

Participatory design of sustainable alternatives for managing and conservation of agro-diversity of Andean tubers in Márquez, department of Boyacá, Colombia

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Abstract

In the municipalities of Tumerqué and Ventaquemada, department of Boyacá, Colombia, were identified approximately 35 small farmers that include Andean tubers on their productive systems: chugua (*Ullucus tuberosum*), ibias (*Oxalis tuberosa*) y cubios (*Tropaeolum tuberosum*), as a main base of the family feeding. However, they express that there haven't been any processes of research and development on the region, related to alternatives of management, conservation, consume and commercialization of these products, which results on the risk of their extinction.

Based on the latest, generation of useful information about agro ecological factors of production, conservation, use and commercialization of Andean tubers in the two municipalities became crucial, especially for providing options, accurate and compatible with the agro ecological, cultural and economic conditions of the region. This process was made through the methodology of "participatory strategic research" that includes the establishment of a prime study about the current condition of the cultivations at a national and local level, together with participatory processes of characterization of the productive systems; and the collection, identification and conservation *in situ* of the native material on the studied zones.

These processes have been implemented as a way to promote the conservation of agro-biodiversity, the exchange of experiences on the growing of these products, the dialogue between different knowledge and the rescue of the local expertise; which results on a significant gain for the small farmers as much as for the technicians who work with them and have a great influence on the studied zones.

Keywords: conservation; agro-diversity; sustainable alternatives; participative research; Andean tubers.

Description and justification of the subject

At the Andean countries, besides the already known species of the Solanum (potatoes) type, it has been achieved the domestication of a group of tubers, morphologically alike, but from different botanic families, that have been less studied and praised in the agronomical world (Tapia y Fries, 2007). The ruba or chugua (*Ullucus tuberosum*), (together with some other species like the libia (*Oxalis tuberosa*) and the cubio (*Tropaeolum tuberosum*) are some of them. They are grown on small areas under traditional production systems, but are indispensable for assuring the feeding diversity and the sustainability of the communities that face a higher risk (Espinosa et al, 1997).

In the particular case of the municipality of Turmequé, located on the province of Marquez of the department of Boyacá, they were identified approximately 35 small farmers, who are currently growing ibias, cubios and rubas, as the main base of the family's feeding. Also, they are considered as a self-consume cultivation so its process involves all the family members. However, based on the testimony of these small farmers, there haven't been enough research projects in the region, so there are no tools for assuming conservation strategies, and sustainable management of the agro diversity; as well as strategies for using, consuming and selling these products. This situation is dangerous for the existence of the products, although their importance "they are healthy cultivations, and a heritage of our elders, a symbol of our culture and the base of our feeding, but the face the risk of remain forgotten" (Melciádes Muñoz, small farmer of Turmequé, 2007).

A participatory process of research took place, based on the latest and with the aim of providing useful information related to the agro ecological elements of production, the identification, conservation of the agro diversity, the alternatives of use and of organizational strengthen for the small farmers of the Andean tubers in Turmequé. This research took into account three components:

5. Historical reconstruction that allows a primary state of art about the different research activities already implemented in Colombia on Andean tubers, particularly, in the department of Boyacá. Also, gathering information about the process of conservation, consume and use on behalf of the small farmers; and about the marketing possibilities for the products.
6. Promote participatory local processes of collection, identification and conservation of native material on the studied zone, through activities of interchange, not only of germplasm between the productive zones in Boyacá, which could promote the identification and conservation of agro diversity; but also an interchange of experiences on agricultural management and alternative ways of use and consume.
7. The research intends to promote a third component that includes the organizational strengthen for the small farmers who conserve and produce these species, in order to start business processes that allow them enhance the development and commercialization of the products and improve their living conditions, as designing strategies of sustainable management.

Geographical location and beneficiary population

The municipality of Turmequé its located at 110 km away from Bogotá D.C. Its population is 12716, distributed on 14 paths. It is located, attitudinally, between 3000 and 3400 musl, and it has medium temperatures of 12°C a 18°C, its annual precipitation is from 800 to 2000 mm. The inhabitants of Turmequé have based their economy on agriculture, providing supplies for the local and regional markets. They grow specially potato, beans, curuba, "caducifolios", fruit tomato, uchuva, peas, corn and Andean tubers as ibias, cubios and rubas, but the latest without the production based on performances and competitive characteristics.

The municipality has a smallholding structure, with low technological development and based on the tradition that every son inherits a part of the land when getting married. This has sharpen the problem, because the families don't get to ensure the basic salary for their sustainability, according to the estimations of the Agricultural Family Unit (AFU). The farmers show a decreasing educational tendency, caused by the low incomes. In Turmequé, a large number of people have moved out from their paths taking their children with them, especially because of the worsening of the productive activities, which has led to improvements on their economical and social conditions. This migrated group is located on rural zones and it has higher proportion of non educated women, 213 women represent a 54% and 181 men represent 46%.

They were identified 35 small farmers in Turmequé that are currently cultivating Andean tubers, located on the following paths: Pozo negro, Teguanegue, Uratá, Matanegra, Volcán Blanco, and in neighboring municipalities as Ventaquemada. The beneficiary population is as follows:

Municipality	Consulted and interested farmers	Direct Beneficiary Families	Indirect beneficiary families
Turmequé	35	80 families	250 families
Ventaquemada	20	60 families	100 families

Objectives

General objective

Design viable alternatives of management, use and conservation of agro diversity through a participatory research of the agro ecological, economical, cultural and market conditions of Andean tubers (*Ullucus tuberosum*, *Oxalis tuberosa* y *Tropaeolum tuberosum*) and the initiation of organizational strengthen processes for the small farmers in the province or Marquetá, Department of Boyacá.

Specific objectives

1. Establish the state of art regarding the research processes and the use, production and commercialization of the Andean tubers in Boyacá, focusing on a case study about the municipality of Turmequé.
2. Identify and characterize the production systems of Andean tubers in Turmequé, based on agro ecological, economical and technological criteria; in order to know the implications of this production for the farmers and their families in the zone.
3. Develop participatory alternatives of conservation, use and production within the agro diversity of Andean tubers in the studied zone.
4. Initiate organizational strengthen and individual growing processes for the small farmers, in order to promote self-management, leadership and sustainability of the Andean tubers.

Methodology

This research bases on the Rural Participatory Innovation (RPI) approach, as this is an integral and trans-discipline methodology that seeks for the communities to be involved since the beginning to all the phases of the process, since the planning to the implementation and follow up phase.

Objective 1. For establishing the state of art about the Andean tubers at a scientific and technical level and regarding the use, production and commercialization in Colombia and specially in Boyacá; it was developed a process of gathering information from different sources: Secondary and primarily sources and field work, using the Case Study approach with the small farmers in Turmequé. Finally, the resembled data was organized and systematized, triangulated, analyzed, which led to a written document.

Objective 2. It was created a participatory committee for characterizing the productive systems of Andean tubers in Turmequé, formed by small farmers and researchers. The committee used participatory methodological tools as semi- structured interviews, talking maps, time lines, and future expectations, so on; for gathering information. The most important variables to consider were: Social, agro ecological, technical and economical variables.

Objective 3. Taking to account the aim of promoting sustainable process for using Andean tubers, according the farmer's priorities and necessities, they were held a set of workshops called "training workshops about food safety and nutrition". They combined the use of Andean tubers with some other nourishment. The workshops also tried to rescue the traditional recipes of the zone, to standardize and balance them.

For promoting conservation process *in situ*, it was created and implemented the "**First Andean tubers agro diversity Fair**". The main objective of the Fair was to collect the local germplasm (from Turmequé and other municipalities). This germplasm was subsequently classified and identified by a local morphological characterizing committee. This processes let the establishment of two focus groups of participatory research about conservation *in situ* on small farms. The focus groups are still working.

Objective 4. For the accomplishment of this objective, we took the methodology developed by the PBA Corporation that works transversally in all the projects at the five countries that belong to the Andean Consortium. This methodology is based on promoting the empowerment of its all process, trough the development of a system of training and monitoring, focused on personal growing, organizational development, that tries to enhance individual abilities and capacities, teamwork, self esteem, trust, communication and conflict management.

This methodology also seeks to identify and strengthen local leaders, as well as promoting the creation of participatory local groups that could later multiply and reproduce the ideas of conservation, use and management of the agro diversity.

Preliminary results

Establishment of the first state of art about Andean Tubers (AT) in Colombia

We currently have a complete written document, still unpublished, that joins several research projects about the use, production and commercialization of Andean tubers in Colombia.

The study shows that, although the importance of these species, there are just a few researches about them, in comparison with other countries such as Bolivia, Ecuador and Peru, where they have a greater value to the general population. The lack of sufficient research in Colombia could be produced by the feeding habits of the urban people, (according to the 2005 national census, made by the DANE, 76% of the Colombian population live in urban environments), which have change their dietary dynamics where, despite of the potato, the Andean tubers are absent and have lost their commercial and cultural importance. This explains why the Andean Tubers are not a priority for researchers.

However, due to the unexplored potential of de AT, public and private institutions have implemented several efforts for conserving and researching about AT, toward studies on different fields; but they are not continuous and barely published.

The document is divided on three parts: The first part is a review of general information about the three species of AT, taking into account their origin, morphological description, agro economical management, use and nutritional properties. The second part, shows the characteristics of the current state of research about these species on a regional and national basis. Finally, the third part is and market prospection in Bogotá, Turmequé and Tunja, developed in order to understand the current possibilities for commercialization and consume of these products.

As the main results, we can shift the fact that the researches already done are followed by a strategic interests, personal motivations and very exact subjects as identification and conservation of germplasm *ex situ*, fertilization, chemical composition, market studies and inter specific diversity.

Related to the commercialization and consume of AT in the urban trade centers, we found that the most popular tuber is de ibia and the cubio is the less popular. Also, we found that in general, the level of consume of this products is very low, due to the small accounts that families often buy and the reduced opportunities when they buy them.

By the other hand, another important result is that the merchants on the trade centers perceive a lot of advantages in selling these products, especially for their price and quality.

Characterization of the productive systems

For achieving this goal, we also produced another written document, still unpublished, which, together with the document presented above, are part of a book that will be published next year.

The main objective of this document is the systematization of the agro ecological, economical and technological characteristics of the AT production systems, at the municipalities of Turmequé and Ventaquemada; in order to know and understand the different implication of their production for the pleasant families on the zone. In addition, we also studied the nutritional situation of the producers of AT, as a primary diagnosis that could led future interventions based on global strategies for solving de nutritional vulnerability together with the conservation of agro diversity.

As a methodological basis, we took a theoretical framework based on the “systemic approach” and the “rural participatory diagnostic (RPD)”. Those two components led the process of research.

The research process let us conclude important assertions, such as the fact that the characterized production systems are typically agricultural, highly heterogeneous because of the small size of the farms and the number and variety of the species grown; also, the educative and socio economical level of the producers and their families affects the characteristics of the productive systems.

We identified as well, a broad diversity of vegetable species and some animal species that are normally kept in the studied farms and enhance de nutritional security of the families, allowing the diversification of productive activities, and a broader flexibility for getting economical incomes when the main products as potato, lower their prices on the markets.

The presence of rubas, ibias and cubios was demonstrated on the characterized farms, at different level of grow, since little spots inside the farms till main products on the productive systems. The level of consume is frequent and is closely related with the nutritional culture and traditions on the zone, which have guaranteed their conservation. However, the existence of these species is facing a progressive restriction, due to the nutritional changes of the rural population, the high changes on the environment and the permanent shortage of the products because of the long cycles of production and the pressure of other more suitable and profitable products as the potato.

The AT are closely linked with the rural culture of this zones, so the cultural expressions and the traditional agricultural techniques have been the same since the indigenous ages, and the forms of use are diverse and unique for every municipality, being almost an expression of their identities. This means that the conservation of the agro diversity is not only a matter of economical expectations.

Taking into account that the AT are part of the dietary structures of this social groups and their production is normally low, all the members of the family are involved in the process. The role of women is very important, especially because they care about the nutritional supplies. Also, the children learn their parent's techniques, guaranteeing the generational survival of these species.

The size of the farms has significant technical and economical implications, which is reflected on the level of productivity and brings difficulties for the competitiveness of the productive systems. That is why, future interventions for communal development have to take into account this element, and be creative when designing non- exclusive strategies for enhancing bonds within the farmers and offering tools for building capacities, in order to face the market's needs and guarantee the productive viability on a long term.

The AT productive systems are characterized by the utilization of agricultural traditional tools as the mattock, the high use of handmade procedures, the low utilization of external row material as pesticide or fertilizers. These conditions make the production really clean and with an extended exploitation and commercialization potential, focused on a set of markets that seek these types of clean products and with costumers willing to pay an extra price for them.

In terms of family's nutritional security, it could be seen that they have a broad diet based on diverse nourishments that are mostly grown on their own farms. However, it can be analyzed that some products consumed on a daily basis are bought on local markets, which produces that, in low productivity periods or low prices of grown products, the real access to these products is restricted. The exchange of aliments is pretty unusual.

Development of participatory alternatives for conservation, use and production of AT agro diversity

First Andean tubers agro diversity Fair. The Fair occurred on 17th may of 2009. The main objective was to collect seeds of ibias, rubas and cubios, for a later establishment of plots of conservation *in situ* that will be managed by the same farmers. About five hundred people visited the fair, especially agricultures, technicians, students, researchers and local and national political authorities. There were collected about 36 sets from different paths from the municipalities of Ventaquemada y Turmequé, together with genetic material from other municipalities of Boyacá and Cundinamarca.

The farmers were the main key actors in the process of planning and implementing the Fair, and it was a space where they had the opportunity to show the results of the project toward some presentation stands, where they

could spread their local knowledge, the species diversity, the traditional agricultural management and their nutritional culture, showing dishes and preparations that came out from the nutritional security workshops.

Plots for conservation in situ

Until today, there have been established two focus groups of participatory research about conservation *in situ* at small farms, one in the municipality of Ventaquemada and the other in Turmequé. Each focus group is integrated by two farms, in which they were established plots where the seeds recollected from the fair were grown. A certain farmer is in charge of one plot and has to register all the phenological developments and agricultural activities implemented.

Next September, there will be a field trip day when all the farmers will have the opportunity to evaluate and visit other conservation plots, receiving from their partners the reports from the development of the plots. Once the plots are completely grown, the seeds will be distributed among all the farmers of the project, in order to be multiplied and validated regarding their nutritional conditions.

Organizational and personal strengthen processes

Until today, there have been implemented four workshops of personal growing and organizational strengthen. The participation of men and women on the process has shown a strong commitment and motivation. The young participants have been very creative and active, designing the project's logo, writing songs and poems about the AT.

The social capital that is developing around the implementation of the project is one of the most important indicators, because, the productive area and the rescue of the agro diversity are not the only evidences of success; however, the cohesion and committed team work within a community that is currently trying to keep their own cultural and nutritional richness are the most important basis of this process and its sustainability through time.

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