The AgroSalud Project (www.AgroSalud.org) aims to improve food and nutrition security among vulnerable populations living in 14 Latin America and Caribbean countries through nutritionally enhanced biofortified crops (beans, maize, rice, sweet potato) and food products derived from these crops and cassava. From 2005 to 2010, the consortium of institutions that make up AgroSalud completed a multitude of activities for the development, evaluation, deployment and promotion of biofortified crops. Selected highlights are presented.

There are advanced breeding lines that meet or surpass the nutrient goals established for rice, sweet potato, beans and maize. These include rice and beans with more iron, sweet potatoes with higher beta-carotene levels (which the body converts into vitamin A), and maize with more of the essential amino acids tryptophan and lysine (which the body needs to form protein). Work continues to push the levels of these nutrients even higher.

Seed production, multiplication and dissemination in Central America
• 719 technicians and farmers trained in producing maize seed (2006-2009).
• 201 tons of maize seed produced for commercial and promotional purposes (2009).
• 314 validation and diffusion plots for rice or beans planted in Nicaragua (2009).
• 27,000 sweet potato clones distributed to Nicaraguan NGOs to establish family gardens among program beneficiaries (2008).

Food products developed with biofortified crops
Biofortified food products were developed for the Colombian market in a pilot project with private industry. A wide array of products have been developed in pilot plants with nutritionally enhanced crops, such as extruded maize, rice and cassava products.

Economic and agronomic impact work
Studies indicate that the potential economic and nutritional impact of biofortified crops depends on the country-crop-nutrient combination in question; for some combinations, biofortified crops will be more cost-effective than nutrient supplementation or industrial fortification and for others less cost-effective. There is good potential for including biofortification in food and nutrition security policies in Bolivia, Colombia and Peru. Two pre-adoption studies suggest high acceptance of nutritionally enhanced maize in El Salvador and rice in Bolivia.

Phases

1. Pre-adoption phase: researchers and farmers
2. Adoption phase: farmers
3. Commercialization phase: local and regional food systems
4. Improved uptake: extension personnel

Nutrition activities
Results to date suggest that the in vitro protein digestibility of amino-acid biofortified maize is not different from conventional maize; however, persons will benefit from the higher amino-acid levels in meals prepared with biofortified maize. From a sensory perspective, most of the improved cultivars are organoleptically accepted by consumers in different countries (beans, Cuba, Nicaragua), sweet potato (Nicaragua), rice (Bolivian, Panama). An impact study with biofortified maize in urban pre-school Nicaraguan children showed the benefits on children’s weight and height (but not on Illness) of consuming this maize instead of conventional maize. For future use in monitoring and evaluation, a food security scale was validated in rural Haiti and Nicaragua.

Nutritional and agronomic benefits
• Nutritive value of biofortified crops compared with conventional crops
• Development of nutritionally enhanced crops
• Improvement of conventional crops

Economic and agronomic benefits
• Cost-effectiveness
• Commercialization
• Improved uptake

Communications updates
The AgroSalud website was updated in 2008 and maintained relevant ever since. An estimated 16,000 persons visited the website since 2008 and about 200 registered. 55 articles were published in newspapers and another 10 in other media (magazines and institutional web sites). Among the news releases written, 90% were published. From 2007 to 2010, communications personnel hosted 487 visitors at CIAT, participated in 8 national and international events, organized 3 promotional campaigns in Colombia, and took advantage of social networking tools such as Facebook (Facebook/AgroSalud).

AgroSalud partners have commercially released 15 maize cultivars with higher tryptophan and lysine levels in Colombia, El Salvador, Haiti, Honduras, Mexico, Nicaragua and Panama; 8 rice cultivars with higher iron in Bolivia, Cuba and Panama; 5 bean cultivars with higher iron in Bolivia, Brazil, Cuba and Guatemala; and 1 sweet potato cultivar with more beta-carotene in Cuba. An additional 21 nutritionally enhanced cultivars are in the pipeline for release in 11 countries in 2010-2011.

Commercial release of cultivars

Panamanian government funds biofortification activities
Researchers from the Instituto de Investigación Agropecuaria de Panamá (IDAP) have secured in country funding to develop and evaluate biofortified rice, beans, maize and sweet potato since 2008 indicating the government’s commitment to biofortification.

AgroSalud supported by Central American Ministers of Agriculture
In 2008, the Comité Agrícola de Centro América y Caribe (CAC) commended those organizations leading AgroSalud, recognized AgroSalud’s activities as a tool to reduce hunger and malnutrition in the region, and requested support for a continuation of AgroSalud’s activities in the region.

Biofortification included in national nutrition plans
Cuban, Panamanian and Nicaraguan partners have succeeded in including biofortification in national nutrition plans, adding legitimacy and urgency to the biofortification work that AgroSalud implements in these countries.

Crops

The focus of the program is on crops that can be grown by smallholder farmers using existing production and processing technologies. Crops include:
- Maize: The main focus has been on developing and releasing biofortified maize cultivars that have higher levels of tryptophan and lysine than the conventional maize cultivars grown by smallholder farmers in the region. Maize is a major staple food in the region, and improving its nutritional content can have a significant impact on the diet of vulnerable populations.
- Beans: Beans are another important source of protein and iron in the region. AgroSalud is working to develop and release biofortified bean cultivars that have higher levels of iron and tryptophan than the traditional varieties.
- Sweet potato: Sweet potato is a good source of vitamin A, and AgroSalud is working to develop and release biofortified sweet potato cultivars that have higher levels of vitamin A.
- Rice: Rice is a staple food in many countries in Latin America and the Caribbean. AgroSalud is working to develop and release biofortified rice cultivars that have higher levels of tryptophan and lysine.

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These crops are important sources of nutrients for vulnerable populations in Latin America and the Caribbean. By improving the nutritional content of these crops, AgroSalud is helping to address the problem of malnutrition in the region.