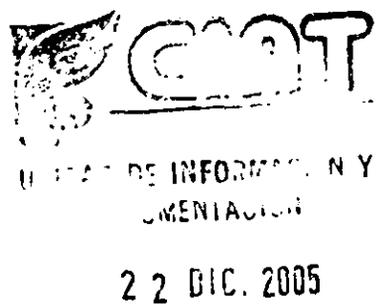


THE CIAT CASSAVA PROGRAM

Project Areas, projects and resource distribution



Centro Internacional de Agricultura Tropical

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Cassava cultivation & processing provide household food security, income & employment for over 500 million people in Africa, Asia & America. Development of the crop—through promotion of and support to better production, processing & marketing—plays an important part in reducing poverty and hunger in less-favored rural areas of the tropics.

The Program contributes to cassava development by generating knowledge, research methods/tools & technology components that lead to improvements in the level/stability of production and to the diversification of markets. It works together with partner institutions in both developing & developed countries, following a commodity-system philosophy in which research on genetic improvement is integrated with and linked to research on management, processing, marketing & crop utilization.

The Program—in collaboration with CIAT's GRU, VRU, BRU & Resource Management Programs—organizes its activities around 4 research areas: *Manihot* Genetic Diversity, Improved Cassava Gene Pools, Integrated Cassava Crop Management, and Cassava Markets. A fifth area covers institutional support for cassava R&D.

This document presents a description of the above five Project Areas. Each Project Area is broken down into one or more projects which make up the portfolio of cassava research carried out by CIAT. There are 11 projects in total each with its own discrete outputs, activities and resource allocation. With each project are described those subprojects that are financed with complementary resources. The total budget (core and complementary resources) for cassava research at CIAT during 1994 and its distribution across Project Areas is shown in Table 1. The allocation of senior staff time across the 11 projects is shown in Table 2.

Table 1. Cassava Program: Total Budget (core and complementary) US\$'000, 1994.¹

Project Area	Core			Complementary projects ³	
	Operations	Overhead ²	Total	Operations	Total
Manihot Genetic Diversity	857	283	1140	140	1280
Improved Cassava Gene Pools	951	399	1350	54	1404
Integrated Crop Management	421	178	599	988	1587
Cassava Markets	153	65	218	172	390
Institutional Development	590	161	751	427	1178
Total	2972	1086	4058	1781	5839

¹ Including the support to cassava research from the BRU, VRU, GRU, Land Management and Institutional Development.

² Research and Central Service costs.

³ Includes overhead charges of between 4 and 20% depending on the type of project.

Table 2. Senior staff allocation across cassava projects, 1995.

Scientist	Total	CD01 Conservation and Characterization of Manihot Genetic Resources	CD02 Defining Desirable Characteristics of Cassava Germplasm for More Efficient Gene Pool Dympt.	CG01 Development of Cassava Gene Pools with Global Perspective	CG02 Deployment of Improved Cassava Germplasm in Latin America	CG03 Deployment of Improved Cassava Germplasm in Asia	CG04 Broadening the Genetic Base for Cassava Breeding in Africa	CG05 Tools and Methodologies for Gene Pool Development	CI01 Integrated Pest and Disease Management	CI02 Integrated Soil Crop Management	CM01 Cassava Product, Process and Market Development	CC01 Research Planning, Information Exchange, Project Design and Networking
C Geneticist	1.00	0.24	0.56	-	-	-	-	0.20	-	-	-	-
C Breeder (HQ)	1.00	-	0.20	0.40	0.30	-	-	0.10	-	-	-	-
C Physiologist	1.00	-	0.30	0.30	-	-	-	-	-	0.40	-	-
C Pathologist	1.00	-	0.10	0.30	-	-	-	-	0.60	-	-	-
C Entomologist	1.00	-	0.10	0.50	-	-	-	-	0.40	-	-	-
C Processing Specialist	1.00	-	0.10	-	-	-	-	-	-	-	0.20	0.70
C Economist	1.00	-	-	-	0.10	0.10	-	-	0.10	0.10	0.40	0.20
C Breeder (Asia)	1.00	-	-	-	-	1.00	-	-	-	-	-	-
C Breeder (Africa)	1.00	-	-	-	-	-	1.00	-	-	-	-	-
C Virologist	0.60	0.08	0.02	0.25	-	-	-	-	0.25	-	-	-
C Tissue culture specialist	0.20	0.10	-	-	-	-	-	0.10	-	-	-	-
C Molecular geneticist	0.10	0.10	-	-	-	-	-	-	-	-	-	-
C Molecular biochemist	0.40	-	0.30	-	-	-	-	-	-	-	0.10	-
C GIS Specialist	0.10	0.10	-	-	-	-	-	-	-	-	-	-
SP IPM Specialist	1.00	-	-	-	-	-	-	-	1.00	-	-	-
SP Biological control specialist	1.00	-	-	-	-	-	-	-	1.00	-	-	-
SP Soil Scientist	1.00	-	-	-	-	-	-	-	-	1.00	-	-
SP Biotechnologist	1.00	-	-	-	-	-	-	-	-	-	-	1.00
AS Agronomist	1.00	-	-	-	-	-	-	-	-	1.00	-	-
AS Food Technologist	1.00	-	-	-	-	-	-	-	-	-	1.00	-
AS Pathologist	1.00	-	1.00	-	-	-	-	-	-	-	-	-
TOTAL CORE	10.40	0.62	1.68	1.75	0.40	1.10	1.00	0.40	1.35	0.50	0.70	0.90
TOTAL COMPLEMENTARY	7.00	-	1.00	-	-	-	-	-	2.00	2.00	1.00	1.00
TOTAL	17.40	0.62	2.68	1.75	0.40	1.10	1.00	0.40	3.35	2.50	1.70	1.90

C: Core Scientist
 SP: Special Project Scientist
 AS: Associate Member/Senior Staff

Note: Additional human resources at the principal staff level include the cassava curator (CD01), financed through core, two postdoctoral fellows (CD01), and a senior research fellow (CI01) financed through special projects.

Cassava Project Area CD

Manihot Genetic Diversity

Purpose: To conserve and characterize biodiversity for improving cassava quality and productivity

Rationale: Genetic diversity is essential for enabling farmers to improve cassava production and take advantage of market opportunities. A well-preserved, readily available, and thoroughly characterized global *Manihot* collection is critical for sustained improvement of gene pools for the major agroecologies of Latin America, Africa, and Asia. A better understanding of the biology, ecology, and gene flow of *Manihot* is needed to develop long-term strategies for managing and deploying genes and genotypes of cassava. In 1992, the international *Manihot* genetic resources network defined a global approach that will help national and international institutions share the work load and benefits of this work.

Benefits: Readily available germplasm of known agronomic potential, along with appropriate conservation methods, enables cassava curators and breeders to meet the requirements of crop improvement more efficiently. This work benefits cassava producers, processors, and consumers through the development of improved cassava gene pools and varieties containing *Manihot* genetic diversity.

Safe, long-term conservation of this germplasm (and dissemination of information on its special features) provides a broad genetic base for the development of sustainable cassava production systems.

CIAT maintains the world collection in collaboration with national germplasm curators and users. Institutions located in the centers of diversity of *Manihot* (South and Central America) should be particularly active in developing and implementing conservation strategies. Programs in Africa and Asia can also participate in and benefit from germplasm management.

Research Partners: IITA, IPGRI, ORSTOM, University of Georgia, Washington University, national programs in Brazil, Thailand and other countries

Project CD01: Conservation and Characterization of *Manihot* Genetic Resources

Purpose: To ensure safe conservation of cassava genetic resources and enhance their value through characterization and documentation

Outputs and activities:

- Safe conservation of *Manihot* germplasm

- ▲ Maintain the world *Manihot* collection in vitro and in the field.
 - ▲ Acquire and distribute germplasm.
 - ▲ Ensure the health and safety of the collection.
 - ▲ Improve conservation methods (seed biology, rooting, and cryopreservation).
 - ▲ Train staff of national institutions in germplasm management.
 - ▲ Document the world collection.
- Characterization and documentation of *Manihot* germplasm
 - ▲ Conduct morphological characterization.
 - ▲ Identify and eliminate duplicates.
 - ▲ Characterize subsets of core, elite, and wild species at the molecular level.
 - ▲ Improve characterization methods (molecular map, taxonomic descriptors, and new screening methods).
 - ▲ Document the collection, develop a global database, and publish a germplasm catalog.
 - ▲ Consolidate the global *Manihot* genetic resources network.
 - ▲ Train national program personnel in characterization and documentation.

Project CD02: Defining Desirable Characteristics of Cassava Germplasm for More Efficient Gene Pool Development

Purpose: To understand the mechanisms and genetic control of variation for useful characteristics and to make this information available for gene pool improvement

Outputs and activities:

- Definition of desirable characteristics in the *Manihot* germplasm.
 - ▲ Characterize mechanisms of variation in resistance (CBB, root rot pathogens, whitefly, chinch bug, and mites) and physiological (photosynthetic rate and water and nutrient use efficiency) and quality traits (starch quality, cyanogenesis and postharvest deterioration).
 - ▲ Produce and evaluate special stocks for enhancement and study of genetic control of useful variation.
 - ▲ Study the structure of genetic variability in *Manihot*.
 - ▲ Characterize ecogeographically the provenant sites of germplasm origin.

The complementary subprojects associated with these core projects are presented in Table 3.

Table 3. Project Area: Manihot Genetic Diversity. Core projects and associated complementary subprojects. 1995.
Core project codes are in bold type.

Code	Title	Purpose	Research partners	Donor	Time Frame	Responsible Scientist
CD01	Conservation and Characterization of <i>Manihot</i> Genetic Resources	To ensure safe conservation of cassava genetic resources and enhance their value through characterization and documentation	EMBRAPA, FCRI, IITA, IPGRI, University of Georgia, Washington University	Core	1994-1998	M.Bonierbale
CD51	Development of a cassava molecular map	To construct a molecular map of cassava to improve breeding efficiency	CIF and University of Georgia	Rockefeller Foundation	1993-1996	J.Tohme
CD02	Defining Desirable Characteristics of Cassava Germplasm for More Efficient Gene Pool Development	To understand the mechanisms and genetic control of variation for useful characteristics and to make this information available for gene pool improvement	CIRAD, DANIDA, EMBRAPA, NRI, ORSTOM, Universidad Nacional de Colombia, University of Florida, University of Newcastle	Core	1994-1998	M.Bonierbale
CD52	Investigation of metabolites implicated in cassava root postharvest deterioration	To develop a biochemical assay for postharvest physiological deterioration in cassava roots and to identify key metabolites whose genetic manipulation may successfully inhibit and/or block such deterioration	NRI	DGIS, NRI	1994-1995	G.O'Brien
CG53	Molecular characterization of bacterial blight isolates in cassava	To improve the level of resistance to bacterial blight in cassava cultivars	ORSTOM, CORPOICA, EMBRAPA/CNPME, IAC, IITA	ORSTOM	1995-1996	V.Verdier

Cassava Project Area CG

Improved Cassava Gene Pools

Purpose: To develop cassava gene pools for improved yield, quality, and resistance to or tolerance of major pests, diseases, and abiotic stresses

Rationale: Cassava varieties derive from improved gene pools targeted at specific ecosystems. These gene pools are developed by scientists of different disciplines who integrate desirable traits for general adaptation from the available genetic base into a group of selected genotypes. National program scientists then select for adaptation to specific agroecosystems and promote successful genotypes among farmers. The creation of new and useful genetic combinations, therefore, depends on a sound knowledge of cassava's response to biotic and abiotic stresses, the crop's inherent qualities, and the development of appropriate and effective methodologies for breeding and varietal diffusion.

Benefits: This work is expected to improve the socioeconomic conditions and nutrition of small farmers in targeted, marginal ecosystems, small-scale processors, and poor urban consumers. Such improvements will occur through enhanced cassava production levels, improved production stability, more efficient processing, and better quality cassava products.

The interaction between CIAT and national programs is expected to be mutually beneficial: national programs will strengthen their research capabilities, and CIAT will receive important feedback for focusing its cassava research on the needs of developing countries. Such an integrated approach is expected to shorten the time for generating and diffusing improved cassava varieties.

Research Partners: IITA, EMBRAPA/CNPMP, Brazil and FCRI, Thailand and national programs in Latin America and Asia

Project CG01: Development of Cassava Gene-pools with Global Perspective.

Purpose: To develop improved populations, incorporating high potential and stability for root yield and quality, resistance to major pests and diseases, and adaptation to the predominant agro-climatic conditions of the major ecosystems where cassava is produced.

Outputs and activities:

- Segregating populations and adapted germplasm for the major ecosystems of importance for cassava production.

- ▲ Evaluate and recombine elite germplasm selected under representative conditions for the most important ecosystems (semiarid lowland tropics, subhumid lowland tropics, humid lowland tropics, highland tropics and subtropics).
- ▲ Incorporate sources of resistance to water stress and improved biomass accumulation.
- ▲ Develop improved screening methodologies and incorporate sources of resistance to mites, white flies, mealybugs and thrips according to their importance in different ecosystems.
- ▲ Develop improved screening methodologies and incorporate sources of resistance to bacterial blight, superelongation disease, anthracnose, root rots, leaf ring spot disease, cassava vein mosaic virus and frog skin disease, according to their importance in different ecosystems.

Project CG02: Deployment of Improved Cassava Germplasm in Latin America

Purpose: To support national programs in adaptive selection and diffusion of new varieties for the specific growing conditions, biotic and abiotic constraints, and market demands of sub-regions in Latin America and the Caribbean.

Outputs and activities:

- A group of superior genotypes covering a large percentage of the predominant cassava producing areas in Latin America and the Caribbean.
 - ▲ Train and network with national personnel for effective dissemination and deployment of genetic material.
 - ▲ Adaptation and implementation of farmer participatory methodologies for the evaluation and selection of cassava germplasm.
 - ▲ Support national programs in the development of functional systems for the propagation and distribution of improved germplasm.
 - ▲ Evaluate the socio-economic impact of variety adoption.

Project CG03: Deployment of Improved Cassava Germplasm in Asia

Purpose: To support national programs in Asia in the development of improved populations, selection and diffusion of elite genotypes adapted to the predominant growing conditions and market requirements.

Outputs and activities:

- A group of adapted and superior varieties, with high root yield potential and quality for predominant markets spread over a considerable area in Asia.
 - ▲ Generation of advanced breeding populations

- ▲ Distribution of advanced breeding materials
- ▲ Upgrading yield capacity and adaptation of breeding populations in national programs in Asia
- ▲ Selection and dissemination of new cultivars
- ▲ Evaluation of the socio-economic impact of variety adoption

Project CG04: Broadening the Genetic Base for Cassava Breeding in Africa.

Purpose: To broaden the genetic base for the future development and diffusion of cassava varieties targeted toward the most relevant ecosystems in Africa.

Outputs and activities:

- Elite germplasm selected under representative conditions of major ecosystems in Africa, used as parental material for the following selection cycle and shipped to National Programs for evaluation and adaptive selection.
 - ▲ Planting, evaluation and selection of seedling nurseries at Ibadan, Kano and Jos, with progenies involving Latin American and African germplasm.
 - ▲ Joint evaluation with IITA staff at different stages of the clonal evaluation process.
 - ▲ Support national programs through the provision of improved germplasm and training in breeding.
 - ▲ Adjust crop management practices to allow for the optimal expression of yield potential under semi-arid environments in Africa.

Project CG05. Tools and Methodologies for Gene Pool Development

Purpose: To increase the efficiency with which improved cassava varieties are generated and diffused by developing non-conventional tools and methodologies for genetic modification, index selection, optimization of sites for evaluation, characterization of major agro-ecosystems, incorporation of cropping system effects, and farmer participatory research in varietal selection.

Outputs and activities:

- Improved breeding methodologies including genetic transformation for interspecific gene transfer.
 - ▲ Develop appropriate breeding methodologies for more efficient gene pool enhancement, including farmer participatory research in varietal selection.
 - ▲ Develop non-conventional methods for genetic modification of cassava, including genetic transformation for interspecific gene transfer.

The complementary subprojects associated with these core projects are presented in Table 4.

Table 4. Project Area: Improved Cassava Gene Pools. Core projects and associated complementary subprojects. 1995.
Core project codes are in bold type.

Code	Title	Purpose	Research partners	Donor	Time Frame	Responsible Scientist
CG01	Development of Cassava Gene-pools with Global Perspective	To develop improved populations, incorporating high potential and stability for root yield and quality, resistance to major pests and diseases, and adaptation to the predominant agro-climatic conditions of the major ecosystems where cassava is produced.	IITA and Brazilian national and state research programs	Core	1994-1998	C.Iglesias
CG51	Cassava germplasm development for the drier tropics and subtropics of Africa, Asia, and Latin America	To develop improved populations, and select and diffuse elite genotypes with high yield potential, resistance to major local pests and diseases, good root quality, and adaptation to the edaphic and climatic conditions of semiarid and subtropical ecosystems	CPATSA, EBDA, EMBRAPA/CENARGEN, EMBRAPA/CNPMPF, EPACE, IPA , EPAGRI, IAC, IPAGRO, IAPAR	IFAD	1990-1995	C.Iglesias
CG02	Deployment of Improved Cassava Germplasm in Latin America	To support national programs in adaptative selection and diffusion of new varieties for the specific growing conditions, biotic and abiotic constraints, and market demands of sub-regions in Latin America and the Caribbean.	National programs in Latin America and the Caribbean.	Core	1994-1998	C.Iglesias
CG03	Deployment of Improved Cassava Germplasm in Asia	To support national programs in Asia in the development of improved populations, selection and diffusion of elite genotypes adapted to the predominant growing conditions and market requirements	FCRI, Thailand and National programs in Asia	Core	1994-1998	K,Kawano
CG04	Broadening the Genetic Base for Cassava Breeding in Africa	To broaden the genetic base for the future development and diffusion of cassava varieties targeted toward the most relevant ecosystems in Africa	IITA	Core	1994-1998	Vacant

Table 4. (Cont.)

Code	Title	Purpose	Research partners	Donor	Time Frame	Responsible Scientist
CG05	Tools and Methodologies for Gene Pool Development	To increase the efficiency with which improved cassava varieties are generated and diffused by developing non-conventional tools and methodologies for genetic modification, index selection, optimization of sites for evaluation, characterization of major agro-ecosystems, incorporation of cropping system effects, and farmer participatory research in varietal selection	Asian Cassava Breeders Network, CAMBIA, ILTAB, Ohio State University, Pan-American Cassava Breeders' Network, Purdue University, University of Wageningen	Core	1994-1998	C.Iglesias

Cassava Project Area C1

Cassava Integrated Crop Management

Purpose: To promote sustainable cassava production in major agroecosystems of Latin America and Asia by developing principles of and component technologies for integrated crop management

Rationale: Cassava's long growth cycle from 7 to 24 months, and predominance in small farm systems precludes the widespread use of agrochemicals for controlling pests and diseases or for maintaining soil fertility. To realize cassava's true production potential, adapted germplasm needs to be integrated with cultural and biological management practices that enhance the crop's biotic and abiotic environment, thus reducing erosion, maintaining soil fertility, and avoiding use of pesticides.

Benefits: Small-scale farmers should obtain higher productivity, lower costs, and a safer working environment. Off-farm benefits to society would include reduced soil erosion and smaller sediment loads in rivers.

National programs will benefit from research conducted at representative sites in several ecosystems; from close collaboration with regional, national, and international partners; from new research techniques of participatory diagnosis, validation, adaptation, and on-farm testing of generated technologies to ensure adoption and thus more sustainable production; and from feedback to ensure orientation of research toward users' needs.

Research Partners: National programs in Latin America and Asia, including EMBRAPA (Brazil), DOAE (Thailand), MARIF (Indonesia), SCATC (China); IITA; research institutions in developed countries

Project CI01: Integrated Pest and Disease Management

Purpose: To develop environmentally sound and economically viable genetic, biological, and cultural control technology and implementation strategies for major cassava pests and diseases

Outputs and activities:

- Appropriate integrated pest management practices for sustainable cassava-based production systems
 - ▲ Identify and quantify pest and disease complexes in selected cassava agroecosystems.
 - ▲ Develop biological, botanical and cultural practices for controlling major cassava pests and diseases.

- ▲ Develop IPM implementation strategies through pilot projects in selected agroecosystems.
- ▲ Train national program scientists and extension personnel in the design, development, adaptation, and implementation of effective IPM strategies.
- ▲ Conduct *ex-post* analysis of the impact of adoption of IPM technologies.

Project CI02: Integrated Soil Crop Management

Purpose: To develop integrated crop management components and principles for sustainable cassava production in Latin American and Asian agroecosystems

Outputs and activities:

- Appropriate crop/soil management practices for sustainable cassava-based production systems
 - ▲ Generate technical knowledge on new technology components and quantification of soil degradation in cassava-based systems.
 - ▲ Develop *interinstitutional farmer participatory* techniques for validating, adopting and selecting component technologies.
 - ▲ Develop and evaluate soil fertility maintenance and erosion control practices for specific ecosystems.
 - ▲ Train national program scientists and extension personnel and the development of intercountry networks.
 - ▲ Conduct *ex post* analysis of the impact of adoption of integrated crop/soil management practices.

The complementary subprojects associated with these core projects are presented in Table 5.

Table 5. Project Area: Cassava Integrated Crop Management. Core projects and associated complementary subprojects. 1995. Core project codes are in bold type.

Code	Title	Purpose	Research partners	Donor	Time Frame	Responsible Scientist
CI01	Integrated Pest and Disease Management	To develop environmentally sound and economically viable genetic, biological, and cultural control technology and implementation strategies for major cassava pests and diseases	National programs of Brazil, Colombia, Cuba, Ecuador, and Panama; IITA; Texas A&M University; University of Florida	Core	1994-1998	A.Bellotti
CI51	Importance of <i>Neoseiulus ideaus</i> and <i>Typhlodromalus limonicus</i> as natural enemies of cassava green mites	To qualify and quantify the predatory behavior of selected phytoseiid species as biological control agents of the cassava green mite	University of Göttingen	BMZ	1992-1994	A.Bellotti
CI52	Control of the cassava pest <i>Cyrtomenus bergi</i>	To increase the knowledge base on the burrowing bug <i>Cyrtomenus bergi</i> for the premonitory application of successful control	Danish Royal Veterinary and Agricultural University	DANIDA	1993-1996	A.Bellotti
CI53	Diversified cassava agroecosystems-chemically mediated orientation	To determine how cassava plant volatiles affect the host location process of larval parasitoides that attack the cassava hornworm and cassava mealybug	ETH	SDC	1994-1996	A.Bellotti
CI54	Ecologically sustainable cassava plant protection in South America and Africa	To develop and implement sustainable forms of plant protection for small-scale cassava producers to increase yields and reduce pesticide use	IITA; EMBRAPA/CNPDA, EMBRAPA/CNPMPF, and governmental organizations of Bahia, Ceará, and Pernambuco states (Brazil)	UNDP	1993-1996	S.Lapointe

Table 5. (Cont.)

Code	Title	Purpose	Research partners	Donor	Time Frame	Responsible Scientist
CI02	Integrated Soil Crop Management	To develop integrated crop management components and principles for sustainable cassava production in Latin American and Asian agroecosystems	National programs of Brazil, Colombia and Ecuador; IITA	Core	1994-1998	M.El-Sharkawy
CI55	Soil conservation in smallholder hillside farming on the Andean Inceptisols through cassava-forage legume intercropping	To generate basic knowledge on soil degradation and erosion of Andean Inceptisols and develop cropping systems that conserve the soil	CETEC, CVC, FEDECAFE, FUNDAEC, INCORA, University of Hohenheim	BMZ	1993-1996	K.Mueller-S.
CI56	Improving agricultural sustainability in Asia integrated crop-soil management for cassava-based production systems	To develop appropriate integrated crop-soil management practices for sustainable cassava-based production systems in Asia	National programs of China, India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam	Sasakawa Foundation	1993-1998	R.Howeler

Cassava Project Area CM

Cassava Markets

Purpose: To strengthen links between farmers and markets, and obtain orientation for cassava gene pool development through research on processing, product development, and markets

Rationale: Cassava is a multipurpose root crop. To maximize its true potential as a source of additional income for small- to medium-scale farmers in tropical agroecosystems requires integrating farm production with marketing opportunities for processed products. The correct identification of existing markets and potential new end uses is key to the crop's development. Rural cassava-based agroindustries provide a link between farmers and markets, generate added value, and ensure that technology development benefits the rural poor.

Benefits: The ultimate beneficiaries will be cassava producers and processors: the development of small- to medium-scale cassava transformation processes, suitable for operation in rural areas, would create income and employment opportunities, thus enhancing the quality of life in cassava-growing regions. Stable prices and markets would motivate farmers to increase production and adopt productivity-increasing, resource-conserving technologies.

Research in national programs will also benefit from an integrated, interinstitutional approach to product, processing, and market development. Not only would the national programs analyze consumption patterns, markets, and demand trends to identify product opportunities and quality requirements, but also receive feedback essential for introducing genetically controlled quality traits for specific end uses.

Research Partners: CIRAD-CA, CIRAD-SAR, IITA, IRAT, NRI, ORSTOM, UBA, UNESP, UNESP-CERAT, UNIVALLE, national programs in Latin America and Asia

Project CM01: Cassava Product, Process and Market Development

Purpose: To develop cost-competitive, consumer-acceptable cassava products through integrating research on marketing, consumption, processing, and quality

Outputs and activities:

- Improved cassava product quality
 - ▲ Study the effects of gene x process interaction on cassava flour and starch quality.
 - ▲ Modify the physicochemical and functional properties of cassava products.

- ▲ Characterize raw material properties for producing different cassava-based products.
- Economically sustainable processes for small- to medium-scale flour production and starch extraction
 - ▲ Conduct market studies in selected cassava-growing regions in Latin America and Asia.
 - ▲ Develop processes for producing high quality cassava flour.
 - ▲ Improve traditional equipment for cassava starch extraction, and develop processes for treating waste water.
 - ▲ Evaluate processes and products at pilot-plant and semicommercial levels in selected countries.
 - ▲ Monitor the commercialization of processes and products.
- Prototype novel cassava products and processes for local manufacture
 - ▲ Determine the potential for new cassava-based products.
 - ▲ Bioconvert cassava flours and starches.
 - ▲ Develop processes for treating and recuperating waste products.
- Strategies, networks, and trained national personnel for sustainable, economically viable, integrated enterprises in cassava production, processing, and marketing
 - ▲ Provide in-service and short-course training for national program scientists and extension leaders.
 - ▲ Form and consolidate national and regional integrated project and utilization networks.
 - ▲ Conduct model pilot of production, processing, and marketing projects in selected countries.
- Feedback on the socioeconomic impact of processing and marketing innovations will help focus research priorities
 - ▲ Perform *ex ante* studies for constraint and opportunity analysis and research planning.
 - ▲ Conduct adoption and impact studies in selected pilot projects.

The complementary subprojects associated with these core projects are presented in Table 6.

Table 6. Project Area: Cassava Markets. Core projects and associated complementary subprojects. 1995.
Core project codes are in bold type.

Code	Title	Purpose	Research partners	Donor	Time Frame	Responsible Scientist
CM01	Cassava Product, Process and Market Development	To develop cost-competitive, consumer-acceptable cassava products through integrating research on marketing, consumption, processing, and quality	CIRAD-SAR, NRI, national programs in Latin America and Asia, IITA	Core	1994-1998	R.Best
CM51	Production and marketing of cassava flour in Colombia	To create, in high-priority regions of rural Colombia, a small-scale, but commercially viable, cassava-flour agroindustry that integrates production, processing, and marketing functions	DRI and FUNDIAGRO	IDRC	1992-1994	R.Best
CM52	Field testing and implementing improved flour-processing technologies	To improve the technical and economic efficiency of small-scale production of high-quality cassava flour for processed foods	CARITAS, FUNDIAGRO, IDRC, NRI	NRI	1993-1995	D.Jones
CM53	Improving small-scale cassava-starch extraction	To improve the technical and economic efficiency of processes for small-scale cassava-starch extraction, and improve product quality	CIRAD; UNIVALLE and Universidad Autonoma (Colombia)	CIRAD and French Ministry of Foreign Affairs	1989-1994	D.Dufour
CM54	Adding value to the products and byproducts of small- and medium-scale cassava-processing industries in Latin America	To develop economically viable, environmentally sound, and replicable cassava-processing systems by strengthening existing markets and creating new product opportunities	CIRAD-CA, CIRAD-SAR, NRI, ORSTOM, UBA, UNESP-CERAT, and UNIVALLE	EU	1993-1995	D.Dufour
CM55	Contribution and future potential of root crops for household food, feed and income generation needs in four regions of Vietnam	To identify area for future postharvest innovation with potential to enhance the welfare of rural populations	INSA, Postharvest Institute, Agricultural University No.3, Hanoi, CIP	DGIS	1994-1995	G.Henry
CM56	Adaptation and transfer of cassava flour processing technology in the Amazonian region of Peru	To provide support for the establishment of a cassava flour industry in Peru	CARITAS-Peru, IAP	PRODAR/ICA	1995	R.Best

Cassava Project Area CC

Institutional Development

Purpose: To increase the effectiveness of national, regional, and global research and development systems for cassava

Rationale: The CIAT Cassava Program forms part of a global system of individuals and institutions in developed and developing countries who are involved in cassava research and development (R&D). Effective use of R&D resources depends on strong links existing among these players so that information, resources, and products flow efficiently and freely among them.

CIAT's international nature and 20-year experience in cassava research justify the Cassava Program's leading role in convening and catalyzing collaborative, interinstitutional endeavors at national, regional, and international levels. These endeavors help identify research topics and their priority, and promote horizontal collaboration between countries and institutions.

Benefits: Those who will directly benefit are: 1) national programs of developing countries, both private and public, that are associated with cassava R&D, 2) international and regional institutions with R&D responsibilities, 3) institutions of developed countries that dedicate resources to basic and applied cassava research and to technical cooperation in developing countries, and 4) donors who finance bilateral and multilateral cassava R&D activities.

The human and financial resources of national cassava systems are more effectively and efficiently used when information exchange is promoted, results shared, and research and development issues related to cassava prioritized. Strong national programs, in turn, means that cassava farmers, processors, and consumers benefit, in a significantly shorter time, from new knowledge, research tools and methodologies, and technology components.

Research Partners: National programs in Latin America, Africa and Asia, IITA, advanced labs in developed countries

Project CC01: Research Planning, Information Exchange, Project Design, and Networking

Purpose: To increase the effectiveness of national, regional, and global cassava R&D systems

Outputs and activities:

- Mechanism for continued adjustments of research priorities for cassava R&D
 - ▲ Conduct ex ante studies on technology impact.

- ▲ Conduct *ex post* analysis of adoption and impact.
 - ▲ Conduct "bench mark" and "need assessment" studies at different levels in the cassava market for identifying constraints and opportunities in selected countries.
 - ▲ Develop agronomic and socioeconomic cassava databases.
- Trained cadres of national program personnel
 - ▲ Develop human resources in training trainers, diagnostic skills, and integrated cassava projects.
- Regional and global cassava R&D and networks
 - ▲ Consolidate existing, and create new, collaborative regional and global research and information networks.
 - ▲ Exchange information through *Cassava Newsletter*, *Cassava Biotechnology Network Newsletter*, and regional conferences and seminars.

The complementary subprojects associated with these core projects are presented in Table 7.

Table 7. Project Area: Institutional Development. Core projects and associated complementary subprojects. 1995.
 Core budget codes are in bold type.

Code	Title	Purpose	Research partners	Donor	Time Frame	Responsible Scientist
CC01	Research Planning, Information Exchange, Project Design, and Networking	To increase the effectiveness of national, regional, and global cassava R&D systems	IITA, national programs in Latin America and Asia, research institutions in developed countries	Core	1994-1998	R.Best
CC51	Cassava Biotechnology Network	To foster collaborative biotechnology research on high priority topics that would enhance food security and the development value of cassava	DGIS and IITA	DGIS	1992-1997	A.M.Thro
CC53	Modernization and strengthening the cassava agroindustry in the Atlantic Coast of Colombia	To generate and validate technology components for improved production and processing systems through <i>participatory research</i> with cassava farmers and processors	CORPOICA, FUNDIAGRO and farmers' cooperatives	Colombian Government	1995-1996	R.Best