PARTICIPATORY RESEARCH TO DEVELOP LOW COST *IN-VITRO* CASSAVA PROPAGATION METHODS

INTRODUCTION

Farmers from the Department of Cauca, Colombia, have encountered limitations in the development of cassava–based systems, namely chronic problem of supply of planting materials in adequate quantity and good phytosanitary quality of the desired varieties.

Our objective is to develop an *in–vitro* propagation system that minimizes external inputs and is appropiate for small – scale farmers' use.

Healthy Cassava plant (Left) and plant infected with the "Frog-skin" disease (right). Note the poor quality of roots

METHODOLOGY

- A work plan was concerted between an organization of small cassava farmers in northern Cauca (Colombia), an NGO (FIDAR) and a IARC (CIAT).
- A community representative was posted at CIAT to learn tissue-culture (T-C), and to participate in establishing a simple propagation methodology. He maintained a constant consultative-communication with a group of women farmers.
- A pilot site was designed outside the Biotechnology Research Unit at CIAT's, to test the use of low cost equipment and to seek alternative culture media available locally to the community (fertilizers, rooting agents, starch, etc.)
- A women group was selected to operate a rural pilot T-C laboratory to produce *in-vitro* cassava seeds. The rural facilities were developed by the project in their locality (Santa Ana, Cauca).
- The work strategies and methodological tools used with the group were as follows: organizational strengthening, self-diagnosis, work plan, recording of activities, monitoring, evaluation and feed back.
- The variety MCOL 1522 (algodona), which is the clone preferred by Cauca's farmers, was used.

The representative from the community training a women group

Women group in a meeting to discuss the project

RESULTS

Training

- A representative farmer from Cauca was trained by CIAT and FIDAR to design, manage, and produce cassava seed using T-C techniques.
- This farmer trained a group of eleven women. Now they are operate a rural T-C laboratory in their locality.
- Other groups from the Cauca area are accompanying the process (with periodic visits) to see the rural T-C laboratory's results and to participate as plant purchasers, lab users or in setting up other rural facilities to apply T-C techniques to other crops.

Low cost equipment and method

- Sophisticated equipment such as pH-meter, oven, pipettes, autoclave and glass containers were replaced with low cost alternatives such as indicator paper, gas stove, syringes, pressure cooker and baby food jars respectively.
- Rural T-C laboratory areas were 6.4 times less expensive to rent than conventional tissue culture facilities.
- Expected cost per plant using rural T-C laboratory has been reduced 5 times less.

T-C laboratory area: Outside view (left), growing area (right) and close up of *in-vitro* plants (insert)

Alternative culture media

- Locally available media reagents such as all-purpose fertilizer, table sugar, vitamin tablets thiamine, jelly and running water were used to replace imported analytical reagents (basal salts, growth regulators, agar and vitamins).
- Supplementing the media with fruit juices (pineapple, banana or coconut water) improved propagation rate.
- We found alternative sources of low cost growth regulators to be efficient for propagation (Hormonagro ® and Progibb ® as NAA and GA_3 source respectively).

Minimum microclimate conditions

- The rural pilot laboratory consists of a small room as the propagation area, a washing and media preparation area and a simple post in-*vitro* growing area.
- This allowed us to obtain information on the minimum microclimate standards needed for *in-vitro* culture.

TYPE OF PARTICIPATORY RESEARCH

- Parameters for building a tissue culture laboratory were defined with the community representative, as well as equipment and inputs required. (Consultative).
- Women's group with the representative adapts the experiences and builds their rural tissue culture laboratory (Collaborative).
- Technical aspects of cassava seed production and laboratory management were defined together with participants (Collaborative).

Location of the working area in Colombia

- Farmers and researchers prepared new proposals for *in-vitro* work with other plant species (Collaborative).

GENDER ANALYSIS

- The intensity and periodicity of activities were defined on the basis of the daily activities carried out by women.
- Women were positioned as actors in the improvement of the community's food security and quality of life.
- The self-esteem of group members was enhanced as they identified and satisfy their own needs.

Some of the members participating in the project (Left). Their children develop educational activities (Right) while they work at the rural T-C lab.

MONITORING

- The procedure of evaluating technical training (trial-error method) was carefully planned.
- Farmers and researchers will publish a procedure manual for the rural tissue culture laboratory.
- The different activities conducted were recorded systematically.

Diary and T-C rural manual developed by members of the project

CONCLUSIONS

- The participation of men and women in the validation and adaptation of tissue culture technology was basic to the orientation of future project goals taking into account individual, family, and community perspectives.
- Complementary economic activities carried out at the community level, such as planting other crops and making handicrafts help create spaces that facilitated dialogue, tolerance, and enhanced understanding of the difficulties faced by the project.
- A multidisciplinary team (technicians, researchers, etc.) had been maintained. The team has been capable of assuming a promotional role providing technical assistance, training and communication with different producer organizations.
- From the technical viewpoint, a tissue culture laboratory was set up with local equipment and tools that cost 20 times less than a conventional laboratory. A culture medium was also produced with local inputs, which was 4 times less expensive than the check medium and had a higher multiplication rate (1:4).
- Rural T-C laboratory will permit farmers control of planting material availability, increase the supply of desired material, increase diversity and flexibility in this small farming systems, stimulating the interest in Cassava research and development and enhance their impact and serve as a model for other regions.

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