Use of *in vitro* technology by small-farmers to clean and preserve native cassava varieties in Southern Colombians Andean region

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Introduction

The Cauca region in Colombia is a zone of high cassava production, mainly to supply the starch markets. However, in the last few years, disease and insect attacks and the low availability of clean and certified material of better response clones have not permitted maintaining large planting areas. The project now seeks to develop and implement an *in situ* conservation system for local cassava varieties adapted from low-cost technology developed by CIAT and FIDAR to produce *in vitro* planting materials. The method involves cleaning local cassava varieties of pests and diseases using *in vitro* techniques. Success would ensure food security for local farmers, at least in part, while preventing loss of agrobiodiversity and allowing local varieties to be more objectively compared with improved varieties.

Methodology

The project activities include:

•With farmers, collecting and characterizing local varieties according to their economic importance, uses, local beliefs, and resistance to the region's biotic and abiotic conditions using participatory rural assessment methodologies;

•Systematizing oral knowledge of local cassava varieties in each region;

•Deploying pest- and disease-free cassava planting materials in farmers' fields;

•Fingerprinting cassava clones collected from the field, using molecular markers, and comparing these clones with accessions in CIAT's cassava *in vitro* germplasm bank; and

•Empowering farmers to take charge of the rapid multiplication and distribution of cassava planting materials cleaned *in vitro*.

Results

•Materials being grown by farmers were collected from Buenos Aires, Caldono, Morales, and Santander de Quilichao (Cauca Province). Twenty seven local clones were collected: Algodona gigante, Algodona rápida, Chiroza, Verde, Algodona grande, Varita, Pate pava, Bajuna pequeña, Correita, Independencia Mejorada, Bajuna Armenia, Totoqueña, Falsa chiroza, Sata, Chiroza roja, Blanquita, Cascara Roja, Parroquiana, Amarilla, Algodona pequeña, Bajuna, Bajuna grande, Panameña, Sauce, Regional morada, SM 5080-1, and Yuca blanca.

•Two seed banks were established using collected materials: 20 materials were planted in Pescador (1500 m) and 17 in Piendamo (1700 m). Pescador's plots were harvested (after 14 months, not at harvest time). It was not possible to harvest the materials planted at Piendamo because of public disturbances.

•Some farmers were interested in Totoqueña (4.1 kg average), Algodona rápida (2.8 kg average), and Algodona grande (2.6 kg average) (Figure1-b). The average per total harvested area (840 m^2) was 1.8 kg, with a total production per area of 1650 kg.

•We expect to find some diversity among Algodona materials because farmers show great interest in them. They produce good starch quality, starch factories pay more for them, and farmers need clean materials for their farms.

Figure 1: Initial plot in Pescador. Details of better clone "Totoqueña" under farmer conditions. Double propose material, with good market for fresh consumption

• As part of the second round of this project, farmers are interested to know if they could obtain other local clones using the same process. For example, they are interested in obtaining material from Rojita (not yet collected, but some farmers have it).

•Stakes were collected from each site and taken to CIAT-HQ at Palmira to initiate meristem culture. Two *in vitro* thermotherapy cycles were done for virus cleaning. Plants from each clone have been rooted on 17N medium (Roca, 1984), and moved to graft on Secundina (MCol 2063) for frogskin disease (FSD) certification. However, not all clones have a good growing rate in *in vitro* conditions, more emphasis being necessary on subcultures and media composition.

•Cleaned material will be used as a source for local seed bank establishment.

•Twenty-one morphological descriptors were evaluated (Fukuda and Guevara, 1998), 11 minimal descriptors, and 10 principal descriptors.

Conclusions

•Although farmers decided to use improved varieties, they consider that new materials reduce their productivity after 3-4 cycles. Local materials behaved well under these conditions, but became infected.

•A clean plot of local materials could support a special project that compared their behavior with improved varieties under farmers' conditions.

•When farmers discuss seed disposal they consider that local clones are available (but with poor phytosanitary status) and improved materials are not available when they need them. In fact, some local materials are not easy to find in the region (they are disappearing).

•The project now seeks to develop and implement an *in situ* conservation system for local cassava varieties adapted from the low-cost technology, developed by CIAT and FIDAR, to produce *in vitro* planting materials.

•This project ensures food security for local farmers, at least in part, while preventing loss of agrobiodiversity and allowing local varieties to be more objectively compared with improved varieties.

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