Cassava propagation by small scale farmers using a low cost in vitro system

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Background

Lack of quality planting material of farmers varieties, produced locally and at a low cost, are major constraints contributing to the limited expansion of cassava production in small farming settings in Colombia. This work presents our experience in adapting conventional cassava propagation into a low-input rural tissue culture multiplication scheme, developed and run by resource-poor small farmers. The project was developed in a farmers’ community in the hillsides of Southern Colombia. Alternative, economical and readily, available sources of tissue culture material and equipment were developed through a two-phase participatory process by a women farmers group, an NGO and CIAT scientists (Escobar et al 2001).

This system allows us to certify the quality of material each cycle, and support seed releases, or renewing materials in the Department of Cauca (Colombia).

At CIAT, research will continue to incorporate other crops, with minimum investment, taking advantage of the low-cost facilities already in place. Other CBN-funded pilot sites, in Ecuador, Cuba and Brazil, are scheduled to implement similar cassava propagation schemes with farmers.

Methodology

The methodology was tested in the field with six commercial clones (6000 in vitro plants) following the diagram 1. The plants were harvested and certified as Frog Skin Disease-free by the Colombian Institute of Agriculture (ICA). Certified cuttings were then used as initial explants in a two-node, rapid propagation system. The purpose was to increase the number of plants for distribution among farmers.

Results

• A laboratory was set up, and constructed with locally sourced materials at a cost estimated as being 20 times less than that for a conventional laboratory (Figure 1).
• A tissue-culture medium was improvised from domestically available ingredients at costs that were 5 times less than those for traditional tissue-culture media. The propagules’ multiplication rate (1:3-4) was comparable as conventional laboratory obtained.

Conclusions

• This experience leads the incorporation of in vitro propagation into farmer’s routine agricultural practices. We believe that the system could be implemented in other cassava growing regions where there is need to renew planting material.
• Low-cost propagation methods could be support decentralized seed systems. Nowadays this project will allow distributed clean material for 7-10 Ha (certified free frog-skin material) for small farmers to be use in the next planting cycle (2004-8). Our material could be use for re-establish cassava plantation in the Cauca’s area.
• Rates of multiplication achieved with the rural tissue culture system were as high as with the conventional tissue culture procedures.

Table 1. Average production of 6 commercial clones produce by farmer using in vitro system

<table>
<thead>
<tr>
<th>Clone</th>
<th>% Commercial roots</th>
<th>Average (kg/plant)</th>
<th>Standard deviation</th>
<th>Anova grouping</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM 523-7</td>
<td>52.2</td>
<td>3.67</td>
<td>0.20</td>
<td>a</td>
</tr>
<tr>
<td>CM 6740-7</td>
<td>54.6</td>
<td>4.15</td>
<td>0.07</td>
<td>a</td>
</tr>
<tr>
<td>HMC-1</td>
<td>67.4</td>
<td>4.57</td>
<td>0.93</td>
<td>a</td>
</tr>
<tr>
<td>MBra383</td>
<td>60.4</td>
<td>3.42</td>
<td>0.27</td>
<td>a</td>
</tr>
<tr>
<td>MCol 1522</td>
<td>25.2</td>
<td>1.25</td>
<td>0.65</td>
<td>b</td>
</tr>
<tr>
<td>MPer 183</td>
<td>65.7</td>
<td>4.4</td>
<td>0.049</td>
<td>a</td>
</tr>
</tbody>
</table>

Pr > F (<0.0001); R² = 0.9256; CV = 12.07; Average among clones = 3578 kg/plant

ICA functionaries certified San Rafael’s plot as free frog-skin diseases plants; those materials were planted last year as part of CBN-PRGA supported activities (Escobar et al 2002). Some materials (HMC-1, CM6740-7, MBra 383 CM 523-7) showed highest potential (Figure 1A-B; Table 1).

Bibliography