. The result is a crop that is inexpensive to produce and well suited to the needs of small farmers as an integral part of a sustainable land-use system.

"But ahipa's potential as livestock feed or for local processing may bring even greater value added to small-scale farmers," notes Graham Thiele, an economist and Director of the CGIAR Research Program on Roots, Tubers, and Bananas.

Along with the giant snails, project participants are undertaking feeding trials with nursery fish and a highly-prized rodent called a grasscutter. The grasscutter has meat that is rich in protein, low in fat, and appreciated for its taste and tenderness.

CIP is collaborating with agricultural research institutes in Uganda, Burundi, Rwanda, Benin, DR Congo, and the Université Catholique de Louvain in Belgium. They are combining research from Africa, Europe, and Latin America to increase the availability of yam bean collections and breeding lines, identify high-yielding varieties adapted to agro-forestry-based or maize-mixed farming systems, and develop its commercial potential. Impact assessment studies have been integrated, as well, to identify where resources can be used most effectively to maximize benefits and adoption.

What really excites Gruneberg, however, is the prospect of introducing a highly beneficial crop into a new region. "If we see local farmers in Africa adopting ahipa, adapting it to different uses, and benefitting from it, that will be an impressive success, indeed!" he concludes.

Global program on Roots, Tubers, and Bananas to exploit untapped potential and new synergies



Two-hundred million poor farmers in developing countries grow roots, tubers, and bananas (RTBs) for food security and income. But they do not fully benefit from the potential of these nutritious, resilient, and versatile crops. They are constrained by challenges such as low yielding varieties, poor quality seed, stresses from climate change, and poor management. The new CGIAR Research Program on Roots, Tubers, and Bananas for Food Security and Income (CRP RTB) provides a platform to address these challenges more efficiently.

"The point of this new joint initiative is to tap the dynamic synergies that exist across our crops and participating partners," explains Graham Thiele, who was recently named Director of the CRP RTB. "The focus is on what we can do together that we can't do separately, such as leverage common approaches or do things collectively that are not feasible or cost-effective individually."

RTBs share key commonalities, such as genetic complexity and clonal propagation. They face similar challenges in crop management, seed systems, and perishability. RTBs offer great potential for higher yields and increased system productivity. Many grow in marginal areas and can be planted in rotation or inter-cropped with grains or other crops. This means more food, more efficient systems, and more diversity to reduce risks of food shortages and nutritional shortfalls.

Bananas, cassava, potato, sweetpotatoes and yams are each among the 10 most consumed food crops in the world. They provide cheap sources of energy, key nutrients, and up to 60 percent of daily calories in some parts of the world. But they are also significant sources of income both fresh and processed.



Research
Program on
Roots, Tubers,
and Bananas

“Around the world, we can identify RTB hotspots,” says Thiele. “They are places where these crops play a major role in food systems, and where potential gains in yields, more efficient systems, and better management are greatest.” In addition, RTBs are often grown by poor women and in remote regions. Enhanced productivity and access to value market chains can improve lives and opportunities for these small-scale producers and their communities, increasing gender equity and reaching some of the poorest of the poor in developing countries.

However, RTBs all face a similar obstacle: chronic underinvestment.

“Roots, tubers, and bananas are not usually well positioned within policy and agricultural extension services, as decision makers do not have a full appreciation of their true importance,” notes a respondent to a stakeholder survey conducted during the project’s design process.

With the launching of this new program, the position of Roots, Tubers and Bananas will undoubtedly gain more ground.

INNOVATIONS Applying sustainable practices at CIP

Just over ten years ago, the 60-meter well that supplies water for the CIP headquarters in Lima was nearly dry. Only 70 centimeters of water remained, compared to 17 meters in 1989. Today, the well’s water level has been largely restored, and CIP’s water usage has dropped by 50 percent thanks to more sustainable water management practices.

In 2001, when it looked like CIP’s well was going to be tapped out, the decision was made to dig the well deeper by an additional 60 meters. Juan Palomino, a plumber at CIP, came up with a complementary proposal to reduce waste and increase recycling.

Nearly 80 percent of the water that Palomino’s system recovers is clean water that was previously being lost due to inefficient pumps. He helped set up a new system to recuperate the wasted water and capture it in a cistern that is used for irrigating CIP’s fields. The remaining 20 percent of the water being recovered is recycled after usage in fields, air conditioning units, and other areas.

“In addition to the important scientific work of the researchers, we in the administrative department try to do our part by conserving vital resources like water,” says Palomino.

Inspired by the positive results of his water management project, Palomino attended a training course on how to construct solar panels, which was offered at the Agrarian University of La Molina, located across the street from the CIP-Lima campus. He subsequently built a pair of solar water-heating units, which he and colleagues tested in Lima and at CIP’s Huancayo station. The panels are currently installed in the dormitories of CIP-Huancayo.

In addition to saving water and energy resources, Palomino has also helped CIP’s researchers with innovative designs and construction for hydroponic, aeroponic, and drip irrigation systems in Lima.

Palomino would like to install more thermal solar systems and keeps looking for other ways to increase efficiencies.

“When we talk about sustainable agriculture and the preservation of our earth’s precious resources, we cannot just look to the farmers,” notes Palomino. “It’s important that we do our part, too.”



Juan Palomino explains water recovery and recycling at CIP-HQ

EVENTS ASARECA General Assembly, Entebbe, Uganda

Staff from CIP-SSA actively participated in the first General Assembly meeting of the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA). Ministers of Agriculture or their representatives from ten countries addressed the theme: “Feeding our region in the 21st Century”. The political leaders were joined by scientists, farmers, businessmen, development partners, and media. Berga Lemaga represented CIP at the meeting. Elmar Schulte-Geldermann contributed to the presentation on “Overcoming seed potato quality constraints to tackle food security and poverty in Eastern and Central Africa in the 21st



CIP exhibit at ASARECA meeting

Century.” Dinah Borus and Margaret McEwan presented posters on developing sustainable potato and sweetpotato seed systems. A CIP exhibition booth was organized and staffed by Tibanyendera Deo, Sarah Mayanja, and Shifar Mulumba.

Also participating was Patrick Makokha, an orange-fleshed sweetpotato (OFSP) farmer from Busia, Kenya. Mr. Makokha showed samples of OFSP flour, which is sold in high-end supermarkets in Nairobi. Demand for OFSP flour has increased 4-fold in the last few years. With proceeds from its sale, Mr. Makokha has been able to purchase a second hand pick-up to help him transport vines and roots, and he is able to comfortably pay the school fees for his seven children.

Irish Minister visit, Malawi

Irish Minister of State for Trade and Development, Joe Costello, visited the program, Rooting out Hunger in Southern Malawi with Nutritious Orange-fleshed Sweetpotato, (OFSP), on 28 February 2012. The visit was conducted in Dedza, Malawi, where the minister was able to observe examples of crop diversification, including intercropping OFSP with other crops in kitchen gardens, along with irrigation schemes and health and sanitation practices. He tasted products made from OFSP and purchased a chitenje, which is a piece of fabric worn as a skirt or other clothing and decorated with special designs – in this case, promoting OFSP.



Minister Costello
with CIP's
Erna Abidin

Modeling Prize

Ulrich Kleinwechter of CIP's Social and Health Sciences Global Program and his team won a competition for developing the best modeling framework application for agricultural technology, held during the annual Global Futures for Agriculture Project meeting, 23-27 January 2012, in Kenya. The application titled, "Improved potato varieties for Sub-Saharan Africa" was selected from among seven CGIAR center applications by a jury of representatives from FAO, CGIAR, academia, and the private sector. The jury highlighted the excellent collaboration of the interdisciplinary CIP team. Global Futures for Agriculture is a CGIAR initiative designed to provide tools to use limited resources more efficiently to support agricultural productivity and environmental sustainability in developing countries. It is focused on evaluating promising technologies, investments, and policy reforms.



Ulrich Kleinwechter and his winning team

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