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The Academy Generates Solutions for Food and Nutrition Security in Colombia

Teresa Mosquera-Vásquez¹, Hugo Melgar Quiñonez², Sara Del Castillo¹, Yesid Aranda¹, Álvaro Parrado¹, Luz Patricia Restrepo¹, Eucaris Olaya¹, Carlos Narváez¹, María Victoria Campo-Daza³ y David Cuéllar¹

1. Universidad Nacional de Colombia, sede Bogotá, Bogotá, Colombia
2. McGill University, Montreal, Quebec, Canada
3. Fundación Colectivo Mujer y Sociedad, San Juan de Pasto, Colombia

Abstract

Food security and nutrition is a challenge that requires a complex approach to face it. McGill University from Canada and Universidad Nacional de Colombia, developed a trans-disciplinary work linking social sciences and natural sciences, and developed a technological innovation, “the most nutritious potatoes”. Three yellow potato varieties were selected by participatory research with communities. These potatoes offer higher nutritional contents such as iron, zinc, dietary fiber, protein, and polyphenol compounds that protect health. These potatoes give 18% more income to small-scale potato farmers because they are more resistant to the most devastating disease in this crop, and their yield is double when compared to the most cultivated variety in the country. We implemented a model to scale-up the new potato varieties, building synergies with authorities at different levels, private organizations, and communities tackling production, market, food consumption, and public policies. In two years, more than six million people are consuming these new varieties and small-scale potato producers’ communities are impacting public policies at the local level. These two participating universities developed knowledge and linked the postgraduate academic programs in Gender Studies, Food and Nutritional Security, Agricultural Sciences and Rural Business Development working collaboratively. Undergraduate students, masters, and doctoral students were trained and capabilities for leadership were built in food security and nutrition for the academy and the communities, and results were generated for policymakers on issues of nutrition, gender and social equity, and environmental protection.

Key words: 1.) Scaling-up 2.) linking agriculture and nutrition 3.) Gender equity for rural women
4.) Leadership

Introduction

The number of undernourished people in the world has been on the rise since 2014, reaching an estimated 821 million in 2017 (FAO, 2018). This fact poses demands to the educational sector, for professionals to acquire new capabilities, ways of learning and working together across organizational, social and economic lines and ways of drawing upon the integration of disciplines and participatory methodologies (Ramaley, 2016). Demands on universities to integrate scientific knowledge with the activities of non-academic actors is growing as modern public governance is becoming more complex (Rudd, 2015).

Face complex challenges such as food and nutrition insecurity, that in Colombia at the national level is 54.6% and in the rural areas is 64.1% (ENSIN 2015) requires a complex approach and to generate scientific knowledge from natural and social sciences in an integrated manner. The scientists and academic sector must build this knowledge from a permanent dialogue and interactions with communities. The knowledge and the solutions that arise from these exercises must be returned to society to ensure the wellbeing of its citizens.

Agriculture is basic for food security and nutrition (FSN). Therefore, it must do important efforts to improve their practices and generate knowledge to impact with better and appropriate food and to be oriented towards a responsible agriculture with nutrition and with the environment. Taking into account this consideration a team of professors from the McGill University of Canada and Universidad Nacional de Colombia explored practical solutions to a complex problem, the food insecurity, and micronutrients deficiency. The team built a trans-disciplinary project that links agriculture with nutrition for scaling-up a technological agricultural innovation named the more nutritious yellow potatoes to alleviate the food insecurity and to impact on the nutrition of the population and to promote sustainable social change.

The agricultural innovation was developed considering that potato is the most important food for Andean communities, is an axis of the peasant economy in these territories and is an ancestral food. This innovation was scaled-up in Colombia in the project named *More Nutritious Potatoes*.

The research question formulated was, is it possible to scale up a technological innovation that impacts the FSN to benefit the vulnerable communities and to contribute to building scientific capacities for Colombia? In order to answer this question, the team involved undergraduate, masters and doctoral students from the two universities. The students were trained in holist approaches about rural development, agriculture, nutrition, food security, gender and social equity, public policies, entrepreneurship, and environmental protection. The academic programs involved were: Social Work, Nutrition and diet, Food Security and Nutrition, Food Chemistry, Agricultural Sciences, Agronomy, and Rural Development. The whole team was sensitized and trained in gender issues and the trans-disciplinary work was axis to conduct all the activities.

This article describes the project *More Nutritious Potatoes*, undertaken from 2016 to 2018 in Colombia, highlighting its main aspects.

The More Nutritious Potatoes project

In Colombia, a high proportion of the population suffers food insecurity and micronutrient deficiencies. In response, in the Andean department of Nariño, a technological innovation was developed. It consisted in three new yellow potato cultivars with higher nutritional contents such as iron, zinc, dietary fiber, protein and polyphenol compounds that protect health; high consumer acceptability, and better agronomic traits. They give 18% more income to small-scale potato farmers because they are more resistant to the most devastating disease in this crop and their yield is the double compared to the most cultivated variety in the country (Mosquera *et al.*, 2017).

The *More Nutritious Potatoes* project was designed and implemented for scaling-up this innovation to contribute to FSN. The project benefited to small-scale potato growers' families from the innovation by strengthening of capabilities for autonomy and governance in public policies, the entrepreneurship to build inclusive businesses, the valorization of agrobiodiversity, the acquisition of good food habits, and the promotion of social equity. The methodologies employed allowed building social and scientific capabilities for Colombia.

Methods

The More Nutritious Potatoes project was designed on a trans-disciplinary exercise involving local communities and stakeholders to establish synergies. The project was built from an exit scenario and included 1.) a comprehensive approach to the problem to meet objectives, 2.) strategies that seek the active participation of stakeholders to reach end-users: education to build autonomy, building synergies, gender approach, communication strategy, and trans-disciplinary approach, 3.) measurable results. 4.) continuous assessment and 5.) an exit strategy. It was designed a model for scaling up implemented in the most important areas for potato crop (Cuéllar *et al.*, accepted).

Results and Discussion

The more nutritious yellow potatoes were scaled up in a comprehensive approach to benefit vulnerable communities and to install in Colombia a system to produce good quality declared seed to impact the potato production system. Besides, with the sowing and consume of the more nutritious potatoes, it was increased the diversity of the diet in the participating families.

The project impacted on the following aspects:

Supply: production and adoption of good quality declared seeds for small and medium-scale farmers and fostering home gardens and food diversity.

Marketing: organization and strengthening of Rural Entrepreneurs Nuclei for short market circuits.

Demand: promotion of consumption for a diverse diet and good nutritional habits. This was achieved through a nutritional education and mass and social media.

Knowledge: developing and adapting social innovations, robust scientific results and training leaders for the future, and a model for social change from scaling up innovations.

Public policies: through of the following actions, proposal of legislation on systems to produce good quality declared seed potatoes, Model for home fortification, inter-sectoral dialogue, and governance.

The project involved different stakeholders through the following strategies:

- *Trans-disciplinary approach:* it was useful to get the commitment of the team members. A strong relationship was developed among all disciplines and academic programs. Also, the scientific collaboration between the two universities involved was beyond of a relation North-South. PhD students from McGill conducted their research in Colombia in collaboration with Colombian researchers. This collaboration impacted especially the academic programs in Food Security and Nutrition in Public Policies and Agricultural Sciences in a sustainable way.
- *Education to build autonomy:* it was important to overcome patriarchal culture and strengthen capabilities on agriculture, food habits, governance, and social equity. Family Farming Community Schools (FFCS) were designed for this purpose. FFCS developed strategies for dialogue between communities and local authorities for public policy incidence.
- *Rural Entrepreneurs Nuclei:* it is a social innovation to strengthen organizational and technical capabilities of social business on the production of seed potato.
- *Leadership for Food Security and Nutrition:* it was a social innovation designed to foster local leadership on FSN.
- *A communication strategy:* it was implemented to reach end-users with key messages through mass and social media.

Seven seed potato producer organizations are producing good quality declared seeds of more nutritious potatoes and are the base of a sustainable system to improve the cropping system and to impact in short market chains. These organizations are located along the Andes mountains in the

most important potato producing regions. These organizations in two years are producing the seed to grow potatoes for fresh consume. They are consumed for 6,5 million people.

A clinical study conducted shows that the families' children under five years involved in the educational program of the project show a significant progress of their nutritional status for the biochemical indicators as ferritin, retinol, and anemia in comparison with children that are outside of the program, spite that the children involved in More Nutritious Potatoes project have an important gap when they are compared with children outside of the program that mostly live close to the municipalities and have better public services like potable water and sanitary services.

Two important results related with the empowerment of women were the creation of two credit unions for women and the women reached 45% in decision-making positions.

Implementing scaling up projects is a complex problem because technical factors referred to availability, access to food and consume and are at stake (DNP-Departamento Nacional de Planeación, 2008) with an intricate set of social relationships with different logics. This situation implies developing different activities in diverse environmental contexts besides generating political commitment and of flexible strategic management to scaling up (Gilson and Schneider, 2010). Additionally, in rural sectors, there are difficulties derived from lack of knowledge, risk aversion, patriarchal and paternalistic cultures, financial and institutional difficulties and geographical conditions.

Conclusions

The More Nutritious Potatoes is a project that borrows from the academic sector with a clear objective, to build scientific capabilities for Colombia in order to give a sustainable solution to food insecurity and to improve the nutritional status of the population with the education as a principle to transform and to promote social change.

A trans-disciplinary project linking education, nutrition and agriculture sectors to tackle food insecurity and nutrition as a complex problem is an excellent experience for students and researchers. Agriculture with nutrition should link from the academic programs. In this manner could offer fundamental concepts that give the bases and sensitivity, so that from any of these fields can understand to the other field.

Synergies among institutions, authorities, private sector and communities are useful to impact social change and enhance sustainability of results.

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