



IMPROVED CASSAVA FOR THE DEVELOPING WORLD

**Project IP3 - CIAT
Annual Report 2006**



INDEX

OUTPUT 1:

Genetic base of cassava and related <i>Manihot</i> species evaluated and made available for cassava improvement: nutritional quality (1001 kb)	Page
Carotenoids at EMBRAPA-CNPMPF	1-1
Enhancing nutritional quality of cassava at CIAT	1-9
Genetic mapping of carotenoid content	1-19
Ongoing field activities	1-21
Genetic transformation (increased carotenoids content)	1-25
References	1-34

OUTPUT 2

Genetic base of cassava and related <i>Manihot</i> species evaluated and made available for cassava improvement: higher commercial value (1445 kb)	
Discovery of an amylose-free (=waxy) starch mutation through inbreeding	2-1
Discovery of high value cassava through mutagenesis	2-15
References	2-21

OUTPUT 3

Development of new genetic stocks and improved gene pools for their evaluation in key target environments (133 kb)	
Selection of progenitors based on previous cycle results and information from other outputs (i.e., resistance/tolerance, root quality traits, etc.).	3-1
Establishment of crossing blocks and production of recombinant seed from previously established blocks.	3-4
Generation and distribution of advanced breeding materials for National Programs.	3-5
Selection of recombinant progenies for broad and specific adaptation within major agro-ecosystems.	3-8
The use of selection index	3-10
References	3-12

OUTPUT 4

Development of genetic stocks and improved gene pools adapted to the sub-humid environments (200 kb)	
Evaluations and selections in the sub-humid environment.	4-1
References	4-21

OUTPUT 5

Development of genetic stocks and improved gene pools adapted to the acid-soil savannas environment (182 kb)	
Evaluations and selections in the Acid Soils Environment	5-1

OUTPUT 6

Development of genetic stocks and improved gene pools adapted to the mid-altitude valleys environment (160 kb)	
Evaluations and selections in the Valle del Cauca Department	6-1

OUTPUT 7

Development of genetic stocks and improved gene pools adapted to other environments in Colombia (86 kb)

Evaluations and selections in Middle-Magdalena River Region	7-1
Evaluations and selections in Tolima – Huila Departments.	7-2

OUTPUT 8

Collaboration with other institutions, scientific meetings, and publications (98 kb)

Support national programs that have traditionally collaborated with CIAT in the development and improvement of cassava.	8-1
Development of collaborative projects with partners in Africa, Asia and Latin America and the Caribbean.	8-2
Scientific meetings and publications.	8-4

OUTPUT 9

Activities related to the maintenance, and or evaluation of the germplasm bank of cassava and wild relatives (445 kb)

Field evaluation of landraces S1 genotypes from the core collection.	9-1
Hardening and planting in the field of 2000 accessions from the germplasm collection	9-3
Genetic Mapping of Quantitative Trait Loci (QTL) Controlling High Protein Content in the Primary Gene Pool of Cassava (<i>Manihot esculenta Crantz</i>)	9-6
Genetic changes as a result of cassava domestication: a study of genes controlling selected traits important for cassava improvement	9-11
References	9-13

OUTPUT 10

Breeding for insect and other arthropods resistance and development of alternative methods for their control (841 kb)

Arthropod taxonomic identifications on CIAT (and other) commodity crops	10-1
Evaluation of inbred cassava lines for resistance to whiteflies and other pest in the Tolima Department (CORPOICA, Nataima, 2005-06)	10-5
Evaluation of cassava germplasm for resistance/susceptibility to arthropod pests on the Colombian Atlantic Coast (Barrancas, Guajira)	10-13
Evaluation of cassava genotypes in germplasm improvement trials for arthropod pest damage, in Sicarare (Codazzi, Cesar)	10-16
Integrated Management of Whiteflies (Homoptera: Aleyrodidae) on cassava	10-9
Ovipositional studies of the cassava whitefly, <i>Aleurotrachelus socialis</i> on accessions of <i>Manihot flabellifolia</i>	10-34
Evaluation of cassava germplasm for resistance to the cassava green mite, <i>Mononychellus tanajoa</i>	10-37
Identification of SSR molecular markers associated with resistance gene (s) against the green mites (<i>Mononychellus tanajoa</i>) in cassava (<i>Manihot esculenta Crantz</i>)	10-40
Evaluation of cassava (<i>M. esculenta</i>) and wild <i>Manihot</i> genotypes for resistance (susceptibility) to the Cassava Green Mite, <i>Mononychellus tanajoa</i>	10-42
Biological control of cassava whiteflies; the evaluation of entomopathogens in	10-47

whitefly IPM	
Transmission of cassava frog skin disease: evaluation of hemiptera species as vectors	10-53
Integrated control of subterranean pests in South America	10-58
Evaluation of cassava (<i>M. esculenta</i>) and wild <i>Manihot</i> genotypes for resistance (susceptibility) to the Cassava Green Mite, <i>Mononychellus tanajoa</i>	
Publications	10-62

OUTPUT 11

Breeding for disease resistance and development of alternative methods for their control (298 kb)

Characterizing cassava genotypes for their reaction to superelongation disease (SED) under greenhouse conditions	11-1
Characterizing cassava genotypes for their reaction to cassava bacterial blight (CBB) under greenhouse conditions	11-2
Validating the use of citrus seed extract and <i>Trichoderma</i> for managing cassava diseases in the Eastern Plains and Cauca, Colombia	11-4
Disease management components and strategies developed for cassava	11-11
Evaluate the Severity of Frogskin Disease in the GM 306 Cassava Family under Natural Inoculum Pressure to Validate and Enhance the Current Scale for Measuring Disease Severity	11-13
Evaluate the DArT technology for marker-assisted selection of cassava (<i>Manihot esculenta</i> Crantz) genotypes that are resistant to CFSD	11-17
Evaluating the Potential of Elite Cassava Clones for Bio-ethanol Production	11-21
Determine the Sustainability of Anaerobic Treatment of Organic Residues from Cassava-Based Bio-ethanol Production	11-24
References	11-28

OUTPUT 12

Development and use of biotechnology tools for cassava improvement (**Part 1**, 1045 kb; **Part 2**, 922 kb; **Part 3**, 1177 kb)

Molecular marker-assisted selection (MAS) for the improvement of local cassava germplasm in Tanzania for pest and disease resistance	12-1
Deployment of Cassava Mosaic Disease (CMD) resistant Latin American Germplasm in Nigeria	12-7
Genetic mapping of multiple sources of resistance to the cassava mosaic disease (CMD)	12-10
Progress in the Genetic Mapping of dry matter content in cassava	12-12
Genetic mapping of beta-carotene content from multiple sources in cassava	12-14
Identification of SSR Markers Associated With Genes Controlling Leaf Retention In Cassava	12-14
Identification of SSR molecular markers associated with green mites (<i>Mononychellus tanajoa</i>) resistance in cassava (<i>Manihot esculenta</i> Crantz)	12-16
The Cassava Genetics Information System (CGIS)	12-18
Development of a reference SSR marker kit to Analyze Diversity in Cassava (<i>Manihot esculenta</i> Cranz)	12-19
A dataset on allele diversity at orthologous candidate genes in GCP crops (ADOC)	12-29
Genetic Diversity Study in Cassava Varieties Cultivated by Small Farmers in	12-30

the Colombian Region of The Atlantic Cost	
Use of Molecular Markers to Estimate Level of Heterozygosity in Selfed Lines of Cassava (<i>Manihot Esculenta Crantz</i>)	12-32
Association analysis of Candidate Genes Associated with Dry Matter Content in Cuban Cassava Germplasm.	12-33
Validation of Diversity Arrays Technology (DArT) as a Platform for whole Genome Profiling in Orphan Crops	12-37
Population structure, phenotypic information and association studies in long-generation crops	12-44
Progress in Positional Cloning of the CMD2 Gene Based on Comparative Genomics with Castor Bean (<i>Ricinus Communis</i>)	12-46
Development of COS Markers for Positional Mapping in Cassava based on Homologous Castor Bean Sequences	12-48
Development of a TILLING (Targeting Induced Local Lesions in Genomes) Protocol for Cassava	12-50
Evaluation of s1cassava lines with 100 ssry markers	12-51
Modification of flowering in cassava by genetic transformation Rationale	12-55
Over-expression of yeast-derived invertase in cassava	12-60
Gene Sequence Analysis of a Natural Waxy Cassava Variety	12-61
Embryo rescue of Gene Tagging and MAS Breeding Populations	12-63
Sharing results of 30 years of cassava breeding: shipments of improved germplasm to Africa, Europe, Asia and Latin America	12-66
Training	12-68
References	12-71

OUTPUT 13

Increasing the productivity and utilization of cassava in Asia using farmer participatory approaches (205 kb)

Institutional Collaboration	13-2
Variety evaluation experiments	13-3
Long-term NPK experiments	13-4
Use of organic and inorganic fertilizers	13-5
Use of green manures, intercroops and alley crops	13-7
Erosion control trials	13-7
On-farm and Farmer Participatory Research (FPR)	13-8
On-farm and FPR trials in Lao PDR	13-8
On-farm and FPR trials in Cambodia	13-11
On-farm and FPR trials in Indonesia	13-12
On-farm and FPR trials in East Timor	13-13
Workshops and Training Courses	13-15