



Competition of Successful Cases 2019

INNOVATIONS OF IMPACT

Lessons from family farming and its link to nutrition in Latin America and the Caribbean





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Especially the small producers participating in these initiatives who with their effort, commitment and persistence achieved innovations for the benefit of the community.

The institutions and campesino organizations for developing, documenting and sharing their experiences and lessons learned.

The researchers and technicians for their unconditional work to achieve more nutritious foods that help us reduce malnutrition.

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The competition evaluators.

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PARTICIPANT ORGANIZATIONS





CONTENTS

ACKNOWLEDGMENTS	3
PARTICIPANT ORGANIZATIONS	4
A COMMITMENT TO IMPROVING NUTRITION FROM AGRICULTURE	6
THE CHALLENGE OF IMPROVING NUTRITION IN LATIN AMERICA AND THE CARIBBEAN THROUGH NATURALLY NUTRITIOUS SEEDS	7
IDB AND FONTAGRO	8
IMPROVING THE NUTRITIONAL RESULTS OF AGRICULTURAL: INNOVATION WITH INCLUSION	9
FOREWORD	10
EXECUTIVE SUMMARY	11
INTRODUCTION	12
METHODOLOGY OF THE 2019 COMPETITION	13
WINNING CASES	14
FINALIST CASES	15
LESSONS LEARNED	16
WINNING CASES	17
Case 1. Planting nutritional and agro-ecological diversity on the Colombian paramo.	18
Case 2. A nourishing food basket. Biofortification to combat hidden hunger in Panama.	20
Case 3. BioFORT Platform: the nutritious route to the Guatemalan diet.	22
Case 4. The BRS Amélia case, a sweet potato against malnutrition in southern Brazil.	24
FINALIST CASES	26
Caso 5. Food security and nutrition: to the rescue of Andean crops in Ecuador.	27
Case 6. Guaranteeing campesino nutrition through agro-ecological kitchen gardens.	29
Case 7. Smallholder families united for nutritional security in northeast Argentina.	31
Case 8. Foods with functional attributes from Latin American savanna. Beekeeping products from silvopastoral systems in Argentina, scaled up to LAC through REDLAC.	33
Case 9. Seed producers against malnutrition in Guatemala.	35
Case 10. Recovery of the native quinoa of the Argentine northwest.	37
Case 11. Innovating in rural areas improves family life in Bolivia.	39

A COMMITMENT TO IMPROVING NUTRITION FROM AGRICULTURE

The resource endowment of Latin America and the Caribbean (LAC) has significant comparative advantages for meeting growing regional and global demand for food. Thirty-eight percent of the land is devoted to agriculture and the region has one of the most important reserves of freshwater and biodiversity. However, with 15 million small- and medium-sized farms covering some 400 million hectares, there are rural and peri-urban communities that face problems of food insecurity and malnutrition.

Improving nutrition from family farming requires joint efforts by public and private actors and civil society to implement technological, organizational, institutional and regulatory changes, with producers as the protagonists.

FONTAGRO - as a cooperation mechanism for Latin America, the Caribbean and Spain, sponsored by the IDB and IICA - is an effective tool for supporting agricultural research and development systems and helping to solve the region's challenges. The strategic lines agreed by the Board of Directors, made up of the highest authorities of the research institutes of the 15 member countries, include diversifying production and increasing the quantities of nutrients provided by staple crops, with the aim of improving the family diet.

These interventions not only target the most vulnerable communities among the 60 million rural inhabitants of these countries, but their results have high potential for replication. One strength in meeting this challenge is the network of more than 10,000 researchers and 330 experimental stations of the INIAs of member countries. Other public and private institutions, universities and agencies come together on FONTAGRO's innovation platforms, which help achieve consistent solutions that can be

scaled up in different territories. Another tool for promoting progress in food quality is to identify and disseminate successful experiences in family farming, developed collectively and with the participation of organizations that operate in the territory.

These mechanisms are strengthened by flexible project partnerships with agencies from around the world, which add input and knowledge to foster innovation in regional agriculture. One of these is HarvestPlus, a joint program of institutes in the CGIAR, formed by 15 international research centers, facilitating the global effort to alleviate hidden hunger caused by a lack of essential nutrients in the diet.

With this shared vision, FONTAGRO and HarvestPlus coordinated the work of organizing the "III Competition of Successful Cases in Agriculture and Nutrition" with the aim of forming opinion among decision makers of the strategic importance of agriculture for nutrition as a new paradigm for strengthening food security.

On behalf of FONTAGRO's member countries we thank the producers and researchers who participated in the cases presented in this publication, demonstration of our commitment to agricultural innovation for improving the quantity and quality of food with criteria of equity and sustainability.

FONTAGRO

THE CHALLENGE OF IMPROVING NUTRITION IN LATIN AMERICA AND THE CARIBBEAN THROUGH NATURALLY NUTRITIOUS SEEDS

More than two billion people worldwide suffer from micronutrient deficiency, which can cause blindness, weakened immunity, stunted brain development, hemorrhage during childbirth, and other serious health problems. An innovative solution is biofortification—using conventional crop breeding techniques to develop staple food crops that are naturally enriched with vitamin A, iron and zinc, all micronutrients identified by the World Health Organization as being the most in deficiency globally. These healthier crops benefit low-income smallholder farming families who cannot afford nourishing diets.

HarvestPlus is a global partnership that for over 15 years has led an effort to develop and promote biofortified crops, thereby helping advance a food-secure future. HarvestPlus is part of the CGIAR Research Program on Agriculture for Nutrition and Health and works with many CGIAR international research centers to alleviate hidden hunger caused by the lack of essential nutrients in the diet.

To date, more than 240 biofortified varieties of 12 staple crops have been launched as international public goods and hundreds of new varieties are being tested in 60 countries, in collaboration with national agricultural research systems and other partners. In addition, 24 governments have included biofortification in their health, nutrition, and agriculture policies and programs. More than 42 million people are consuming these nutritious foods. Clinical trial data demonstrate that regular consumption of biofortified crops leads to significant reductions in diarrhea, pneumonia, iron deficiency, and night blindness, as well as improvements in memory, attention, and physical activity.

In Latin America and the Caribbean (LAC), work has been done to increase the iron content in beans; zinc in rice, beans and maize; and beta-carotene in sweet potato and cassava, the most important crops in food-insecure rural communities, with biofortified varieties being released in several countries.

One challenge for the region is that many funders are focusing their food and nutrition programming on sub-Saharan Africa and South Asia, since these regions' average malnutrition rates are higher than in LAC. However, levels of undernutrition and micronutrient deficiency remain high in countries like Haiti and Guatemala, and there are challenges for low-income families elsewhere in the region. In all these LAC countries, the collaboration of local public and private actors working on the nutrition problem is essential for providing biofortified seeds and technical assistance as an effective strategy for improving nutrition. Several countries in the region have taken the lead in integrating biofortification in their policies and programs, and important research on biofortification has been conducted throughout the hemisphere.

For HarvestPlus, our alliance with FONTAGRO—formed by the highest-level authorities of research institutes in 15 LAC countries and Spain—is strategic. The shared vision of the potential of agriculture for improving nutrition led us to support this internationally recognized organization to hold the “III Competition of Successful Cases in Agriculture and Nutrition,” with the aim of disseminating the experiences of producers and researchers that have benefitted their communities and have high potential for replication. The four winning cases and the seven finalists highlighted in this publication, “Innovations of Impact,” offer lessons learned that we intend to share.

At HarvestPlus, we value working with decisionmakers to highlight the importance of biofortification as a tool for strengthening nutrition security. Our goal is to continue to join forces so that 1 billion people globally are consuming foods with more essential vitamins and minerals by 2030.

**Arun Baral, CEO
HarvestPlus**

IDB AND FONTAGRO

A shared vision of nutritional security in Latin America and the Caribbean

One of the greatest challenges facing humanity in the coming decades will be meeting the growing need for food. The United Nations estimates that by 2050 the world's population will be approximately 9.8 billion. To feed that population, the United Nations Environment Program estimates that food production will have to increase by 50%.

But the challenge is not only in terms of the quantity of food but also its quality. Specifically, it will be necessary to ensure that the nutritional content of food allows people to develop their full potential, which requires eliminating the micronutrient deficiency known as “hidden hunger.” HarvestPlus, a program of the CGIAR (Consultative Group on International Agricultural Research), pursues precisely this goal, by fortifying crops that are part of the basic food basket with vitamins and minerals.

FONTAGRO, with its established track record of more than two decades as a mechanism of reference for cooperation on the challenges facing family farming in Latin America and the Caribbean and Spain, has made the right decision in deciding to hold its third competition of successful cases in family farming in partnership with HarvestPlus, precisely on the theme of food fortification.

This is a very commendable effort since it shows how investment in innovation in family farming can help eliminate the scourge of hidden hunger. However, this contribution would not be complete without dissemination of the competition results. By carefully compiling these results, this volume, Innovations of Impact, fulfills a very important task, which I am sure will be very useful for decision makers in agri-food systems and for all those interested in these issues.

The Inter-American Development Bank (IDB) agrees with FONTAGRO on the importance of agricultural

programs that take nutrition into account, especially among the poorest populations. We are proud, therefore, to accompany FONTAGRO in this and other future actions aimed at promoting good nutrition and eliminating hidden hunger in Latin America and the Caribbean.

Pedro Martel

Division Chief Environment, Rural Development, and Disaster Risk Management at Inter-American Development Bank

IMPROVING THE NUTRITIONAL RESULTS OF AGRICULTURE: INNOVATION WITH INCLUSION

At IICA we are joining in this FONTAGRO competition with enthusiasm because we know that it is crucial to showcase agriculture's role as the main source of healthy nutrition through the foods that people harvest and consume. The results more than meet our expectations, recognizing that Latin America and the Caribbean (LAC) have many successes that can be used as a model here and in other regions.

The concept of nutritionally smart agriculture (NSmartAg) is radical in the true sense of the word: transforming agriculture to meet the dual objectives of improving farmers' incomes and achieving better nutritional outcomes. At IICA, we see NSmartAg as an excellent option for LAC for several reasons. First, it will help to diversify food availability by adding complexity in this region characterized by the predominant role of basic products such as soybeans, maize, wheat and beef. Second, it will benefit an estimated 16.5 million small and family farmers in the region, responsible for up to 90% of agricultural production. Third, since most of these farmers are associated with rural poverty, the NSmartAG will provide greater nutritional content, stability and diversity of food supply, and increase the profitability of production and consequently farmers' income. In the framework of the XXXIX meeting of the Inter-American Board of Agriculture (IABA), the highest governing body of the ICA, held in 2019, we made two fundamental commitments along these lines. The first is to promote a new generation of institutions, public policies and international cooperation actions to ensure sufficient levels of public and private investment, particularly for research, development and innovation.

The second commitment is to stimulate development of connectivity infrastructure, along with design of new systems of education, training and extension, to facilitate access to and use of new technologies and to exploit the opportunities they offer for increasing

the productivity and inclusion of family farming, especially for rural youth and women. NSmartAg must be part of the strategy for meeting these commitments. Part of the solution is to promote innovations with inclusion that take into account the various possible paths, recognizing the roles of the actors and their interactions. Cases such as those identified with FONTAGRO and Harvest Plus help us in this task because together we are promoting innovative options, practices and technologies that help small producers to make decisions that simultaneously increase their income and contribute to nutrition.

We also contribute to building and maintaining living networks that connect local, national, regional and international actors where we promote discussion and capacity building for innovation. We work with women's groups which have made substantial contributions to food security through their work in food production and processing, sales and other informal market activities. These women are often responsible for selecting the seeds for planting or household use, safeguarding the biodiversity so essential to nutritionally smart agriculture. We promote their organization and empowerment.

We recognize that good nutrition is both an outcome and an input for economic growth and social development. This is why we are committed to raising awareness that investment in nutrition through agriculture is more than a social good: it is a good development policy.

Manuel Otero
Director General
Inter-American Institute for Cooperation
on Agriculture - IICA

FOREWORD

Successful Cases, a tool for decision makers

The Successful Cases Competitions organized by FONTAGRO are aimed at improving the understanding of innovation processes in family farming and their sustainable impact on competitiveness and food security. Making these experiences known is a way to contribute to the decision making of leaders, donors and referents in the sector. These strategic actions are sponsored by the Inter-American Development Bank (IDB) and the Inter-American Institute for Cooperation on Agriculture (IICA), and are being implemented with the consent of the FONTAGRO Board of Directors, formed by the highest authorities of the research

institutes of the 15 member countries in Latin America, the Caribbean and Spain, responsible for overseeing RDI and innovation in their territories.

The first competition “Innovations for Family Farming” was held in 2012. One hundred and five profiles were received from researchers and family producers from FONTAGRO member countries and from others operating in Latin America interested in the proposal. Of these 15 were selected for publication and three were declared winners:

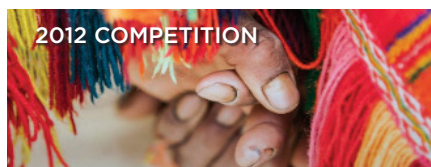
“The Huancaro producers’ market, Cusco” from Agronomists and Veterinarians Without Borders and the Cusco Producers’ Association, Peru”; “The Case of Beekeeping in Argentina and the Dominican Republic” from INTA, Argentina, and the Center for Agricultural Development, Dominican Republic; and “The Andean Potato Project” from the International Potato Center (CIP), Peru.

In 2015, a second competition was held with the more specific theme of great interest at global level: “Innovations for adaptation of family farming to climate change.” On this occasion, in addition to the original sponsors, the competition was backed by the Global Environment Facility (GEF), a strategic ally of FONTAGRO in this area.

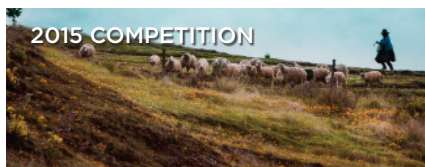
As part of this competition, 49 profiles were received, from member countries and third parties, of which 11 were selected for publication and four were declared winners: “Adapta Sertão: a coalition against climate change,” by the Rede de Desenvolvimento Humano, Brazil”; “Fish that improve food security in Bolivia” by the Centro de Promoción Campesino and Asociación de Piscicultoras del Norte Integrado, Bolivia; “Creole goats in Patagonia” by INTA and the Secretaria de Agricultura Familiar, Argentina; “Confronting poverty and climate vulnerability on the altiplano” by CIP, Peru and the Natural Resources and Environment Research Center; and “Water Harvesting in Nicaragua and Mexico” by the Latin American Fund for Irrigated Rice, Colombia.

In this foreword, we consider it appropriate to offer a historical overview of the themes and organizations that have received awards, because we understand that the solutions implemented to meet the challenges of family farming continue to have the potential to be replicated in other regions.

In 2019, FONTAGRO announced the third competition of successful case studies, “Agriculture and Nutrition,” which introduces a novel theme at global level: improving nutrition through innovation in family farming. Its methodology, along with the complete documents of the winners and finalists are presented in the pages of this publication which we invite you to share.



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EXECUTIVE SUMMARY

Innovations with impact on nutrition

This new publication in the FONTAGRO Innovations of Impact series brings together for the first time emblematic cases of improved nutrition from family farming in Latin America and the Caribbean.

With producer organizations or research bodies in the lead, all the experiences have in common the joint work of public and private actors, with the objective of diversifying the diet and developing technologies that help alleviate malnutrition in rural and peri-urban communities, with benefits for society as a whole.

The role of sponsors is a strength for highlighting success stories. In this regard, the III Competition of successful cases of innovations in family farming, which gave rise to this publication, was organized by FONTAGRO with the support of the IDB, as legal representative and administrator, and the sponsorship of the CGIAR HarvestPlus Program and the Inter-American Institute for Cooperation on Agriculture, IICA.

Successful Cases 2019 includes the description of the challenging scenarios that motivated the changes, the solutions implemented and the lessons learned, with the aim of reaching a better understanding of the process of innovation in agriculture as mobilizer of increased quantity and nutritional quality of food.

The ‘nutrients under the magnifying glass’ section contains data that researchers are increasingly putting on the agenda when developing new varieties and diversifying production: the contribution of essential nutrients for humans.

A motivating aspect of these experiences is the testimonies of the beneficiaries who bring us closer to the challenges they have lived through and the problems they have had to overcome to bring the new technologies to their communities.

The photos taken by the researchers, technicians and the farmers themselves show the commitment of these pioneers of nutritional improvement from agriculture. Each case ends with the lessons learned and the potential for replication in other regions and countries, with the expectation of helping decisionmakers visualize the opportunity that supporting agricultural innovation has meant.



INTRODUCTION

Importance of working in agriculture and nutrition

The objective of the “III Competition of Successful Cases, Agriculture and Nutrition” is to make known innovative experiences in family farming in Latin America and the Caribbean, which have not only favored greater availability of food in response to population growth, but also improved its nutritional quality. Initiatives to improve nutrition through agriculture take on more importance considering that 815 million people in the world suffer from chronic undernourishment, 5% more than in 2015 (FAO, 2017).

Although the increases in agricultural productivity in recent decades have resulted in more food in the most vulnerable regions, this does not guarantee an improvement in the family diet. Consequently, some research programs are shifting the focus of their work from “adding more calories” to “incorporating nutrients essential for the human metabolism.”

With this new concept, various tools have been developed to improve nutrition through agriculture. Among them, biofortification which offers crop varieties that provide higher quantities of provitamin A, iron and zinc, the micronutrients identified by the World Health Organization as most lacking in diets at international level. Other equally important intervention strategies are

-Agricultural diversification through sustainable systems, combined with initiatives that encourage inclusion of new foods in the family menu.

-Development of horticultural systems that reduce the effects of the seasonality of production

-Recovery of native crops with outstanding nutritional properties.

-Development of beekeeping in silvopastoral systems, where there is complementarity of resource use and a positive effect on food availability

-Systems for post-harvest, food collection and preservation, and development of new nutritious products with traceability

- Health management systems that reduce the potential for disease along the value chain.

- Marketing systems with impact on improvement of prices and income of family producers.

All these mechanisms were recreated and adopted in all eleven finalist cases of the FONTAGRO competition. It is considered that identification of these types of successful experience, their scaling up and especially promotion of investment in the theme, have an enormous potential for stimulating nutritional improvement (Hertforth et al, 2012).

COMPETITION METHODOLOGY 2019

The competition was organized by FONTAGRO with the sponsorship of the CGIAR Harvest Plus Program and the Inter-American Institute for Cooperation on Agriculture (IICA). Fifty-one profiles were submitted from which 11 finalists were selected, four of which were winners.

To give professional rigor and transparency to the evaluation process, an external panel was formed of specialists and sponsors of the competition, with extensive experience in production systems of small producers and the nutritional value of food.

The evaluation process was based on selection of profiles that obtained the highest score based on the criteria postulated in the competition terms of reference and the values for each criterion defined by the evaluation panel. The finalists were invited to submit their complete case with the help of editors assigned by FONTAGRO. The panel analyzed these documents and made suggestions to underscore the importance of innovation in agriculture and its relation to improvements in nutrition.

The cases were then reviewed by the editor of this publication, “Innovations of impact,” to ensure that they fully reflected the view of the researchers and producers, and included the evaluators’ recommendations, as well as standardizing the contents and presentation of the cases. The winners were the profiles that best integrated the various qualitative and quantitative criteria, emphasizing improvement in food availability and quality, the potential impact on the beneficiaries’ nutrition and possibilities of scaling up and replication.

The prizes

Based on the results obtained, the evaluation panel recommended the following cases to the FONTAGRO Board of Directors for awards:

“Sowing nutritional and agro-ecological diversity on the Colombian paramo,” in the category “Producers’ associations and other private sector organizations” and

“Biofortification in family farming in Panama,” in “National public sector and nongovernmental organizations.”

Since the category “Regional or international sector” was declared void as no case obtained the minimum score required, the panel recommended that this prize be shared by two finalists: “*BioFort Platform, strategy to reduce malnutrition in Guatemala*” and “Dissemination of the BRS Amélia cultivar in Southern Brazil,” considering that both had sufficient merit to be considered winners.

The prize awarded to the researchers and producers who are the protagonists of these experiences, along with the institutions and associations to which they belong, will help build their capacities. Another distinguished recognition is for the other finalists presented in this publication where we highlight their work and commitment to agriculture and nutrition in Latin America and the Caribbean.

WINNING CASES

The first chapter contains the four winning cases from the “Agriculture and Nutrition 2019” competition. One of them, “Planting nutritional and agro-ecological diversity in the Colombian paramo” shows how, in just two years, 300 families of the Paramo de Guerrero, Colombia, who had very limited diets, gained access to a varied and nutrient-rich diet, with around twenty vegetables, native potatoes and ancestral Andean grains.

This diversification was promoted by a producers’ organization, led by women, with support from official and academic bodies, and strengthened with the creation of the company Páramo Farms SAS. The success of the experience, which also points to the potential of empowering campesino women as a driver of nutritional improvement, was awarded the prize in the category “Producer associations and other private organizations.”

We then present “Biofortification to combat hidden hunger in Panama,” a case involving 13,000 farmers in more than 800 poor communities, producing biofortified food with the support of the “AgroNutre Panama” project, led by the Institute of Agricultural Research of Panama (IDIAP). Today, 230,000 people consume rice, beans, maize and sweet potato, enriched with quality proteins and essential micronutrients, which resulted in the inclusion of this strategy in the country’s public policies, a great advantage for its replicability.

The achievement, which won them the prize in the category “National public sector and nongovernmental organizations,” forms the basis for understanding the complexity of a cooperative mechanism in the fight against malnutrition. Apart from the international support from HarvestPlus, it was crucial to set up a local, inter-institutional

and multidisciplinary management team, which coordinated a successful intervention in the territory, including agronomic, social, educational, health and nutritional aspects.

The next award-winning case is the “Biofort Platform: the nutritional route to the Guatemalan diet.” The case tells the story of thirty public and private actors, led by the Institute of Agricultural Science and Technology (ICTA), who began working voluntarily on crop biofortification in the country with the highest chronic malnutrition in Latin America. In four years, 88,000 small family farmers produce and consume beans, maize and sweet potatoes biofortified with iron, zinc and provitamin A, benefiting 500,000 people. Although these results are satisfactory, the objective is to work for the strategy to be included in Guatemala’s public policies, which is fundamental for the country’s socioeconomic development.

The presentation of the winners ends with the case “BRS Amélia, a sweet potato against malnutrition in southern Brazil.” Among other actions, the BioFORT Network, led by the Brazilian Agricultural Research Corporation (Embrapa), launched an orange-flesh sweet potato biofortified with provitamin A, in a region where consumption of the vegetable was popular, but with white flesh, without any contribution of this essential micronutrient. An additional quality of the new variety is its high productivity, more than double the Brazilian average, which speeded up its adoption and the consequent improvement in income. Today, the crop covers 15% of the area cultivated in Rio Grande do Sul, Brazil’s main sweet potato producer, benefiting 5,000 family farmers and the entire regional population.

FINALIST CASES

No less important are the lessons learned from the finalist cases in this competition, which will be described in the next chapter. Ecuador's experience in rescuing neglected Andean crops is based on the actions of the National Institute of Agricultural Research (INIAP) which promoted the production of quinoa and lupine, and in six years 500 indigenous and mestizo families increased their consumption by 30%. However, these foods - rich in protein, iron and other micronutrients - are not included in the country's basic food basket, which is a call for reflection on the importance of policies that link agriculture and nutrition to promote changes on a larger scale.

Another experience of interest is the Ecohabitats Foundation's agro-ecological kitchen gardens, implemented in rural communities in Cauca, Colombia, which have food insecurity and severe climate variability. The initiative showed that in just four years, 170 families managed to produce 30 types of biofortified vegetables and grains and 480 people now consume 230 g/day of these foods all year.

Productive diversification combined with initiatives to encourage expansion of the family menu was also taken up by INTA Las Breñas, Argentina. This case shows how 65 smallholder families in the northwest of the country, who ten years ago had little access to food, by working together in an association, now produce 100 t/year of vegetables, fruit and meat for the 325 inhabitants of the community and for another 7,000 consumers.

INTA Famaillá, Argentina, proposed the case of honeys from Latin American savanna, based on differentiation by botanical origin and nutritional and functional attributes. After 21 years of work, the experience was

scaled up and today more than 6,000 Argentine, Dominican and Costa Rican small beekeepers have food with traceability and high biological value.

There is also a case of small seed producers who took a firm step against malnutrition, after years of capacity building. The ATESCATEL cooperative, in the heart of Guatemala's Dry Corridor, diversified its portfolio by incorporating biofortified seeds that improved members' incomes. In three years, the new hybrid maize reached 72% of maize sales and beans 61%, benefiting 10,000 family farmers.

One case that reflects the potential of research for enhancing the value of key crops for human nutrition is native quinoa. In Northwest Argentina, the Faculty of Agronomy of the University of Buenos Aires identified varieties with a higher content of protein, iron and zinc than the average of the species. In a few years, 100 family farms were developed with a total of 1,245 hectares planted.

Lastly, we describe a case where improvement in family nutrition starts with the increase of campesinos' income. The Valles Foundation of Bolivia promoted agricultural diversification and commercial strengthening of 5,000 small campesinos, who increased peanut production by 60% and export 450t of oregano per year.

This publication, a voice for successful experiences that recreate a new vision of agriculture as a tool in the fight for better nutrition, becomes in its pages an indispensable document of analysis for leaders, donors and sectorial referents around the world.

LESSONS LEARNED

There are technologies for improving nutrition

From the lessons learned in this competition, documented in detail by the researchers and producers in each of their cases, we highlight some of the key ones.

Improving nutrition from agriculture requires joint efforts to implement technological, organizational, institutional and policy changes. The most successful cases are those that achieved a systemic approach to all these aspects, even integrating research results into national food policies.

Each experience approached the innovation process with different tools, although all were based on the joint work of public and private actors, with very precise coordination making it possible to identify the problem, implement solutions and monitor progress. One lesson learned is that it is not only a matter of doing agricultural research in different disciplines, but of combining actions with extensionists, nutritionists and educators, aware of the importance of family nutrition.

In all the cases there was active participation by family producers in developing and validating the innovations. However, potential beneficiaries often did not identify undernourishment as a problem in their communities, possibly as a result of years of marginalization, which required redoubling efforts to encourage adoption of the technologies. In this regard, although most of the experiences involved working with cooks and mothers of schoolchildren, it is important to strengthen actions to promote the empowerment of women who play an overwhelming role in household nutrition.

With respect to biofortification, the INIAs and universities in Latin American and Caribbean countries are supported by HarvestPlus and the 15 research centers of the CGIAR (Consultative Group on International Agricultural Research) which develop staple crops as public goods for family farming. Consequently, this initiative, while taking into account the differences specific to each territory, is applicable in all the region.

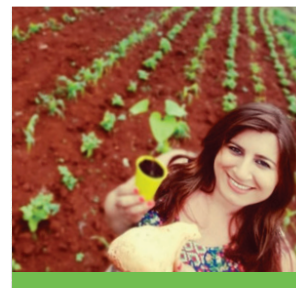
On the potential impact of this and other technologies on the nutrition of beneficiaries, the scientific validation and regulatory frameworks needed to make this possible are not yet up to the task, which is a challenge for researchers and public health leaders in each country and at international level.

The good cost-benefit ratio of the tools implemented in the different cases of “Agriculture and Nutrition” is critical for raising awareness among decisionmakers of the importance of investing resources in agricultural innovation as a mechanism for contributing to food security.

As a long-term mission, it is necessary to build the capacities of researchers, technicians and producers needed to develop innovation programs in family farming linked to improvements in nutrition. Another important task is to incorporate this aspiration into related academic fields and even use the FONTAGRO cases as motivators in universities and other technical training centers in the region and the world.



WINNING CASES



CASE 1. SOWING NUTRITIONAL AND AGRO-ECOLOGICAL DIVERSITY ON THE COLOMBIAN PARAMO

Authora: Margarita Cabal, legal representative, Páramo Farms SAS.
Editor: David Dudenhofer.

EXECUTIVE SUMMARY

Most small farmers in the Vereda Pantano de Arce, Colombia, an Andean community located at over 3,100 masl., eat mainly potatoes and products obtained from dairy cows, a diet that does not provide all the nutrients needed for a healthy life. The region is located on the Páramo de Guerrero, a broad ecosystem with a great diversity of species and water sources which contributes to supplying this resource to the big cities. But the native vegetation has been degraded due to the expansion of potato monoculture and pastures. In response to these problems, a project was developed which combines agricultural diversification to improve family nutrition with reforestation to preserve the drainage basins.

These innovations were promoted by the Association of Agro-ecological Producers of Pantano de Arce (ASOARCE), founded in 2017 by several campesinos - mostly women - advised by a community agronomist. With the support of experts from the Colombian Agricultural Research Corporation (AGROSAVIA), the National University of Colombia and various official local organizations, the members were trained in organic agriculture and introduced, tested and adopted 23 types of vegetables, eight native potato varieties and several Andean ancestral grains.

This process was strengthened with the creation of the company Páramo Farms SAS, managed by a woman which set up a collective demonstration unit on her farm through an agreement with ASOARCE. This initiative was very important because few campesinos had enough land to produce this diversity of food for sale. On this six-hectare property, members cultivate the new varieties and market the crops in the area,

which expands the nutritional improvement to a larger number of people and generates economic benefits for the farmers. As a result, the 300 families of the Pantano de Arce and the neighboring villages of El Páramo and El Guamal can consume native potatoes, rich in iron, zinc and antioxidants; 'super foods,' such as kale and broccoli, so named for their high vitamin and mineral content; and ancestral crops such as amaranth, chia, quinoa and yacon, considered essential for food security by the FAO.

To give sustainability to the initiative, the company Páramo Snacks was created, which developed native potato, beet and yacon chips, baked, without oil, thus promoting healthy and nutritious snacks, which have already positioned themselves in niche markets in Bogotá, Medellín and Cali. As an example, the Violeta variety, one of those used for potato chips, almost doubles the amount of antioxidants in Criolla, the country's most traditional, according to a study by the National University of Colombia.

The Association is also contributing to restoration of watersheds by planting native trees on agricultural land. With the support of public environmental protection organizations, the producers of Vereda Pantano de Arce planted 22,000 native species of trees and obtained funds for their conservation.

The data of success

In only two years, 300 families of the Paramo de Guerrero who consumed very limited diets were able to access a variety of nutrient-rich foods, with 23 types of vegetables, native potatoes and Andean grains, planted by a campesino organization led by women.

The case of Paramo Farms shows how, in just two years, a group of families with very limited diets gained access to a varied menu through an associative model supported by other private and public actors. This progress also shows the potential of empowering rural women as

drivers of nutritional improvement in the rural population. By 2020, the goal of Paramo Farms is to incorporate 270 families into organic agriculture and reforestation, with sustainable benefits for the community.

NARRATIVE SUMMARY

From a plate of potatoes to a diet with some thirty vegetables



María Elena Pulido, with her family.

María Elena Pulido is a campesino woman from the Vereda Pantano de Arce, Páramo de Guerrero, Colombia, who works hard to improve the food and economic prospects of her community. Despite coming from a low-income family and having had her first daughter at 15, she has achieved much in her 37 years. She obtained her high school diploma in 2012 and, since 2017, she has been leading the Association of Agro-ecological Producers of Pantano de Arce (ASOARCE) which runs a community farm producing organic Andean vegetables and grains for own consumption and sale.

“Very often when my daughters were little we didn’t have a range of foods available. So, out of necessity, we would prepare only potatoes or rice. Today my granddaughters eat different vegetables every day, a luxury we never knew in our childhood.” the campesino leader added that as well as her work

at the Association, she and her husband cultivate a kitchen garden.

One contribution the leader is proud of is the collaboration with the village primary school, where the Association, supported by the Regional Autonomous Corporation (CAR), opened a plant nursery. There, campesinos, teachers and children produce vegetables for the school canteen and seedlings to take home with information on how to grow them and why it is important to diversify the family menu. As the mother of two daughters and grandmother of two granddaughters, Pulido has also made an effort to create equal sources of work for women and men, with the aim of creating a cleaner and greener environment for the children of their community.

“Women who wanted to have a paid job had to work in the potato monoculture; but that meant being exposed to agrochemicals. Now, things are beginning to change.” She added that ASOARCE’s vision is to create ‘healthy’ employment in cultivation of vegetables and reforestation of the basins that provide potable water to Subachoque and Bogotá.

“We want to offer better opportunities especially for women who are heads of households,” said the farmer, who in 2018 was recognized by the NGO BothEnds for her leadership in actions to recover the Colombian paramo through family farming and reforestation. Pulido hopes there will be new progress in the coming years: more organic kitchen gardens, more work for the rural population, more reforestation and well-maintained water sources. “We want a better future for the young people of the community.”

CASE 2. A NUTRITIOUS FOOD BASKET. BIOFORTIFICATION TO COMBAT HIDDEN HUNGER IN PANAMA

Authors: Maika Lorena Barría Castro, AgroNutre project manager, Agricultural Research Institute of Panama (IDIAP).
Editor: Miriam Lizeth Villeda Izaguirre.

EXECUTIVE SUMMARY

Nearly 13,000 family farmers in 812 communities in situations of poverty and extreme poverty, with the support of the Institute of Agricultural Research of Panama (IDIAP) and other institutions, are producing biofortified foodstuffs, helping to tackle malnutrition in more than 200,000 people.

According to the Ministry of Health, 400,000 people in rural areas have insufficient intake of micronutrients which limits their human and socioeconomic development. At national level, anemia affects 33.8% of children under 5, 14.6% of schoolchildren, 43% of expecting mothers; and vitamin A deficiency affects 23.6% of children under 5. To combat this vitamin and mineral deficit, known as 'hidden hunger,' in 2008 Panama launched crop biofortification for these neglected campesino communities. This strategy is complementary to supplementation, strengthening and diversification of the diet, which the country applies to the whole population to improve food and nutritional security.

In 2013, the IDIAP National Biofortification Project was set up to promote development, cultivation and consumption of more of the nutrients essential for the human metabolism. This is the case of rice with 32% more zinc than traditional varieties; beans with 49% more iron; maize with 37% more quality protein, and sweet potato with 24% more provitamin A.

The project was implemented with technical support from HarvestPlus, and international research centers, which contributed to development of the basic biofortified germplasm in line with the needs of Panamanian producers. These genetic lines were developed through

conventional improvement methods with selection processes and field crosses, aimed at achieving varieties that are nutritionally superior and have good agronomic performance on small family farms.

Apart from this collaboration, it was crucial for achieving the objective to form a local, inter-institutional and multidisciplinary management team made up of ministries, secretariats, universities and other organizations involved in the theme. Under this model IDIAP was able to coordinate a successful intervention in the territory by means of an integrated view of agriculture and nutrition, including social, educational and health aspects.

This work methodology is one of the great strengths of Agronutre Panama. Identification of nutritional demands by the health area sets in motion the production of biofortified seeds, followed by the extension work of agronomists and technicians, and food education by nutritionists and teachers who give direct support to the communities.

The data of success

In 2013 AgroNutre began to promote biofortified crops of rice, beans, maize and sweet potato, among poor campesino communities in Panama. Today 12,975 farmers are working to combat the malnutrition of 230,000 people, resulting in inclusion of the strategy in the country's public policies.

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An example of this dynamic is the bean varieties introduced into populations with high prevalence of anemia. To ensure their acceptability, a pink-colored biofortified seed was launched, the preferred seed of Panamanian farmers and consumers. As a result the innovation was achieved without modifying the traditional diet, respecting the cultural habits of the beneficiaries.

The success of the experience of IDIAP and its network of collaborators, along with the international evidence of the favorable cost-effectiveness ratio of biofortification, led to inclusion of this strategy in the country's public policies, instrumented in Panama's National Plan for Food and Nutritional Security 2017-2021, as one of the actions for combatting malnutrition in a sustainable way.

NARRATIVE SUMMARY

Cultivating sweet potatoes reaps benefits



Peralta with other producers from his community.

Arquimedes Peralta (pictured) is a producer from Botoncillo, Los Santos, who has been producing sweet potatoes on his farm for eight years. In Panama, rice is never short on the table, but the farmer transformed this new crop into a business that creates jobs for young people on the farm and for women with washing and selection of the tuber.

In 2013, IDIAP arrived with its AgroNutre project and he had the opportunity to learn about and adopt the IDIAP C.90-17 and IDIAP C. 03-17 biofortified sweet potato varieties, which contain higher amounts of provitamin A than conventional ones, an essential nutrient in the family diet.

"I started with 100 plants of the Creole Cucula variety and I really liked the crop because it is simple to grow. Then I started to reproduce material to increase production," recalled the entrepreneur who also began to supply the market. "In the last few years we tested the biofortified varieties; we learned good management practices

and obtained good yields," referring to the training they received from IDIAP. For its part, the Nutrition Board, a partner in the project, was responsible for selecting farms in different areas to disseminate the new technology. "Most people liked this sweet potato because it adapted to the environment. Also, families began to eat it and got to know the taste in different dishes. A lot of the women learned how to prepare it and children asked for it in their meals," said agronomist Manuel Madrid, director of the Board, "Although it was not a common food in the diet, it was very popular because of its soft texture and sweet taste."

Taking nutrients to the city

Currently, some 40 farm producers on the Nutrition Board of the Ngäbe Bugle Region, West Panama and Veraguas, have found an opportunity in the production and sale of biofortified sweet potato, not only to improve their families' nutrition, but also to begin to position the new food on the urban market.

Some communities, for example Botoncillo, are placing washed and packaged sweet potatoes in one of the country's big supermarket chains - thanks to an agreement that guarantees competitive prices - and on the national market. The plan is to meet a minimum demand of 50 quintals per month and then gradually increase to 200 quintals.

"Once we consolidate the activity, the idea is to produce flour and other foods made from biofortified sweet potato. My idea is to teach other farmers how to manage the crop so they too can progress," Peralta concluded.

CASE 3. BIOFORT PLATFORM: THE NUTRITIOUS PATH TO THE GUATEMALAN DIET

Authors: . Julio Antonio Franco Rivera, coordinator of the Cooperation and Liaison Unit. ICTA, Guatemala.
Editor: Miriam Lizeth Villeda Izaguirre

EXECUTIVE SUMMARY

Guatemala has the highest level of chronic malnutrition in Latin America and is the third country in the world suffering from this scourge, according to the VI National Survey of Maternal and Child Health 2014-2015 of the Ministry of Public Health and Social Assistance. In children under five, it affects 46.5% of children and 32.4% suffer from hidden hunger, a phenomenon related to diets insufficient in micronutrients - iron and zinc and provitamin A - which cause growth retardation, low IQ and blindness.

To help combat this problem, several public and private institutions and organizations in Guatemala began work voluntarily on biofortification of basic crops in the family diet, especially in rural and indigenous areas where child malnutrition reaches 70%.

In 2015 the BioFORT Platform was created to coordinate actions in research, development, promotion and consumption of biofortified crops to strengthen the nutrition of the population at national level. Led by the Institute of Agricultural Science and Technology (ICTA) with the support of HarvestPlus, a world reference in biofortification, this alliance has 30 members, including government institutions, non-governmental organizations, universities, seed producers, international cooperation and civil society.

Biofortification is a conventional genetic improvement technique based on processes of selection and field crossing, which obtains varieties with higher micronutrient content, good agronomic performance and consumer acceptance. The seeds are for public use and are available for the most vulnerable rural

families, who have limited access to a diversified diet. On average, a Guatemalan consumes 423 g of maize and 58 g of beans per day. Foods based on these grains are the main source of iron and zinc for children and pregnant women. Consequently, biofortification of these crops was considered critical by researchers for increasing the amount of micronutrients provided by traditional foods.

It took the BioFORT Platform four years to develop the new varieties and achieve a total of 88,000 farmers and their families producing and consuming beans, maize and sweet potatoes biofortified with iron, zinc and provitamin A. The project contributed to reducing the malnutrition of about 500,000 people in 15 of the country's 22 departments.

One way to measure the contributions of this innovative technology was through laboratory analysis of emblematic foods on the family menu. A tortilla (bread substitute) made from biofortified maize contains 63% more zinc than one made from conventional raw materials and a

The data of success

It took the BioFORT Platform four years for 88,000 family farmers to produce beans, maize and sweet potato biofortified with iron, zinc and provitamin A, which contributed to combating malnutrition among 530,000 people in 15 of Guatemala's 22 departments.

glass of atol (a popular children’s drink) has 78% more. In addition, cooked black beans provide 63% more iron than traditional beans.

Reducing malnutrition by joining multi-sectoral efforts is not easy and does not have immediate impact. However, the BioFORT Platform’s action demonstrated that public-private synergy is possible

in pursuit of a common goal: alleviating hidden hunger.

The results obtained so far are successful, although the objective is to press to have biofortification included in Guatemala’s public policies so that every child and adult consumes this type of nutritious food, which is fundamental for the country’s development.

NARRATIVE SUMMARY

Cooperating to produce biofortified foods



CAPTION: Marta Rivera Duque, vice president of ATESCATEL, with an ICTA technician during release of biofortified hybrid maize.

In Atescatempa, Jutiapa, southeast Guatemala, the ATESCATEL Agricultural Cooperative supports small farmers in their efforts to achieve more productive crops with better income. The cooperative is part of the BioFORT Platform, an initiative that gave the farmers access to biofortified seeds of beans (ICTA Chorti) and maize (ICTA HB18), which produce grains with a more essential nutrients for the family diet. ATESCATEL has 83 partners, including 15 women. Its vice president, Marta Rivera Duque (in the photo), explained that these new varieties meet the needs of the community in several ways. “With these seeds we help improve children’s nutrition, which is why we promote them among our members. We also lend or give them away to

other farmers so they can try them out,” said the cooperative VP, adding that many families in the area are affected by malnutrition.

“We have seen that foods prepared with biofortified grains are accepted by children. The beans turned over with tortillas (traditional food) which we make at the Association have a very special taste. They love them,” Rivera said, noting that ATESCATEL has an agro-industrial processing line that provides jobs for several women. Another member of the cooperative, Julio César Portillo, said it was important for members to know that their crops were contributing to reducing malnutrition among children in their municipality, one of the many where the BioFORT Platform coordinates actions to reach the family menu. “We received bean seeds with more iron; and maize seeds with more protein and zinc, just what our children need. They taught us to how grow them and we saw that they compete in yield with the other varieties,” the producer said, referring to the support received from the Institute of Agricultural Science and Technology (ICTA).

Portillo believes it is time to change and look for better development alternatives for farmers. “We must not only plant as we have always done in the past, but transform our crops and place products on the market.” In his case with this idea, he has succeeded in creating employment for 10 people. “Now we want to take these biofortified crops to more families and integrate them into children’s meals in the schools,” he concluded.

CASE 4. THE BRS AMÉLIA CASE, A SWEET POTATO AGAINST MALNUTRITION IN SOUTHERN BRAZIL

Authors: : José Luiz Viana de Carvalho, Embrapa, researcher manager of the BioFORT Network. Pedro Santiago Mello Rodrigues, International Center for Tropical Agriculture (CIAT), focal point Brazil.

Editor: Daniela Hirschfeld.

EXECUTIVE SUMMARY

Vitamin A deficiency is the most common cause of preventable childhood blindness among poor children in developing nations. While liver, egg yolk and dairy products are the main sources of this vitamin, 80% of the daily requirement for these population groups comes from yellow and orange vegetables, which are high in carotenoids, the antioxidants the body is able to convert into vitamin A.

In an effort to contribute to production of foods rich in micronutrients, including carotenoids, the BioFORT Network was created in 2003 in Brazil, adopting crop biofortification as a strategy to improve the nutrition of the population. Led by the Brazilian Agricultural Research Corporation (Embrapa) with the support of HarvestPlus - world reference in biofortification - and the International Center for Tropical Agriculture (CIAT), the network consists of universities, producer organizations and other public and private actors committed to food security.

Biofortification is a technology aimed at increasing the micronutrient content of staple crops in the regular diet through conventional genetic improvement. According to HarvestPlus, this approach is sustainable since the seeds are public goods and are available to family farmers who have limited access to a diversified diet and other micronutrient interventions (Bouis et al., 2011; Bouis and Saltzman, 2017). Unlike fortification during food processing, biofortification begins early with development of the germplasm. This is done by selecting lines with high micronutrient content and crossing them with others with good agronomic performance and yield, to create new

varieties that provide food with a high level of consumer acceptance. With this technique and continuing with the genetic improvement begun in 1992 by Embrapa in Rio Grande do Sul, the BioFORT Network worked with the sweet potato materials available in the region - tubers with white flesh and traces of carotenoids - to develop the BRS Amélia variety, biofortified with provitamin A which was finally launched in 2011.

This innovation, recognizable at first sight by its pink skin and orange flesh, already covers 15% of the cultivated area in this southern state, Brazil's leading producer of the popular vegetable. Its qualities include high productivity - 32 t/ha, 230% more than the state average - but above all its nutritional contribution. The carotenoid content - 4,700 Qg/100 grams of flesh - positions this variety as an important tool in the fight against malnutrition. Another key to dissemination of BRS Amélia was the presence of certified nurseries with ample production capacity, which guaranteed provision of cuttings to the farmers in the area.

The data of success

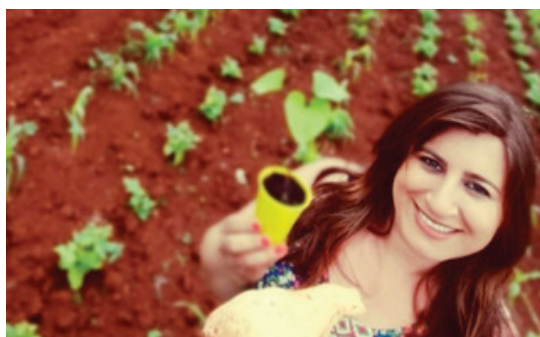
In 2011 the BioFORT Network launched BRS Amélia, a high productivity biofortified sweet potato with vitamin A as part of its actions against malnutrition. Today, this crop covers 15% of the cultivated area in Rio Grande do Sul, Brazil's main producer of the vegetable, benefiting 5,000 family farmers.

At national level, the BioFORT Network developed a total of twelve varieties biofortified with iron, zinc and carotenes which, besides sweet potato, include cassava, beans, cowpea, rice, maize, wheat and pumpkin. This variety permits interventions

in regions with nutritional deficiencies in different states. These actions have already directly benefited 5,000 farmers in Rio Grande do Sul and Paraná, and more than 40,000 families throughout the country.

NARRATIVE SUMMARY

Amelia, the ‘sweet potato queen’ of the south



Andrea Mattos, farmer.

Andrea Mattos (pictured), a farmer from Crissiumal municipality in Rio Grande do Sul, Brazil, recalls that when she first knew about Amélia she was not convinced and decided to get to know the new variety little by little, but very soon discovered a real ally. The experience not only benefited her work on the farm, but was a success in the family diet and in the community. “BRS Amélia,” its full name, is the denomination given to a sweet potato variety launched in 2011 by the Brazilian Agricultural Research Corporation (Embrapa). With its pink skin and yellow flesh, this sweet potato - known in Spanish as camote, batata or boniato - differs from those traditionally grown in the country because of its high yield, but above all because of its nutrient content. Thanks to a technique known as biofortification, this new sweet potato is an important source of provitamin A carotenoids and therefore a sustainable and low-cost tool for fighting malnutrition.

Andrea recalls that the first contact with BRS Amélia was on the recommendation of the Small Farmers’

Movement (MPA) in Três Passos municipality, which was already producing this variety. Her family decided to try it, but with a modest crop, for family consumption only.

“It was a success. We had never eaten anything that tasty or sweet. We prepared it baked, boiled and fried, there seems to be honey in this sweet potato,” Andrea said. “So we decided to expand the crop for commercial purposes.” They planted a quarter hectare and harvested between seven and nine tons. Five were easily sold to markets, restaurants, schools, daycare centers and directly to other families.

“The next year we were more ambitious and planted one hectare, with high productivity and quality of tubers,” Andrea continued. In 2018, they again expanded the area and were even able to help the community. “At the state school where my children go, there were problems to do with providing lunches and we donated sweet potatoes. The new variety was very popular with our children,” she said, since sweet potatoes were already established in popular culture and had even inspired a children’s song, ‘the sweet potato queen,’ which sang the praises of the vegetable.

She explained that the tubers that are not sold or donated, because they do not meet commercial standards, found another use. “On the farm we use them to feed cows, calves and pigs, using up all the crop”.

Based on this experience, for Andrea and her family, BRS Amélia became an important source of nutritional and economic benefits. “We learned how to manage the crop well and our cost of production is low. Today, orange-fleshed sweet potato is important in our diet at home and improves the income of small farmers.”



FINALIST CASES



CASE 5. FOOD SECURITY AND NUTRITION: TO THE RESCUE OF ANDEAN CROPS IN ECUADOR

Authors: Nelson Mazón, Ángel Murillo, Laura Vega, Diego Rodríguez (Andean Legumes and Grains Program-INIAP), Elena Villacrés (Nutrition and Quality Department-INIAP).

Editor: Víctor Mares.

EXECUTIVE SUMMARY

The National Institute of Agricultural Research (INIAP), with the support of public and private organizations, promoted the cultivation and consumption of ancestral Andean grains with high nutritional value, among family producers in Cotopaxi, Chimborazo and Cañar provinces, Ecuador. The project focused on indigenous populations with a high level of poverty where chronic malnutrition affects 35% to 50% of children under five.

Lupine (*Lupinus mutabilis*), quinoa (*Chenopodium quinoa*) and amaranth (*Amaranthus* spp) were historically relegated to these areas, situated from 2,700 to 3,800 meters asl, and displaced by the production of potatoes and maize for family consumption. Today, these Andean grains are being revalued for their potential for reducing malnutrition - given their content in proteins, iron and other micronutrients - and because of their good performance in soils of low fertility, where they contribute to the sustainability of agricultural rotation.

Since 1990, INIAP has been working on the genetic improvement of these species and launched varieties adapted to local agro-ecological and socioeconomic conditions, with lower content of anti-nutritional factors - such as saponins in quinoa - which limit their ingestion. With FONTAGRO's support, the Institute focused on improving the efficiency of lupine debittering - due to the presence of alkaloids - to shorten processing times prior to consumption, with the consequent saving of water. These innovations were fundamental for acceptance of the new crops on the farms and as food in the family diet, particularly among the child population.

Together with farmers' organizations formed for this purpose and others already in existence, seed production strategies were developed with

characteristics close to the formal certification system, but following standards more appropriate to the local situation. This guaranteed the supply to family farmers, making the initiative more sustainable.

The experience has already benefited 500 indigenous and mestizo families who have increased their consumption of lupine and quinoa, with the active participation of women who have made changes to their household diet. Surveys in these communities show that the increase in consumption of both lupine and quinoa was in the order of 30% from 2009 to 2015. Another important contribution was improvement of family income from seed production and marketing of surplus grain crops.

While this case is an example of the potential of the fight against malnutrition, through the coordinated efforts of public and private organizations, key crops such as lupine and amaranth are still not included in the country's basic food basket. This successful experience shows that inter-sectorial policies and financing which link agriculture and nutrition in rural communities are fundamental for driving change on a large scale.

The data of success

El INIAP promoted planting of Andean ancestral grains rich in proteins and essential micronutrients, in indigenous and mestizo communities in Ecuador. In six years, 500 families increased consumption of quinoa and lupine by 30%, adopting 30 culinary recipes devised by campesino women.

NARRATIVE SUMMARY

Campesino families revalue the nutritional contribution of Andean grains



Bravo and other farmers evaluating lupine tests.



Andean products prepared with Andean grains

Julio Bravo is a small farmer from Guamote canton, Chimborazo province, Ecuador. For generations, his family worked the land with low productivity and little technical assistance, resulting in a subsistence situation, and food and nutritional insecurity.

In recent times, thanks to the work of the National Institute of Agricultural Research (INIAP), their situation and that of thousands of campesino

families in the Ecuadorian Andes is changing, along with revaluation of ancestral grains.

As a founding partner and current president of the Corporation of Andean Legume and Grain Producers (CORPOPURUWA), Bravo explained how the collaborative work with INIAP developed and what its scope was.

“Andean grains have high nutritional value. In pre-Hispanic times they were an integral part of agriculture and the family diet, but in later times they were relegated,” Bravo recalled, noting that it was only ten years ago that these crops began to be rescued, with delivery of small quantities of seed of improved lupine and quinoa varieties.

“Their reintroduction on the farms, in rotation with traditional crops such as potatoes, has led to improved productivity and a better family diet,” Bravo said. In addition, a local quality seed industry has been started up and gradually strengthened. “The new activity is replacing the traditional production system on each farm. Today, it covers the needs of farmers who are more and more interested in diversifying crops.” The local leader also stressed the importance of the training provided by INIAP specialists. “This has given campesino families like mine a clear understanding of the importance of consuming foods with high nutritional value to combat, for example, child anemia.”

For Bravo, the associativism promoted by the project and by farming leaders is taking campesinos into the market economy based on processing of Andean grains. “We want our young people to stay in the countryside and find in agriculture and agribusiness the opportunities their elders did not have”.

CASE 6. GUARANTEEING CAMPESINO NUTRITION THROUGH AGRO-ECOLOGICAL KITCHEN GARDENS

Authors: Liliana Patricia Paz Betancourt, executive director Ecohabitats Foundation. Luis Alfonso Ortega Fernández, Ecohabitats Foundation.

Editor: Doribel Herrador.

EXECUTIVE SUMMARY

Small family farming in Colombia is operating under precarious socioeconomic conditions, compounded by the growing problem of climate change which threatens availability and access to food on a continuous and stable basis. According to the latest edition of the country's National Survey of the Nutritional Situation, 22.8% of the rural population do not consume a daily amount of vegetables and 58.5% do not include fruit in their diets either.

Cauca department, where the case took place, is one of the most vulnerable regions of Colombia, with 60% of people in food insecurity situations (CISAN 2009). The rate of chronic malnutrition - measured as height-for-age deficit - and prevalence of excess weight or obesity exceeds 20% in children and adolescents aged under 18 (Ortega-Bonilla and Chito-Trujillo, 2014).

Research by the Ecohabitats Foundation in 2014, showed that 2,000 rural families in the northwest of Popayán, Cauca produced scant quantities of vegetables, due to the great variability of rainfall, with excesses in the rainy season and deficits in the dry season.

Starting in 2015, the Foundation and campesino organizations, with support from the Research Program on Climate Change, Agriculture and Food Security (CCAFS), began a pilot experience with 28 families with the aim of starting continuous production of more than 30 varieties of vegetables and biofortified grains.

Organickitchen gardens adapted to climate variability were implemented, with an effective surface area of 24 m² and a greenhouse with low-cost infrastructure

for collection and storage of rainwater, along with drip irrigation, making it possible to overcome water shortages during the dry season. These technologies, together with climate monitoring by the families and planning of sowing, are ensuring stable production of 223 plants/12 m² every 3 months, intended for self-consumption and marketing of surpluses.

The strategy included knowledge dissemination through zonal field schools. Planning of activities is based on selection by the women, advised by the technicians, of the crops for the family diet. The women sell the surplus on the Popayan Organic Market Network and are currently setting up a formal business.

In just four years, the initiative was extended to 170 campesino families in Popayán, Morales and Yumbo municipalities, improving the nutrition of 480 people who consume 230 g/day of a wide range of foods throughout the year.

The success of the experience received recognition from the departmental (provincial) environmental

The data of success

The Ecohabitats Foundation promoted agro-ecological kitchen gardens in rural communities in Cauca, Colombia, with food insecurity. In only four years, 170 families were producing 30 types of biofortified vegetables, greens and grains and 480 people were consuming 230 gr/day of these nutritional foods.

authority, the municipal government and a network of children's homes in Popayan. Its impact led to the inclusion of these innovations in Cauca's portfolio of actions, showing that - through coordination of

institutional efforts and empowerment of campesino women - agriculture, adaptation to climate change and nutrition can be combined to make a sustainable improvement in the quality of life of the population.

NARRATIVE SUMMARY

Campesino women improve family diet by growing vegetables all year round



Vargas, with products from her kitchen garden.



Rivera on her farm.

Rural families in northwest Popayan, Colombia, who cultivate coffee and panela cane sugar, were dependent on the income generated by these crops to buy other foods. Family kitchen gardens were common but were unsuccessful in the face of alternating seasons with excessive rain and drought. In 2015, the Ecohabitats Foundation, with 28 families, began to develop gardens adapted to climate variability - with greenhouses and drip irrigation - able to permanently produce organic vegetables and greens for self-consumption and sale of surpluses.

Ana Cecilia Vargas, a campesino woman from Los Cerrillos village, who helps her husband with

cultivation of coffee, explained why they adopted the new gardens and what it meant for the family's diet.

"We realized we could produce food on the farm all year round which we were buying in town. The training given by the technicians and the 'campesino to campesino' accompaniment helped us to make the change. Now, it's summer and although it's not raining, we have food on the table and we are supplying the city of Popayan."

For the past year, the women have been organizing a local market for organic products known as the "harvest festival." Vargas was one of the pioneers of this initiative and now runs the organization.

"For me it was an opportunity to make our products known. Every 15 days we bring fresh and processed foods, such as cheese, yogurt, powdered and cubed panela, whole meal maize flour and tortillas. All produced by groups of campesino women from different villages," demonstrating the value of women's empowerment.

Maria Cristina Rivera, another farmer from the San Antonio area, started with this type of garden a year ago after the training given by the field school.

"We used to plant vegetables only when the season was right. I've been working with the new facilities for a year now. We learned how to prepare fertilizers with the coffee harvest residues and we planned the planting, in line with the rain data given us by our partners. I realized we are able to grow our own food all the time," Rivera said.

Only four years after beginning this experience, 480 campesinos from three municipalities (Popayán, Morales and Yumbo) consume 230 gr/day/person of organic vegetables and basic grains throughout the year. A success!

CASE 7. SMALLHOLDER FAMILIES UNITED FOR NUTRITIONAL SECURITY IN NORTHEAST ARGENTINA ARGENTINO

Authors: Gabriela Marta Faggi, Rural Extension Agency, INTA Las Breñas, Chaco, Argentina- Ricardo Peranich AER- INTA Las Breñas.
Editor: Iciar Pavez.

EXECUTIVE SUMMARY

The INTA Rural Extension Agency Las Breñas, Chaco province, with the support of universities and public and private institutions, promoted the productive diversification of 65 smallholder families in Corzuela, with the aim of contributing to a nutritious and healthy diet through implementation of kitchen gardens and agro-ecological farms. Previously dedicated to the cultivation of cotton, this community lived in subsistence conditions in a peri-urban area with little access to food, both in quantity and quality. The interventions, which began in 2009 and continued for ten years, were aimed at developing technological, organizational and commercial changes, under the concept of social economy, that is prioritizing family needs. After a diagnosis that identified the main problems of the area, such as water shortage, lack of social organization, agricultural infrastructure and access to credit, a project was developed jointly with the beneficiaries.

The first step was introduction of environmentally-adapted crops and varieties of high nutritional value by delivering seeds from the ProHuerta Program of the Ministry of Social Development and INTA. At the same time, water management was improved with construction of artisanal systems to store rainwater and recycle water for household use. Through collective work, a sustainable solution was achieved to cover almost all the community's irrigation needs.

The new crops include green-leaf vegetables, rich in vitamins and minerals which were not previously part of the family diet; the Colorada INTA and Morada INTA varieties of sweet potato, source of vitamin A; prickly pear (*Opuntia ficus*

indica), high in food fiber and vitamins; and orange-colored papaya (*Carica Papaya*) with a high contribution of beta-carotenes.

The project helped change the family diet through training based on official nutritional guidelines and their relation to locally produced food. In addition, new forms of social organization were stimulated, with the aim of creating incentives for value added and marketing of surpluses. In this respect, support was given to formation of an organization led by women - Association of Corzuela - which achieved accreditation as recipient and administrator of state microcredits. With this backing, an agro-industrial plant and a collective sales brand, Flavors of Corzuela, were created, which was soon exhibiting at local and national fairs.

Ten years into the experience, the surface area of the family kitchen gardens had grown by 1,040%. In 2019, 102.6 tons of food were produced, mostly vegetables and fruit for 325 beneficiaries in Corzuela and another

The data of success

Ten years ago, INTA Las Breñas, Argentina, promoted the productive diversification of 65 smallholder families in El Chaco with limited access to food sources. Today, through their association, they obtain 100 t/year of vegetables, fruit and meat for the 325 inhabitants of the community and for another 7,000 consumers.

7,000 consumers. Following the success of the experience, the project was scaled up to seven rural associations directly benefiting 700 regional farmers.

This case shows how a community-based organization built on the leadership of small family farmers with the state as facilitator of change, was able to diversify production and increase food and nutrition security in a sustainable way.

NARRATIVE SUMMARY

Smallholder families united against hidden hunger



Marcela Chávez



Miriam Alomo

Over the past 10 years, 65 families living in poverty in Corzuela, Chaco, advised by INTA Las Breñas, began to implement agro-ecological kitchen gardens on their land and formed an association to process and sell the surplus. Led by women, the initiative has provided them with varied, nutritious and healthy diet, benefiting another 7,000 consumers per year.

Marcela Chávez, 40, supports 3 children in secondary school. “My mum used to grow vegetables to put in the pot every day and not spend on shopping. But I had to leave school to help out in the fields. Now, things have changed,” Chávez said with the satisfaction of being able to provide for her family.

Five years ago she started working with other women to add value to horticultural crops. “We used to get together at home to make jam. Then we formed an association and started growing. Today, we have a place with ceramic floors and walls, a gas stove and air

conditioning. It changed our lives because processing fruit in summer, with the heat of the Chaco, was very difficult,” she said, describing the agro-industrial venture of the Corzuela Association.

With the backing of the National Microcredit Commission, they were able to move forward. “They gave us scholarships to learn to become microcredit advisors and entrusted us with the administration of a revolving fund. The result was very positive, we have directly financed 70 ventures,” she said.

Now while the men work in the fields as tractor drivers and other jobs, the women participate in the local Free Trade Fair. “Some families bring us their products, we advertise on the radio and handle the sales,” said Chávez, explaining that they also learned to grow and eat nutritious ‘nopalitos’ (a food made from prickly pear) and even send them to a Mexican food restaurant in Buenos Aires.

Miriam Alomo shares much of Marcela’s experience. She is mother of two children and lives with her husband on a two-hectare property where they have a kitchen garden and raise poultry. She joined the Corzuela Association in 2011, attended training in good practices and helped build cisterns and a home water recycling system for irrigation. “It was very important because the well water was contaminated.”

They also made progress in agro-industry with the group processing of the fruit under the “Flavors of Corzuela” brand. “We divide the income, a part is reinvested and another part is shared between.” For Alomo, the most important thing is to have diversified the family diet. “Now, we produce a little bit of everything: tomato, sweet pepper, parsley, arugula, lettuce, chicken and eggs. We learned to eat well, in a healthy way,”

CASE 8. FOODS WITH FUNCTIONAL ATTRIBUTES FROM LATIN AMERICAN SAVANNA. BEEKEEPING PRODUCTS FROM SILVOPASTORAL SYSTEMS IN ARGENTINA, SCALED UP TO LAC THROUGH REDLAC.

Authors: Luis María Maldonado, head of the Agro-industry Division, INTA Famaillá. María Inés Isla, full prof. National University of Tucumán, Inv. Ppal. CONICET.

Editor: Liliana Rosenstein.

EXECUTIVE SUMMARY

More than 6,000 small beekeepers from Argentina, Dominican Republic and Costa Rica, with the support of INTA Argentina and other institutions in Latin America and the Caribbean (LAC), participated in technological, organizational and regulatory changes to enable them to offer food with quality guarantees, traceability and high biological value, benefiting society as a whole. The case began 20 years ago in Tucumán, northern Argentina. Despite being the world's second largest honey exporter, the beekeeping chain paid little attention to the quality of the product, which has been recognized for its contributions to human nutrition and health since time immemorial. This dynamic created an activity dependent on the use of chemicals, which resulted in detection of antibiotic residues in the European Union, setting off a deep crisis in the sector.

In response to this problem, a team of researchers from INTA's National Beekeeping Program (PROAPI), the National University of Tucumán and the National Council for Scientific and Technical Research was set up in INTA Famaillá, Tucumán, to work side by side with the beekeepers who organized themselves into associations.

One of the first improvements was to implement the protocol for quality management and safety assurance of honey, which gained a significant degree of adoption throughout the country, reaching 100% in the northern cluster, with a decisive impact on the competitiveness of Argentine beekeeping.

Simultaneously, emphasis was placed on value added and product diversification. The researchers identified honeys and propolis by botanical origin and determined their nutritional and functional characteristics, which resulted in development of differentiation plans and initiation of campaigns to promote domestic consumption, even at very low levels compared to developed countries.

The task included active participation in creation of a regulatory framework to support innovations. Significant steps were taken, such as incorporation of propolis and native stingless bee honey into the Argentine Food Code, and development of the Geographical Indication "Lemon Blossom Honey of Tucumán" to market these products with details of the established quality parameters to facilitate their evaluation by consumers.

With this trajectory, INTA Famaillá assisted institutions in the Dominican Republic and Costa Rica under the

The data of success

Twenty-one years ago, INTA- PROAPI began to differentiate the honey by botanical origin and nutritional and functional attributes. Today, more than 6,000 small beekeepers in Argentina, Dominican Republic and Costa Rica offer bee products with guarantees of quality, traceability and high biological value.

framework of REDLAC, a platform for development of beekeeping in countries of Latin America and the Caribbean with extensive territories of natural and implanted forests.

In brief, the case “Foods with functional attributes from Latin American savanna” shows to public and

private decisionmakers the opportunity offered by innovation in regional beekeeping to improve the nutrition of their inhabitants and to position products on a global market that is increasingly looking for natural foods, with traceability and quality management from origin.

NARRATIVE SUMMARY

Passion for lemon honey



Medina with his beehives in Famaillá

Tucumán is home to 75% of Argentina’s lemon growing in a narrow strip with particular agroecological characteristics that produces a unique honey, with a floral aroma, a slightly acidic sweet taste and light color. The beekeepers’ vocation, the associative work and the support of INTA Famaillá led them to develop the Geographical Indication seal to enhance the product on the markets. Sergio Medina, a beekeeper for 20 years and president of the Norte Grande Cooperative, tells how production developed in the area and how it impacted the population’s diet.

“My parents are farmers who work in sugarcane and lemon. I introduced beekeeping to the family farm. I learned about the activity in a Rural Change group and became passionate about it. I bought 20 beehives, enough for our lemon trees and, as I expanded, I worked with neighbors and covered other provinces. I turned over exclusively to honey and now have 180 beehives,” said Medina who from the start has worked with genetics and INTA quality protocols.

The strength of the area is the lemon blossom honey, but the flowering is very short and the product is

harvested in late August and September. “Then we move the hives to Santiago del Estero. There we take advantage of the carob tree which gives us darker honeys and propolis. Everything has a market,” he said.

The cooperative? “At first we worked individually but we had to cooperate with other beekeepers to reach the markets,” he said, recalling that thanks to the association they made the first shipment of 60 tons of lemon honey to Japan in 2008.

“It wasn’t easy, it took us several years to put it all together. We were getting visits from Japanese people. We had to get translators and go through all the procedures. They wanted to know the quality and where the honey came from. The team from INTA Famaillá and SENASA worked side by side with us,” said Medina proudly, adding that Norte Grande was growing and Famaillá now has 180 members.

Another advance by the cooperative was the startup of a fractionation plant and value-added processing of products, which results in sales of 2 ton of honey a year on the local market.

Impact on households? “Before, honey was not so common. Now, in my family, we include it in the daily diet of both men and women. I also got used to propolis, I take it before winter and it helps prevent colds.” With respect to the people of Famaillá which has about 23,000 inhabitants Medina said, “They consume more honey because they see that it’s pure. More beekeepers are needed because they benefit the community”.

Preferences? “We put all the honeys, light and dark, on the table, but the lemon is our own and you like best what’s from your own land”.

CASE 9. SEED PRODUCERS AGAINST MALNUTRITION IN GUATEMALA

Authors: Karen Yessenia López García, consultant, ATESCATEL. Leonel Osorio Quiñónez, president of ATESCATEL. Zulma Karina Hernández, vice president, ATESCATEL. Julio Portillo, vocal I of ATESCATEL.

Editor: Guillermo Pérez.

EXECUTIVE SUMMARY

The Integrated Agricultural Cooperative ATESCATEL RL, located in Atescatempa municipality, Jutiapa department, Guatemala, was set up in 1985 by small farmers with the objective of producing and marketing maize and bean seeds, the basis of family nutrition in the country which has the highest level of chronic malnutrition in Latin America.

The cooperative, located in a region of recurrent droughts that exacerbate food insecurity, received technical training and financial support from several national and international organizations with the aim of strengthening its production, sales and marketing management. The organizations include the BioFORT Platform, an inter-institutional network created in 2015 to improve the nutrition of the Guatemalan population through crop biofortification.

This alliance, led by the Institute of Agricultural Science and Technology (ICTA) and advised by HarvestPlus, introduced this type of seed to the country's most vulnerable rural areas. The beans biofortified with iron and zinc, and maize with high quality protein and zinc, obtained through conventional genetic improvement, achieved grain yields similar to traditional varieties.

With this innovation, ATESCATEL developed a vertical integration model of the seed chain, going from cultivation, cleaning, selection and packing, to selling the differentiated product to direct and institutional buyers. The trajectory of the cooperative was critical for diversifying markets and adopting new technology, achieving benefits for the cooperative itself, its members and the family farmers in the area, who now produce and consume more nutritious grains.

Between 2016 and 2019, twenty ATESCATEL partners produced 39.8 tons of maize seeds and 45.6 tons of biofortified beans, which led to adoption of the new crops in the departments of Guatemala, Baja Verapaz, Alta Verapaz, Jutiapa, Zacapa and Chiquimula. The beneficiaries include 4,028 farmers who bought the new varieties and another small 5,286 farmers who were given the materials through the BioFORT Platform. Biofortified seeds are taking up a growing percentage of ATESCATEL's sales portfolio. In only three years, the biofortified hybrid maize ICTA HB-18^{ACP+Zinc} accounted for 72.1% of sales in the category compared with 27.9% for the conventional hybrid; and the biofortified bean ICTA ChortíACM reached 61% versus 39% for conventional seeds.

This advance was promoted by the cooperative's business model, which gives members a higher price than the local informal market, since they buy their crops as seed and not as grain. As a result, producers obtained an average of USD2,123.76/ha for biofortified beans, a 90% increase over conventional varieties. In the case of maize, they obtained USD5,309.39/ha, 38% more in the same comparison. The offer of a fair price also contributed

The data of success

in 2016 the ATESCATEL cooperative diversified its portfolio bringing in production of seeds biofortified with iron, zinc and proteins. After three years, the new hybrid maize now accounts for 72% of sales and beans 61%, benefiting 10,000 farmers.

to positioning the cooperative as a sustainable social enterprise in the Guatemalan agricultural sector.

ATESCATEL's success with biofortified seeds is based on the work done in cooperation with public

and private organizations committed to food security, and on the use of the capacities built up over the years in disseminating the new technology, with benefits for producers and consumers.

NARRATIVE SUMMARY

A cooperative combats malnutrition with biofortified seeds



Karina Hernández.

The Integrated Agricultural Cooperative ATESCATEL, Jutiapa, Guatemala, was created in 1985 with the objective of producing and marketing maize and beans, basic grains that constitute the basis of the family diet. In Atescatempa municipality, where the cooperative is located, more than one third of the population is poor, and one fifth, or about 3,000 people, are extremely poor.

Since 2016, ATESCATEL has been part of the BioFORT Platform, an inter-institutional network that aims to strengthen family nutrition through crop biofortification. This alliance has allowed ATESCATEL to diversify its seed portfolio, adding varieties to tackle the problem of malnutrition at the same time as raising incomes.

Karina Hernández is one of 20 farmers producing biofortified maize and beans. When she was widowed she had to run the household to support her two children, and became directly involved in farming, a sector mostly in the hands of the men.

“Despite coming from a farming family, my knowledge was very limited, since it was considered an activity for men. But as head of the household I needed training. Today I can demonstrate my skills which, of course, I have learned in the cooperative,” the young entrepreneur explained, referring to the training she received along with other members in production and sales, in addition to financial support from several organizations in the BioFORT Platform. Today, she is not only vice-president of ATESCATEL, but also supervises the work of 15 people in the conditioning of seeds and grains at harvest time. “Another of the benefits I have had in the organization is the possibility of growing and getting into the processing area. It was a new opportunity to earn more.”

The work done by the women in the various areas of the cooperative improved the living conditions of many households. “We supplement the family income and our children no longer go to school without money,” one employee said.”

For Hernández, a key aspect of ATESCATEL's line of biofortified products is that the grains improve children's nutrition. “When we grow these varieties, our children eat a portion of beans and a tortilla, as always, but the nutritional content is higher.”

CASE 10. RECOVERY OF NATIVE QUINOA OF NORTHWEST ARGENTINA

Authors: Daniel Bertero, PhD, professor of Plant Production, Faculty of Agronomy (UBA).

Editor: David Dudenhoefer.

EXECUTIVE SUMMARY

Quinoa is renowned for its nutritional value since it contains high quality protein with a good balance of essential amino acids, particularly lysine, as well as minerals and vitamins. It is also noted for its capacity to adapt to a wide range of environmental conditions.

In the Northwest Argentina (NOA), in Jujuy, Catamarca and Salta provinces, this grain was very important in the pre-Columbian era, but was abandoned after the Spanish conquest. Although it survived thanks to andean farmers who continued its cultivation. Fifteen years ago it was thought that there were no native materials in Argentina. Some family farmers used commercial varieties from Bolivia and even Peru, the world's leading producers and exporters of quinoa.

Since 2001, the Professor of Plant Production at the Faculty of Agronomy of the University of Buenos Aires (FAUBA) has coordinated a project to identify, conserve, characterize and value native quinoa. The project was implemented with the collaboration of the National Council of Scientific and Technical Research (CONICET), the National Institute of Agricultural Technology (INTA), the Ministry of Agriculture, Livestock and Fisheries and the World Bank.

The researchers collected a great diversity of genetic material from the territory of the NOA, bringing together 92 varieties that were incorporated into the INTA National Germplasm Bank. A selection of these was characterized by molecular markers, and the nutritional composition and association between these components was evaluated. As a result, quinoa was found to have a great nutritional variability, something that had not been studied in Argentina or in other Latin American countries.

The main conclusion was that the NOA varieties, in addition to being better adapted to the area, had a

nutritional value comparable to those of the leading nations in the field. The 21 varieties analyzed had high protein content, with an average of 16.8%, higher than the 14.12% of the species (Vidueiros et al 2015). In addition, genetic groups with higher levels of iron and zinc than the average were identified, which will guide improvers to select according to particular objectives.

Nutritionally superior materials with good grain size and color and disease resistance - among other traits of agronomic and commercial interest - were shared with INTA improvement programs, contributing to development of new varieties. Several of these quinoa plants are already being used by rural families as well as by visitors to the famous Quebrada de Humahuaca, among other tourist attractions in the region.

This case shows the potential of agricultural research for enhancing key crops for human nutrition. In a region where only isolated plantings of native quinoa were found a few years ago, cultivation has now grown to about 100 family production units with a total of 1,245 ha of quinoa planted. Several organizations and entrepreneurs are working on agro-industrial and commercial innovations to boost consumption of this ancestral grain, which will contribute to food security in NOA communities.

The data of success

In Northwest Argentina, region where there were isolated crops of native quinoas, the FAUBA has identified varieties with a higher content of proteins, iron and zinc than the average of the species. In just a few years, 100 family farms have been developed with a total of 1,245 hectares planted.

NARRATIVE SUMMARY

Native quinoa has found its place in the family diet



Raúl Viveros, farmer in Colanzulí, Salta, Argentina.

Viveros on his smallholding of native quinoa.

Raúl Viveros is a farmer from Colanzulí, Salta, an Andean village in Northwest Argentina (NOA) who works as a technician for the Family Farming Program of the Ministry of Agriculture. Starting at a very young age he began to disseminate various regional crops, with no particular interest in quinoa.

In 2006, he began to focus on this grain through a project supervised by Daniel Bertero, professor at the Faculty of Agronomy of the University of Buenos Aires (FAUBA). He participated in evaluations and trials with native quinoa along with other farmers in his community and found the experience very enriching.

“Now, we know that this grain, which we have consumed all our lives, has high levels of protein, lipids, minerals and vitamins. It’s a complete food,” Viveros said, referring to the fact that the species has been grown in the NOA since pre-Columbian times but was only recovered in recent years.

CAPTION: Raúl Viveros, farmer in Colanzulí, Salta, Argentina

“For hundreds of years, this grain was devalued. Today, in Colanzulí, Salta, Argentina we are moving ahead with other Andean crops, but native quinoa has its place. There is a high level of awareness of its nutritional value,” said Viveros, referring to the Ministry’s promotion of planting and food education.

As the project progressed, the technician realized that Colanzulí and other Kolla communities in the NOA, have a new alternative for contributing to food security and improving family income.

“In my house we consume quinoa in soups and empanadas every week. And, because we have increased production, we can sell 80% of the grain we harvest,” Viveros said, noting that native quinoa is highly sought after by soup kitchens and tourist restaurants in the area.

“Although my two children are young, they have already learned to eat quinoa in different preparations and they like it. I hope they understand the value of a balanced diet and continue the tradition”.

CASE 11. INNOVATING IN RURAL AREAS IMPROVES FAMILY LIFE IN BOLIVIA

Authors: : Jaime Gutiérrez Guerra project manager, Valles Foundation. Miguel Ángel Florido Torrez, former civil servant, Valles Foundation.

Editor: Abel Rojas Pardo.

EXECUTIVE SUMMARY

The Valles Foundation, a non-profit organization in Bolivia, implemented a project to reduce poverty and improve food security in rural areas of the country. The scheme helped more than 5,000 farming families to develop peanut and oregano crops through productive and commercial technological innovations, which resulted in a more diversified diet and higher incomes for the population.

Peanuts (*Arachis hypogaea*) are a species considered to be native to the Bolivian Chaco and emblematic of the national gastronomic culture. Historically, peanut activity was in the hands of small farmers of Quechua, Guarani and Guarayo ethnic origin, who cultivated less than one hectare. The low productivity and the high contamination of the grains with aflatoxins limited the availability of a food recognized for its contribution of proteins, vitamins and minerals, essential in human nutrition.

Starting in 2004, the Foundation's team of specialists began a process of participatory research with 2,000 families, with the aim of ensuring the safety of the grain in both conventional and organic peanuts. Good agricultural and post-harvest practices, technologies for industrial processing, price information services and business rounds were developed, which facilitated access to markets by capturing value.

In just five years, peanut production increased by 58.6% from 13,315 t in 2009 to 21,123 t in 2014, with a further 5% increase estimated by 2018; and consumption per person rose from 0.88 kg/year to 1.04 kg/year. Through the Peanut Producers' Association (APROMAN), some 250 producers export 54 t annually of peeled peanuts with organic certification to a demanding market such as Germany, with a 30% increase in family income.

Oregano (*Origanum vulgare*) was introduced as a crop in Chuquisaca, Cochabamba, Potosi and Tarija because of its hardiness, adaptation to poor soils and different altitudes, along with its easy handling which facilitates participation by the whole family in production tasks. Also in this case, it is a food with high nutritional value which has aromatic, tonic and digestive properties appreciated by the food industry.

The Foundation's support consisted of variety validation, technical assistance, strengthening of industrial processing and market development. Currently, a total of 2,805 farmers produce, consume and export oregano through the UNEC company (Spices and Condiments Business Unit). On average, 450 t/year are shipped to Mercosur countries, with an 84% increase in family income.

The case of the Valles Foundation shows how by means of participatory research, support for agro-industrial ventures, promotion of consumption, transparent trade and market development, it was possible to increase beneficiaries' income and thus improve family nutrition.

The data of success

Since 2004, the Valles Foundation has promoted production of peanuts and oregano by 5,000 campesinos in Bolivia. They now obtain 60% more peanuts with income up to 30% more and export 450t/year of oregano, with 84% higher benefits, thus improving the family diet.

NARRATIVE SUMMARY

Peanut soup, Bolivia's emblematic dish

For 18 years the Valles Foundation worked with Bolivian families of the altiplano, Chaco, humid tropics and valleys, promoting technological innovation and developing enterprises to improve the quality of rural life. One of the experiences resulted in dissemination of peanut cultivation, a grain with high nutritional value whose consumption has risen by more than 18%, reaching 1.04 kg/person/year in addition to generating foreign exchange from exports.

“Peanut consumption is very common and extremely important in rural communities. The project has helped to promote its consumption because of its high contribution of protein (22-30%), vitamins and minerals, essential in human nutrition. Families recognize this value and use it two or three times a week in roasts, soups and other preparations,” Walter Fuentes, technical expert of the Foundation, explained

In 2009, Bolivia produced 13,315 tons of peanuts and in just five years the crop increased by 58.6% to 21,123 tons in 2014, of which 63.4% was exported at a value of US\$ 23.5 million/year. Currently, 2,000 producing families in the valleys have price information services and business rounds, which facilitate acceptance in the markets by capturing value. In addition, three groups of women sell 12 tons of processed peanuts on the local market. Part of the income is invested in improving the quality of family life.

“Few people know how difficult it was to start the business, the peanut harvest was not good and

profits were low, but it was worth it”. “Internal organization was crucial since we didn't have much time for meetings. We live in remote places and have a lot to do at home.” “Now we are organized and next year we will be do better.” These are the words of María Coca, Nazaria Colque and Wilma Terrazas, producers of Chuquisaca who set up a roasted peanut seed business, improving the nutrition and economy of families.

The Valles Foundation also supports oregano cultivation which - due to its aromatic, tonic and digestive properties - is frequently consumed by families and is in heavy demand in the food industry. The work done in this production chain, in coordination with other institutions, consisted of introducing and validating varieties, technical assistance for processing and marketing; and promoting the product on the markets. With the participation of 2,800 families, 450 tons/year were exported to Mercosur countries, generating an income of USD 285,000 per year.

The value of these foods for the national culture was recognized by the publicity received by peanut soup - Bolivia's flagship dish - whose basic ingredients are peanuts and oregano, when this traditional food, prepared by the young Bolivian Elba Rodríguez, won the Masterchef Argentina 2014 competition.

“My mother used to make it for me when I was little. It has a unique taste”, she said proudly in front of the dish that fascinated the judges of the first reality cooking show on Argentine television watched by millions of viewers.



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