



**CASSAVA DEVELOPMENT PILOT PROJECT IN BRAZIL**

**INTEGRATED PRODUCTION , PROCESSING AND COMMERCIALIZATION  
OF DRY CASSAVA CHIPS FOR ANIMAL CONSUMPTION**

**FIRST TECHNICAL PROGRESS REPORT**

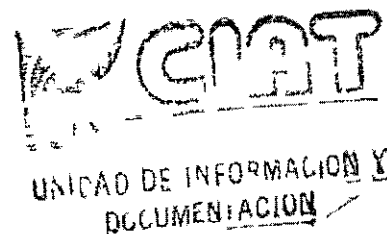
**PREPARED FOR THE W K KELLOGG FOUNDATION**

**BY THE**

**INTERNATIONAL CENTRE FOR TROPICAL AGRICULTURE**

**CIAT**

**JUNE 1990**



**18 MAR 2002**

CASSAVA DEVELOPMENT PILOT PROJECT IN BRAZIL

INTEGRATED PRODUCTION, PROCESSING AND COMMERCIALIZATION  
OF DRY CASSAVA CHIPS FOR ANIMAL CONSUMPTION

TECHNICAL PROGRESS REPORT FOR PERIOD ENDING MARCH 1990

PROJECT SUMMARY

The project is intended to improve the welfare of the rural poor involved in cassava production in communities in the State of Ceara in Northeast Brazil. This general objective is to be achieved through the introduction and adoption of improved cassava production, processing and marketing technology.

In order to realize this objective the following outcomes are expected of the project:

- 1 The generation and testing of a small-scale cassava-based agro-industrial development model
- 2 Institution building through the utilization of the participative management approach to develop and strengthen community based organizations
- 3 Welfare Improvement through the stimulation of economic development and employment opportunities in the rural communities in the project area

Tracking the progress towards achieving these specific project objectives is being done through an evaluation strategy comprised of the following activities:

- a Monitoring of the daily functioning of the project, especially in the area of cassava processing. The purpose here is to generate information needed to adjust

the technology to fit the specific circumstances of the area

- b Monitoring of the impact of the project in relation to cassava production and productivity levels in the State of Ceara. This information will be essential in determining if, through the development of an alternative commercialization channel for the cassava, the project is effectively acting as a stimulus for expanding production of this crop in the State
- c Monitoring of the distribution of the benefits of the project among intended beneficiaries. This information being essential in assessing the real contribution of the project in terms of overall rural development in the target areas

Additionally, the Socio-Economic impact of the project will be evaluated to assess if the socio-economic status and well-being of the farmers participating in the project are being positively affected. The focus of this assessment will be on determining the impact of the project on income generation and distribution, education levels, farmers organizations, access to the political support and demand system, and social benefits

For this socio-economic evaluation, monitoring will take place at three levels, differentiated on the basis of (1) project specific objectives, (2) target population, and (3) target areas

The first level of monitoring is the collection of base line data on organizations participating in the project. This will facilitate end of project assessment of results. This activity is scheduled to be undertaken during the first year of the project

The second level of monitoring will consist of a survey of a relatively large group of cassava farmers (150) who are participants in the project. This sample population will be defined using the base line information obtained from the first level of monitoring.

The third level of monitoring and evaluation will consist of a series of small group surveys and intensive follow-up of a limited number of farmers. Sample populations for this level of monitoring will be produced from the second level.

This monitoring and evaluation system is detailed in Table 1.

Table 1 The Monitoring and Evaluation System for the Ceara Cassava Project

LEVEL	I DATA BASE LINE	II SURVEYS	III INTENSIVE FOLLOW UP
Population	a Cassava processing farmers organizations b Cassava farmers	Sample taken from Data Base Line structured according to area land tenancy membership	Sub sample from the survey sample
Objectives	a To obtain information on the functioning of the cassava processing farmers groups in relation with their performance and the benefits of the project b To create framework that could be used as a reference to extrapolate the results of the surveys and the intensive follow up	a To obtain information about the impact of the project in the production of cassava b To analyze the impact of the project on farmers incomes	To obtain information related to cassava production technology at farm level
Areas	a Cassava sales variety age b Sellers land tenancy	a Land tenancy b Cropping systems c Labor availability d Commercialization	a Cassava Production Technology used by the farmers

	<p>cy farm size loca tion</p> <p>c Processing produc tion costs labor, commercialization profits credits</p>	e Yields	b Availability and use of cassava production inputs
Methodology	<p>a Data collection for the monitoring system based on the needs of the farmers groups</p> <p>b Information is cen tralized on Data Base Line and is systematically analyzed later</p>	a Annual survey with 150 farmers	Periodic visits and small surveys to a selected group of farmers

## PROGRESS TOWARDS PROJECT OUTCOMES

According to the work-plan this project involves six activities there being

- 1 Selection of an initial site for developing a pilot project
- 2 Identification of local institutions to carry out the planning and establishment of a working group to implement the project, as well as identification of local sources for financing it
- 3 Design and establishment of the pilot project
- 4 Observation of the operation of the pilot project and in situ modification of the modus operandum to accommodate it to local conditions
- 5 Monitoring of project performance and modification of project design
- 6 Design of the expansion phase to commercial-scale production

Following is our report on the progress made, during the past year, in the implementation of these activities

### Implementation

#### 1 Selection of Site for Development of Pilot Project

The State of Ceara has been selected as the site for the pilot project. This choice has been strongly influenced by prior activities related to small scale cassava farming and processing

carried out in the area that served as a foundation of both experience and organizational infrastructure on which to built the Kellogg Project

In 1979, EMBRATER organized a study tour for a group of its technicians working with cassava farmers and processors. This tour included some Asian Countries (Thailand, Malaysia, Indonesia) where the production of dry cassava chips for animal feeding was acquiring great importance as an alternative commercial activity for the cassava farmers. On the return of this mission to Brazil, EMBRATER decided to initiate activities promoting the production of dry cassava chips among small-scale farmers in the North-East and in 1980 the first training and demonstration drying plant was built in the State of Ceara located in CETREX, a training center of the Rural Extension State Agency, EMATERCE

In 1981, the first three cassava drying plants were built in rural areas of Ceara in collaboration with three Cooperatives in the municipalities of Goncalo do Amarante, Vicosa do Ceara and Trairi (See Table 1 A). These units were not very successful for several reasons, among these the extensive drought that hit the area between 1979 a 1983, and substantially reduced crop production through out the state, and the agroindustrial model chosen which relied on large producer cooperatives (400 - 500 members) which greatly diminish the interest of participating farmers to the extent that two of these cooperatives were later dismantled (Trairi and Sao Goncalo) and the other functioned only sporadically during the past 10 years

Between 1982 and 1986 the concept of small scale, cassava-based agroindustry to produce dry cassava chips for animal feeding remained practically frozen in the State of Ceara

Table 1 A - Cassava Drying Plants Installed in Ceara  
1980 - 1981

Community or Farmers Group	Municipality	Drying area Installed (M2)	Date of Construction	Source of Funding
CETREX	Caucaia	450	1980	BIRD/ EMBRATER
Cooperativa Agricola	Trairi	1 250	1981	BIRD/ EMBRATER
Cooperativa Agricola	Sao Goncalo do Amarante	1 250	1981	BIRD/ EMBRATER
Cooperativa Agricola	Vicosa do Ceara	1 250	1981	BIRD/ EMBRATER
TOTAL		4 200		

The second generation of cassava drying plants in Ceara was initiated in 1986, again with the support of EMBRATER and EMATERCE. This time 5 units were installed across the state and once again, the performance of the farmers groups was poor. Cited among the principal reasons for this failure was the poor selection of areas and farmers groups due to pressures put upon the extensionists. The loan for building the drying plants was approved at the last moment and with a very limited period of time available for it to be used. Other factors affecting the functioning of this agroindustrial activity were the lack of credit for planting and the lack of planting material (See Table 1 B)

UNIDAD DE INFORMACION Y  
DOCUMENTACION



Table 1 B - Cassava Drying Plants Established in Ceara  
1986 - 1987

Community or Farmers Group	Municipality	Drying area Installed (M2)	Date of Construction	Source of Funding
Solidao	Cruz	450	1986 87	BIRD/ EMBRATER
Angelim	Granja	420	1986 87	BIRD/ EMBRATER
Cachoeira do Boi Morto	Ubajara	380	1986 87	BIRD/ EMBRATER
Serra do Santana	Assare	400	1986 87	BIRD/ EMBRATER
Serra do Mondeu	Araripe	420	1986 87	BIRD/ EMBRATER
TOTAL		2 070		

In 1988, several agricultural institutions from Ceara formed a State Committee for Cassava with the aim of coordinating the work being implemented with this crop in the State. At the same time, the Cassava Program of CIAT was increasing its presence in the area and collaborated actively in setting up this Committee. During that year, with the involvement of other sources of funding (SUDENE, BNB and CIAT) nine new groups of farmers organized around cassava processing facilities were established (See Table 1 C)

Since its establishment in Ceara the Kellogg funded project has collaborated with the Ceara State Cassava Committee in the strengthening of the coordinating activities of this Committee. Consequently, during this reporting period 20 groups of cassava producers were organized, and/or reactivated. Nine of these had their operations established prior 88-89 (See Table 1 C). Eleven of the twenty were established during 1990 (See Table 1 D)

Table 1 C - Cassava Drying Plants Established in Ceara  
1988 - 1989

Community or Farmers Group	Municipality	Drying area Installed (M <sup>2</sup> )	Date of Construction	Source of Funding
Folha Larga	Granja	700	1988 89	BNB (ETENE)
Poco dos Cavalos	Trairi	600	1988 89	BIRD/ EMBRATER
Dourado	Morada Nova	700	1988 89	BIRD/ EMBRATER
Lagoa do Mato	Bela Cruz	700	1988 89	BIRD/ EMBRATER
Jua dos Vieiras	Vicosa do Ceara	600	1988 89	BNB (ETENE)
Barreiro	Sao Benedito	600	1988 89	BNB (ETENE)
Queimadas	Vicosa do Ceara	500	1988 89	PAPP (FADA)
Lagoa Grande	Acarau	210	1988 89	SAO VICENTE
Alvaca/ Goiabeira	Santana do Acarau	400	1988 1990*	PAPP (FADA)
TOTAL		5 010		

\* Was finished in 1990

Table 1 D - Cassava Drying Plants Installed in Ceara  
1989 - 1990

Community or Farmers Group	Municipality	Drying area Installed (M2)	Date of Construction	Source of Funding
Patos Aruaru	Morada Nova	400	1989 90	PAPP (FADA)
Macaetuba I	Vicosa do Ceara	600	1989 90	PAPP (FADA)
Lagoa do Mineiro	Itarema	400	1989 90	PAPP (FADA)
Seriema	Quixada	400	1989 90	PAPP (FADA)
Aroeiras	Aracati	500	1989 90	PAPP (FADA)
Iboassu Velho	Granja	400	1989 90	BNB (ETENE)
Carqueijo	Mocambo	400	1989 90	BNB (ETENE)
Pau da Bandeira	Salitre	400	1989 90	BNB (ETENE)
Sao Vicente	Aranipe	400	1989 90	BIRD/ EMBRATER
Marinheiros	Itapipoca	204	1989 90	BIRD/ EMBRATER
Gurui	Sobral	875	1989 90	PAPP (FADA)
TOTAL		4 975		

## 2. Identification of Local Institutions and Financial Resources

The existence of an incipient "State Cassava Committee" facilitated the identification of local institutions and the establishment of working groups to coordinate the local organizational activities related to small-scale integrated cassava production and processing in Ceara. The State Cassava Committee was created in 1988 with the collaboration of SEARA, EPACE, EMATERCE and CIAT.

This Committee was fundamental to the formulation and development of the project proposal that was submitted to the Kellogg Foundation. Consequently, its credibility was established with the approval of funding for the project and it has since gained general recognition as the coordinating body for all activities relating to the promotion and development of the cassava crop in the State of Ceara.

The Committee is being aided in its work by the greatly increased level of support generated as a result of a CIAT organized study-tour for a group of policy-makers from Northeast Brazil. Included was a group from Ceara led by the Secretary of Agriculture of that State. This study-tour took place during April 1989 and included visits to cassava based agroindustrial projects in Colombia and Ecuador.

The identification of local institutional capacity and the building of local institutional support is being pursued at four levels. These are (1) state level, (2) regional level, (3) local level, and (4) community level. However, due to the current general adverse economic situation in Brazil the identification and development of local financial support was difficult during this first year of the project.

### 3 Design and Establishment of the Pilot Project

This activity is composed of five elements These are (a) Production Technology, (b) Processing Technology, (c) Commercialization, (d) Organization and (e) Training The following presents project progress in terms of these elements

3 A Production Technology Two constraints have been identified in the application of this element to the design and establishment of the pilot project These are (i) minimal adoption of improved agricultural technology, and (ii) the lack of availability of good quality planting material Actions taken to reduce the negative impact of these constraints are the setting-up of "demonstration/pre-production trials" in the case of one and "seed production plots" in the case of two

3 A I Demonstration/Pre-production Trials The purpose of these trials, which have been set-up in the vicinity of each dry cassava processing plants are to test, show-case and demonstrate improved cassava production technology for the benefit of farmers, and to generate feed-back for research and extension workers to be used in the dissemination of improved production technology If successful, these trials will form the basis for the elaboration of local, regional and national production plans Consequently, existing but not field tested improved production technology developed by EPACE and EMATERCE has been incorporated into these trials, and technicians from these institutions are involved in the planning, establishment and evaluation of the trials During the reporting period 16 of these trials were established

3 A II Seed Production Plots In order to counter the inavailability of good quality planting material and to ensure that the anticipated increase in demand for improved seeds resulting from the impact of this project will be met, seed production plots are being planned and set-up During the

reporting period 16 of these plots were set-up in dry cassava processing areas. Farmers groups from these areas have actively participated in the development of these plots. The work is being undertaken as communal enterprises thus serving to promote group consolidation and instill, among the participating farmers, a sense of ownership and control over the production of this planting material. Table 3 A presents detailed information on these plots.

Table 3 A - Seed and Pre-Production Plots Established in 1989

Region	Municipality	Farmers Group	Area of the Plots		Arrangement
			** P P	Seed	
Itapipoca	Acarau	Lagoa Grande	0 25	1 0	Communal
	Cruz	Solidao	0 25	1 0	Individual
	Bela Cruz	Lagoa do Mato	0 25	1 0	Communal
	Trairi	Poco dos Cavalos	0 25	1 0	Communal
	Granja	Folha Larga	0 25	1 0	Communal
		Iboassu Velho	0 25	1 0	Communal*
		Itarema	Lagoa do Mineiro	0 25	1 0
Ibiapaba	Vicosa do Ce	Jua dos Vieiras	0 25	1 0	Communal
		Macajetuba II	0 25	1 0	Communal
		Queimadas	0 25	1 0	Communal
	Sao Benedito	Barreiro	0 25	1 0	Communal
Cariri	Salitre	Pau da Bandeira	0 25	1 0	Communal*
	Assare	Serra do Santana	0 25	1 0	Communal
Limoeiro	Morada Nova	Aruaru	0 25	1 0	Communal*
	Aracati	Aroeira	0 25	1 0	Communal*
Quixada	Quixada	Serriema	0 25	1 0	Communal*

\* New Groups

\*\* P P = Pre Production

3.B. **Processing Technology.** Integrated cassava development projects which function as suppliers of raw material to the animal feed industry are faced with the problem of meeting large scale demands on a continuing basis while their suppliers are generally a collection of small-scale farmers who may have difficulties maintaining consistency of quantity and quality. This aspect of cassava based agroindustry is crucial to the success of this project. It mandates the orientation and adaptation of the farmers to the given processing technology and to the new market.

Consequently, the following considerations are of great importance to the Processing Technology activity

- i Efficiency of use of drying plant
- ii Efficiency of use of processing plant
- iii Global efficiency
- iv Yields and conversion ratios, and
- v Equipment

These considerations constitute the parameters utilized in the assessment of progress in this activity

3 B I Efficiency of the Use of Drying Plant This parameter gives an idea of the availability of cassava in the area of influence of the processing unit. It is based on the assumption that given the existence of adequate climatic conditions for cassava sun drying and adequate supply of raw material, the cassava drying plant should process an optimum number of lots of cassava roots per year. This optimum number has been estimated as 60 lots per year which is the combination of a processing period of 20 weeks and a total of 3 lots of cassava processed per week. In the case of the State of Ceara, sun-drying of cassava can be carried out between August and December (20 weeks). The climatic conditions during this period permit the drying of a "lot" of cassava roots in two days (3 lots

per week) In cases where cassava sun drying is practiced on a day-to-day basis using only half of the installed area each day, the number of lots processed rises to 120 per year

Table 3 B I shows the efficiency of use of the plant for some of the groups that produced dry cassava chips in this year In some cases, it was not possible to collect reliable data The values obtained are in general low which is considered standard for the first year of operation of a dry cassava plant under normal conditions Efficiency values below 50% are considered negative and indicate that corrective actions should be taken

3 B II Efficiency of Use of Processing Plants This parameter gives an idea of the assimilation of the processing technology by the group of cassava farmers It is expressed as a relation between the amount of cassava chips that are processed per unit of drying area (loading rate) as compared with an optimum amount (10 kg per square meter) Values below 75-80% are considered low Table 3 B II shows some efficiencies obtained by the twelve groups during this year of operation With the exception of one group (Barreiro), the results could be considered satisfactory Two of the groups (Poco dos Cavalos and Lagoa Grande) performed outstandingly

3 B III Global Efficiency This parameter combines the efficiency of use of the plant and the efficiency of processing Values below 65-70% are considered poor and some adjustments have to be made Table 3 B III presents some results obtained in this first year With the exception of LAGOA GRANDE, the rest of the groups will need to improve considerably in their organization and functioning during the next year



Table 3 B I - Efficiency of Use of the Plant

Organization	Processing Period			Lots Processed		Efficiency of Use %	System *
	First	Last	# of Weeks	Real	Theoretical 1/		
Poco dos Cavalos	6/9/89	25/11/89	11 5	40	70	57 1	A
Barreiro	25/9/89	14/12/89	14	19	40	45 2	B
Cachoeira do Boi Morto	30/08/89	09/11/89	10 0	06	30	20 0	B
Queimadas	11/09/89	22/11/89	11 0	08	33	24 2	B
Jua dos Vieiras	01/08/89	01/12/89	18 5	52	108	48 1	A
Lagoa Grande	13/08/89	12/01/90	23	63	69	91 3	B
Solidao	01/08/89	16/11/89	16	35	48	72 9	B
Folha Larga	28/07/89	08/12/89	19	38	57	66 6	B
Dourado	25/08/89						
Lagoa do Mato	12/09/89						
Serra do Santana	05/10/89						
Serra do Mondeu	01/11/89						A

\* A One lot processed per day with 50% of drying area occupied

\* B One lot processed every two days with 100% of drying area occupied

1/ The theoretical number of processed lots have been estimated based on the actual number of weeks of operation in each agroindustry

Table 3 B II - Efficiency of processing of the plants

Organization	Processing			Average Loading Rate	Optimum Loading Rate	Efficiency of Processing
	# Lots	Area M <sup>2</sup>	Kg Cassava Processed			
Poco dos Cavalos	40	300	108 343	9 01	10 0	90 1
Barreiro	19	600	41 890	3 67	10 0	36 7
Cachoeira do Boi Morto	06	380	17 320	7 60	10 0	76 0
Jua dos Vieiras	52	300	96 850	6 20	10 0	62 1
Lagoa Grande	63	210	120 000	9 07	10 0	90 7
Solidao	35	450	118 000	7 49	10 0	74 9
Folha Larga	38	700	92 557	3 48	10 0	34 8
Queimadas	08	500	16 148	4 03	10 0	40 3
Dourado		700	3 900			
Lagoa do Mato		700	47 500			
Serra do Santana		360	5 000			
Serra do Mondeu		400	35 000			

Table 3 B III - Global Efficiency

Organization	Efficiency of Use of the Plant %	Efficiency of Processing of the Plant %	Global Efficiency %
Poco dos Cavalos	57.1	90.1	51.4
Barreiro	45.2	36.7	16.6
Cachoeira do Boi Morto	20.0	76.0	16.2
Folha Larga	66.6	34.8	23.1
Jua dos Vieiras	48.1	62.1	29.8
Lagoa Grande	91.3	90.7	82.8
Solidao	72.9	74.9	54.6
Queimadas	24.2	40.3	9.8
Dourado			
Lagoa do Mato			
Serra do Santana			
Serra do Mondeu			

3 B IV Yields and Conversion Ratios Table 3 B IV presents the results obtained this year by the 12 groups that participated in cassava processing activities. The total output of 702 t of cassava roots processed and 265 t of dry cassava chips produced could be considered acceptable given the fact that it was the first drying season for most of the groups. This production could have been increased if working capital at the beginning of the season had been made available earlier. The yields of one of the groups (Solidao) were seriously affected by continuous attacks of Mandarova (Erynnis ello) which not only causes reduction in production yields but also affects the quality of the processed roots.

Table 3.B IV - Yields and Conversion Rates

Organization	Ton Roots Processed	Ton Dry Cassava Produced	Conversion Ratio	Yield (%)
Folha Larga	92 55	34 00	2 72	36 76
Poco dos Cavalos	108 34	45 07	2 40	41 60
Barreiro	41 89	16 71	2 50	40 00
Cachoeira do Boi Morto	17 32	6 80	2 54	39 30
Queimadas	16 14	6 92	2 16	46 30
Jua dos Vieiras	96 85	38 95	2 63	38 00
Dourado	3 90	1 32	2 95	34 00
Lagoa do Mato	47 50	17 45	2 72	36 76
Lagoa Grande	120 00	44 40	2 70	37 00
Solidao	118 00	38 10	3 09	32 30
Serra do Mondeu	35 00	13 77	2 54	39 30
Serra de Santana	5 00	1 97	2 53	39 50
TOTAL	702 60	265 46		
AVERAGE			2 64	37 80

3 B V Equipment The principal equipment used in the natural drying of cassava is the chipper which is usually built on the basis of models brought in from elsewhere. In the case of Ceara, there already existed a chipper made by a local fabricator which generally gives a rather low performance (2-2.5 ton of roots per hour). Since most of the groups organized operated drying areas larger than 400 square meters it was decided to develop another chipper with greater output capacity. This new chipper was designed by CIAT and fabricated by a local workshop.

Now in operation it gives an output of 10 ton/hour, four times that of the one formerly in use. This advanced type of chipper is now being used by several groups and it is anticipated that it will soon become standard installation at all participating drying plants.

**3 C Commercialization** The operational assumption basic to this activity is that as a result of the project, alternative market for the cassava crop of small-scale farmers will develop through the selling of sun-dried cassava chips to manufacturers of animal feed for use as partial substitute for cereal in feed composition. While this has been the case with similar projects in Colombia and Ecuador, it was not realized in Brazil during the first year of the project.

Most of the dried cassava produced in Ceara was bought directly by dairy farmers in the vicinity of the drying plants. Of the 115 consumers for the product during 1989, only three were commercial manufacturers of animal feed. However, they accounted for 30% of the purchase. Table 3 C shows the distribution of customers for dry cassava in Ceara in 1989.

The limited attraction of commercial feed manufacturers to the dry cassava market in Ceara may be due to the fact that these manufacturers are high volume consumers of production raw materials. Since the output of the cassava drying plants was low during the year it was not sufficient to stimulate the interest of these buyers. It is expected that with an expansion of production and increased supply of dried cassava chips during year two of the project there will be a positive change in the situation.

Table 3.C - Commercialization of Dry Cassava in Ceara  
1989

Organization	Dry Cassava Produced (Ton)	# of Consumers Per Ton Bought					Purchases by Animal Feed Producers Ton
		Total	<1 Ton	1-5 Ton	6-10 Ton	>10 Ton	
Lagoa Grande	44 40	25	18	6	1		
Solidao	38 10	3		1	1	1	24 7
Jua dos Vieiras	38 95	11	4	4	1	2	12 9
Poco dos Cavalos	45 07	6	5			1	43 1
Folha Larga	34 00	24	10	14			
Lagoa do Mato	17 45	1				1	
Barreiro	16 71	25	18	7			
Serra Mondeu	13 77		OWN CONSUMPTION				
Dourado	1 32		OWN CONSUMPTION				
Cachoeira do Boi Morto	6 80	12					
Queimadas	6 92	4	1	3			
Serra de Santana	1 97	4	1	2		1	
TOTAL	265 46	115	68	38	3	6	80 7

### 3 D Organization

3 D I Organization of Institutions Institutions concerned with the production and processing of cassava in Brazil exist at the national state, regional and local levels. These institutions are vital to the successful implementation of the project and to the sustaining of the activities initiated by the project. Since these institutions constitute an important part of the project's task environment it is necessary that they be incorporated into the organizational structure for the implementation of the project. This is been accomplished in the following manner:

National Level As stated in the project proposal an Advisory Council should be established at this level to provide general guidance to the project. It has since been determined that this is not necessary. Consequently it has not been pursued (acronyms are defined in Annex 1)

State Level At this level the Ceara State Cassava Committee (CCC) has been organized. It is composed of technical and administrative representatives from State agencies concerned with the cassava crop. Among these are EMATERCE, CEPA and COCENTRAL. CIAT is also represented on this Committee.

Its purpose is to plan and coordinate State wide project activities. It is chaired by the Ceara State Secretary of Agriculture and is scheduled to meet once a month. To date it has been meeting as scheduled. To ensure that operational inputs are available when needed and the support of collaborating institutions is maintained the committee has appointed an Executive Leader and established channels for constant contact with the offices of Research and Extension services located in the zones of activities.

Regional Level. The organizational plan requires the establishment of Regional Cassava Committees, one for each zone.

of operation, and each composed of representatives from farmers' organizations and technical support agencies. The purpose of these committees is to decentralize the administration of the project and facilitate maximum bottom-up input into the decision making process.

Progress has been slow in the setting up of these committees. During the reporting period only one of these committees has been officially established. The responsibility for the formation of these committees rests with the CCC which is now committed to the stimulation of activities in this area during the second year of the project. It is expected that four additional Regional Committees will be created during this period.

**Local Community Level** The organizational plan for this level calls for the creation of technical teams composed of agricultural extensionists, social extensionists and Subject-matter Specialists drawn from area Research and Rural Extension agencies. These teams are to function under the coordination of the respective Regional Cassava Committees for the purpose of stimulating the formation of community based farmers groups for integrated cassava production and processing activities in the target areas.

**3 D II Organization of Farmers** The establishment of small-scale farmers organizations for the installation and administration of integrated cassava production and processing operations is central to the success of this project. Progress in this area has been hampered by slow developments in the CCC at the State level. However, the following has been achieved during the reporting period:

Twelve existing but dormant farmers groups were reorganized and, or, reactivated. Although the majority of these groups were established long before the initiation of this project they were not experienced in the operation of small-scale commercial



enterprises under the supply and demand system of agroindustrial production. This was because they were oriented basically towards the "farinha houses" type community-owned enterprise common to North East Brazil. Another 12 cassava farming groups were organized during the year and should begin processing activities in August 1990.

The organizational structure is diagramed on figures 1 and 2.

**3 E Training** During the reporting period several important events related to this activity were accomplished. These events are detailed below.

Event	Type of Training Event	Participants		Date
		Technicians	Farmers	
1 Planning Meeting	Induction	26	16	07/09/89
2 Course on Cassava Processing	Component Related (Processing)	30		14/18/89
3 Seminar on Community Organization	Component Related (Organization)	35		17/19/89
4 Course on Cassava	Component Related (Production)	38		27/11 01/12/89
5 1 Annual Meeting of Farmers Managers	Component Related (Evaluation)	14	17	

Additionally, Excursion and Special Cassava field days were utilized for training and information purposes. These events are presented in the following schedule.

CEARA INTEGRATED CASSAVA DEVELOPMENT PROJECT  
ORGANIZATIONAL STRUCTURE - NATIONAL LEVEL

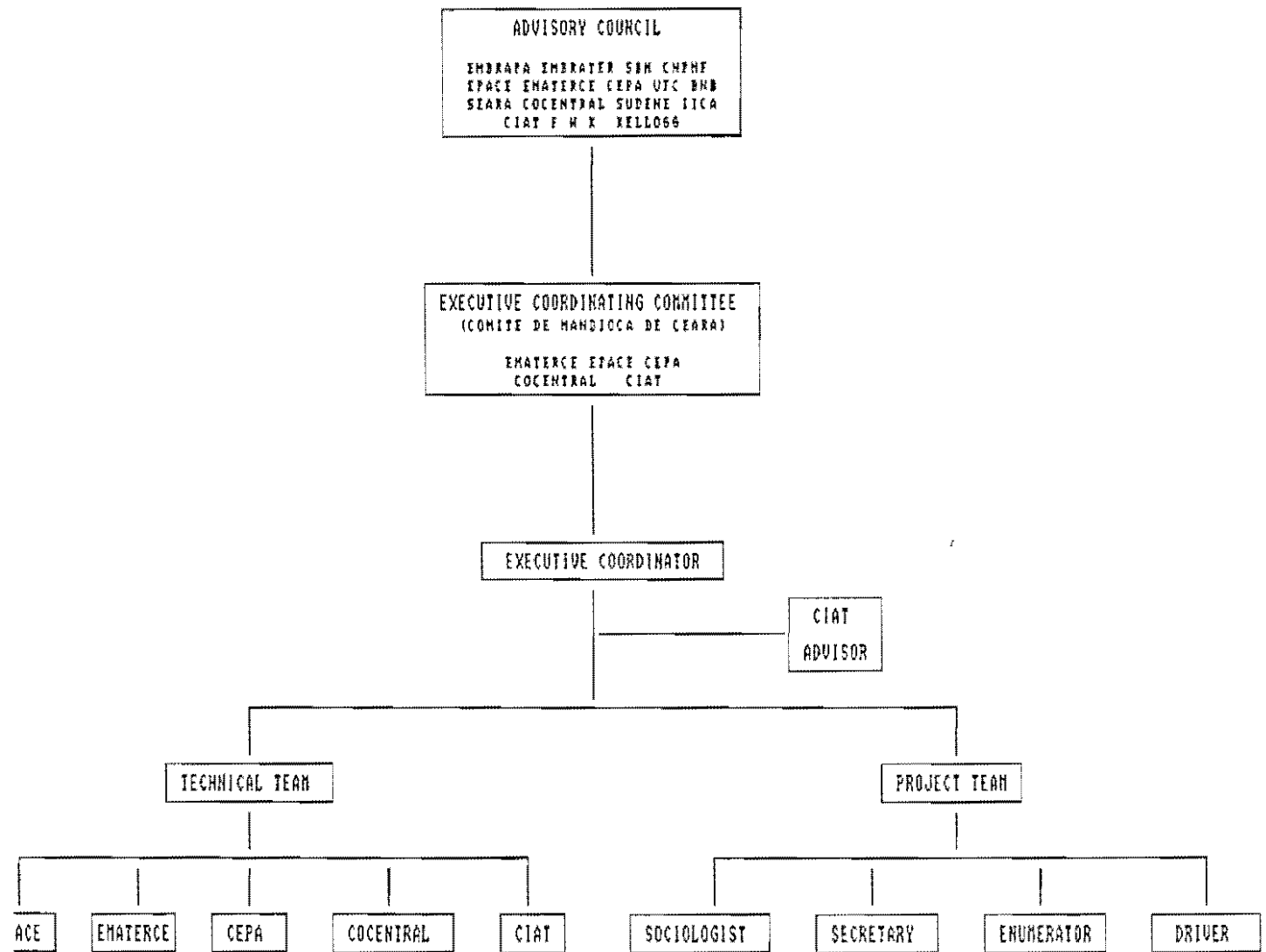
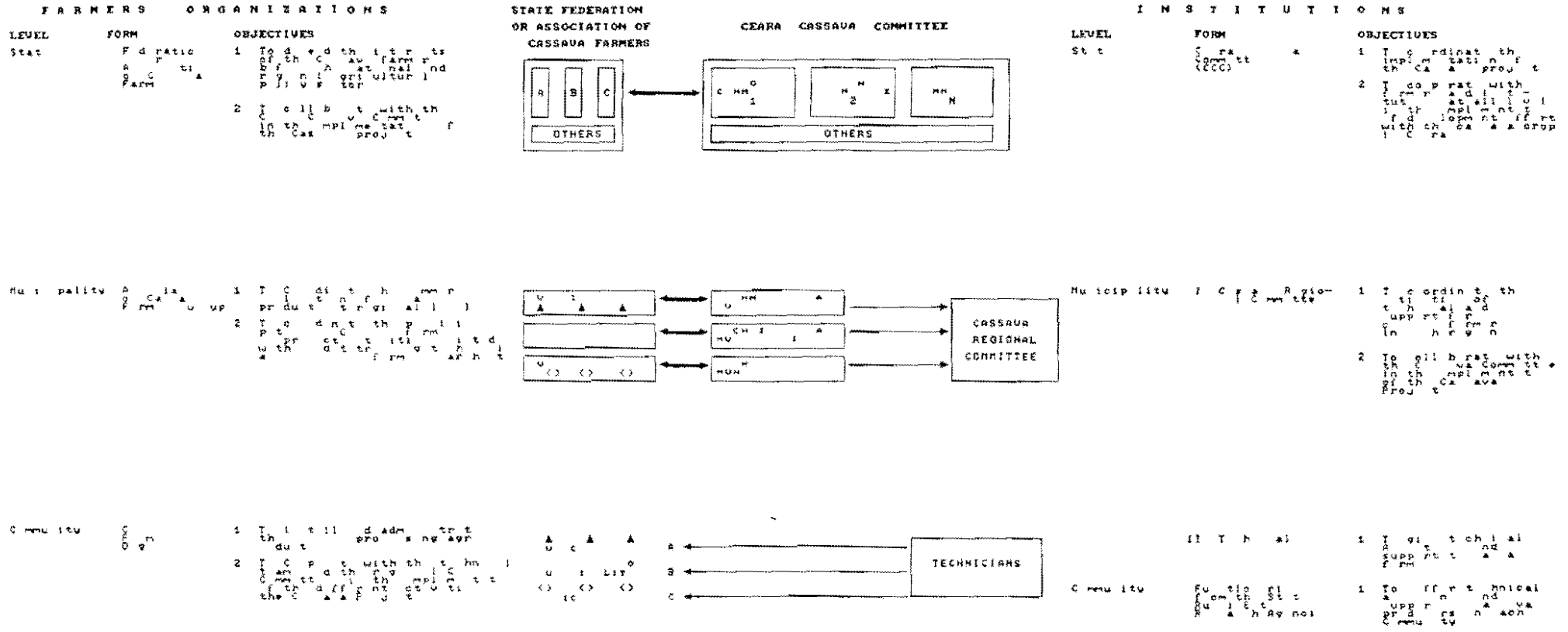


FIGURE 2

CEARA INTEGRATED CASSAVA DEVELOPMENT PROJECT  
ORGANIZATIONAL STRUCTURE - STATE LEVEL



Region	Type of Training Event	Participants		Date
		Communities	Farmers	
Itapipoca	Excursion	1	8	12/09/89
	Excursion	1	18	27/09/89
	Special Field Day	24	100	30/10/89
Ubajara	Excursion	2	15	10/07/89
	Excursion	1	17	08/09/89
	Excursion	1	10	15/09/89
	Excursion	1	15	17/10/89
Sobral	Excursion	7	35	23/05/89
	Excursion	1	5	23/08/89
	Special Field Day	5	20	03/10/89

#### 4. Monitoring and Evaluation

##### 4.A Characteristics of the Participants in the Project

4 A I Land Tenure Currently there are 25 active farmers groups in the project. Members of these groups operate their holdings under three types of land tenure systems-owners, share-croppers and renters. Data on these systems are presented below.

Table 4.A I - Land Tenure of Cassava Farmers  
1989

Type of land Tenure	Frequency	%	Percentage cumulative
Owners	370	66.0	66.0
Share croppers	72	12.9	78.9
Renters	118	21.1	100.0
TOTAL	560	100.0	
Valid cases	560	Missing cases	0

4 A II Age of Participants - 1990 The majority of project participants falls between the ages of 30 and 60, with less than 20% below 30 and 13% above 60 This will become the base line data for the monitoring of participants This information is presented in graph 4 A II below

4 B Size of Cassava Farmers Organizations. The optimal size for participating farmers organization is still to be determined This is because many participating groups are in transition from community groups originally organized around communal activities such as cassava flour houses (casas de farinha), communal wells (cisternas) and communal stores (armazens) The base line information collected on these groups is presented in the following chart

# AGE OF MEMBERS, 1990

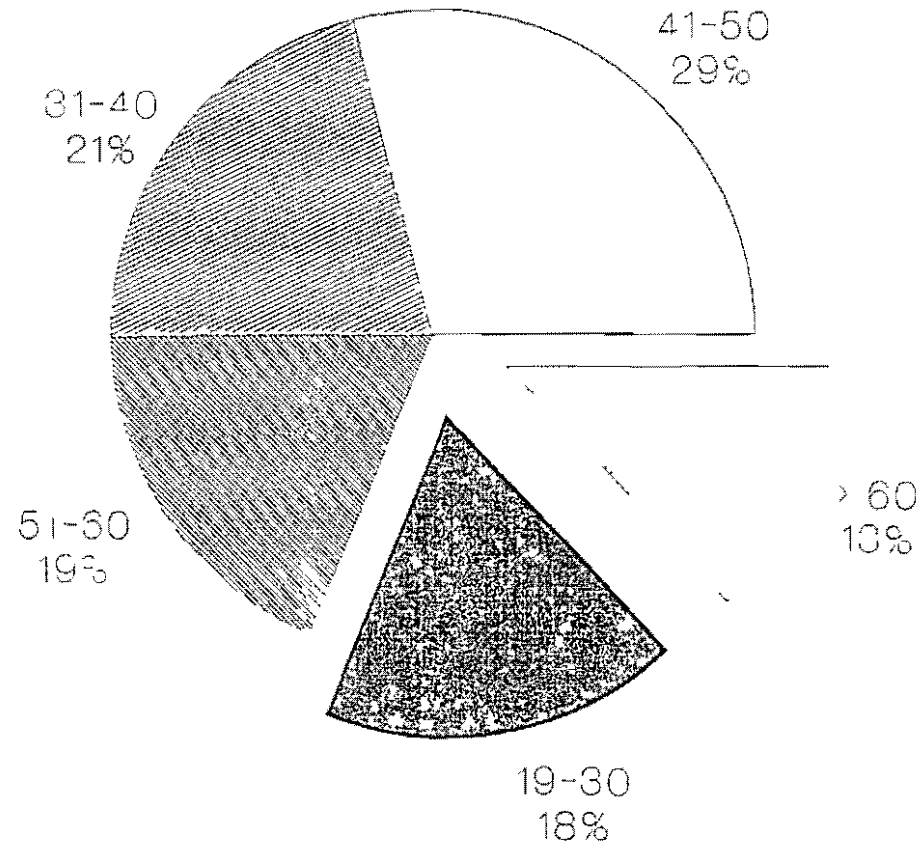


Table 4 B - Size of Cassava Farmers Groups - 1990

Region	Municipality	Community	# of Members	Percentage Cum
Uajarara	Vicoso Ceara	Jua dos Viera	23	4.1
		Queimadas	9	1.6
		Macajetuba I	38	6.8
	Sao Benedito	Barreiros	49	8.8
	Uajarara	Cachoeira Boa	22	3.9
			141	
SOBRAL	Granja	Angelim	18	3.2
		Folha Larga	34	6.1
		Iboassu Velho	41	7.3
	Mucambo	Carqueijo	18	3.2
	Santana Acarau	Alvaca/Goitabe	10	1.8
	Camocim	Corrego Branco	20	3.6
			141	
ITAPIPOCA	Itapipoca	Marinheiros	19	3.4
		Traini	Poco Cavalos	19
	Cruz	Solidao	16	2.9
		Acarau	Lagoa Grande	20
	Bela Cruz	Lagoa do Mato	19	3.4
	Itarema	Lagoa Mineiro	12	2.1
			105	
LIMOEIRO	Aracati	Aroreira	24	4.3
	Morada Nova	Patos/Aruaru	56	10.0
		Dourado	23	4.1
			103	
QUIXADA	Quixada	Sistema	19	3.4
CARIRI	Santa Cariri	Serra Mondeau	07	1.3
	Assare	Serra Santana	16	2.9
	Salitre	Pau Bandeira	17	3.0
	Aranipe	Sao Vicente	11	2.0
			51	
		TOTAL	560	100.0

4 C. Cassava Production An assumption basic to this project is that if given the possibility of alternative markets for their crop, resource-poor small-scale cassava farmers are likely to increase their production Two factors of production are being monitored to test this assumption These are (1) size of cassava plots planted by small farmers, and (2) the relationship between plot size planted and land tenure system

4 C I Size of Cassava Plots Planted (1988-1989) Base line information on the size of cassava plots planted by small scale farmers in the project area has been collected Preliminary analysis of this data indicates that plot size does not generally exceed one hectare per farmer (see Table 4 C I) Monitoring of this factor is being continued to determine if any future changes may be attributed to the impact of the project

Table 4 C I - Cassava Plot Size - (1988 and 1989)

Area Planted (ha)	Frequency		Percentage	
	1988	1989	1988	1989
0 0 1 0	247	232	48 9	43 8
1 1 2 0	163	184	32 3	34 7
2 1 3 0	42	58	8 3	10 9
3 1 5 0	37	35	7 3	6 6
> 5 0	16	21	3 2	4 0

4 C II Plot Size and Land Tenure System (1988 - 1989)  
Initial data collected on this factor suggests a similarity of size of lots planted by share-croppers and renters but significant difference between these two categories of land holders and the small holders whose cassava areas are generally



larger Date for 1988 show that small holders participating in the project were planting 60% more than share-croppers and 35% more than renters In 1989 the difference shown were 47% and 43% respectively This suggests an increase in production of share-croppers in comparison with small holders, but a comparative decline in the case of renters (see Table 4 C II) Monitoring of this situation is continuing

Table 4 C.II - Land Tenure vs Cassava Plot Size (1988 and 1989)

Land Tenure	Mean Cassava Area Planted (Ha)	
	1988	1989
Owners	2 11	2 22
Share croppers	1 30	1 51
Renters	1 60	1 55
Entire Population	1 90	1 99

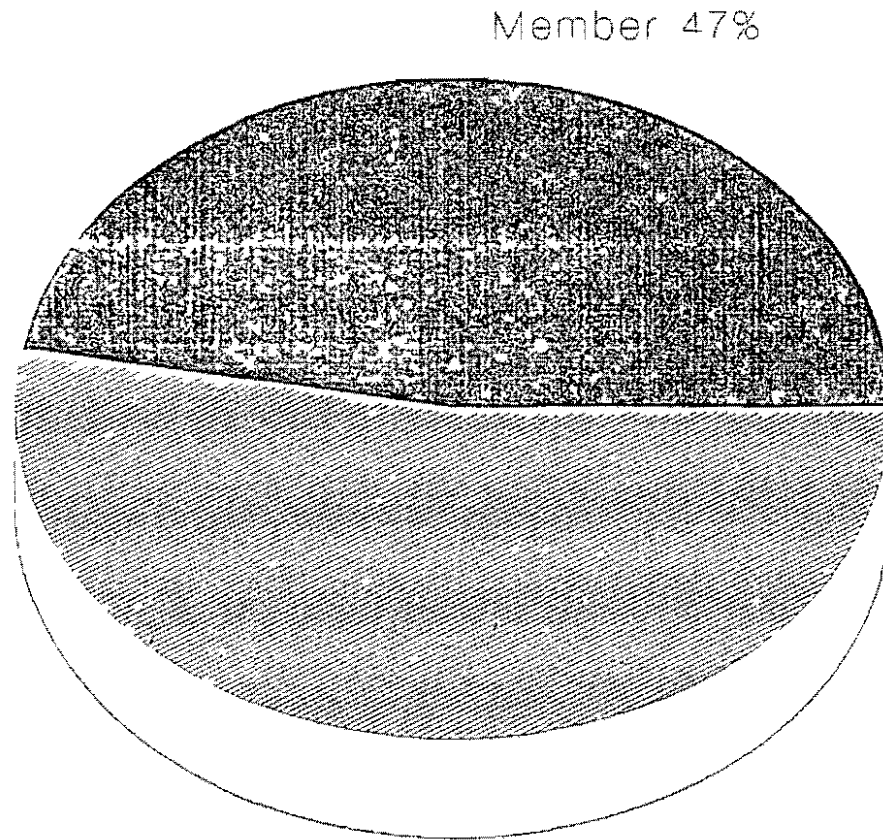
4 D Results of First Processing Season During the first year, 12 groups were participating in production of dry cassava The results obtained are described below

4 D I Cassava Sales 53% of the cassava roots processed in the first season were coming from non-members around the processing units and 47% from the members (see Graph 4 D I) Of the cassava roots sold to the processing units by the members, 69% was coming from small holders, 22% from renters and 9% from share-croppers (see Graph 4 D II)

4 D II Cassava Processing Wages The production of dry cassava generates employment which benefits by the farmers members of the processing groups During the first season, the

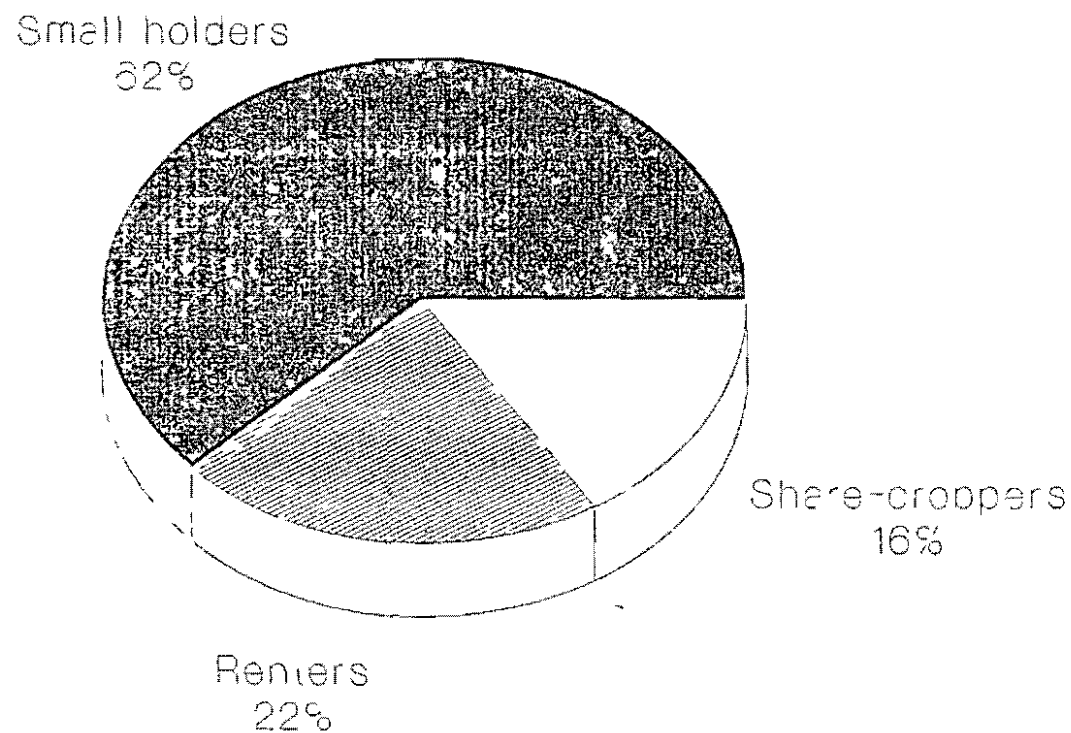
FIGURE 4 D I

# Cassava Roots Sales, 1989 (%) by Membership



Ceara Cassava Project

# CASSAVA SALES, 1989 (%) by MEMBERS by LAND TENURE



wages paid at the cassava drying plants were distributed as follows 52% to the small holders, 35% among renters and 13% among share-croppers (see Graph 4 D III)

4 D III Total Income 1989 The total income earned by the 12 groups which were processing cassava in the first year is presented in the graphs below It can be seen that 58% of the total income earned in 1989 by the processing groups went to small holders, 32% to renters and 10% to the share-croppers (see Graph 4 D IV)

Additionally, the distribution of this total income according to the size of cassava plots shows that more than 70% of the total income obtained in 1989 in the processing plants went to those farmers whose area planted is between 1 0 and 2 0 hectares and that those farmers with more than 3 0 hectares received less than 10% of total income (see Graph 4 D V)

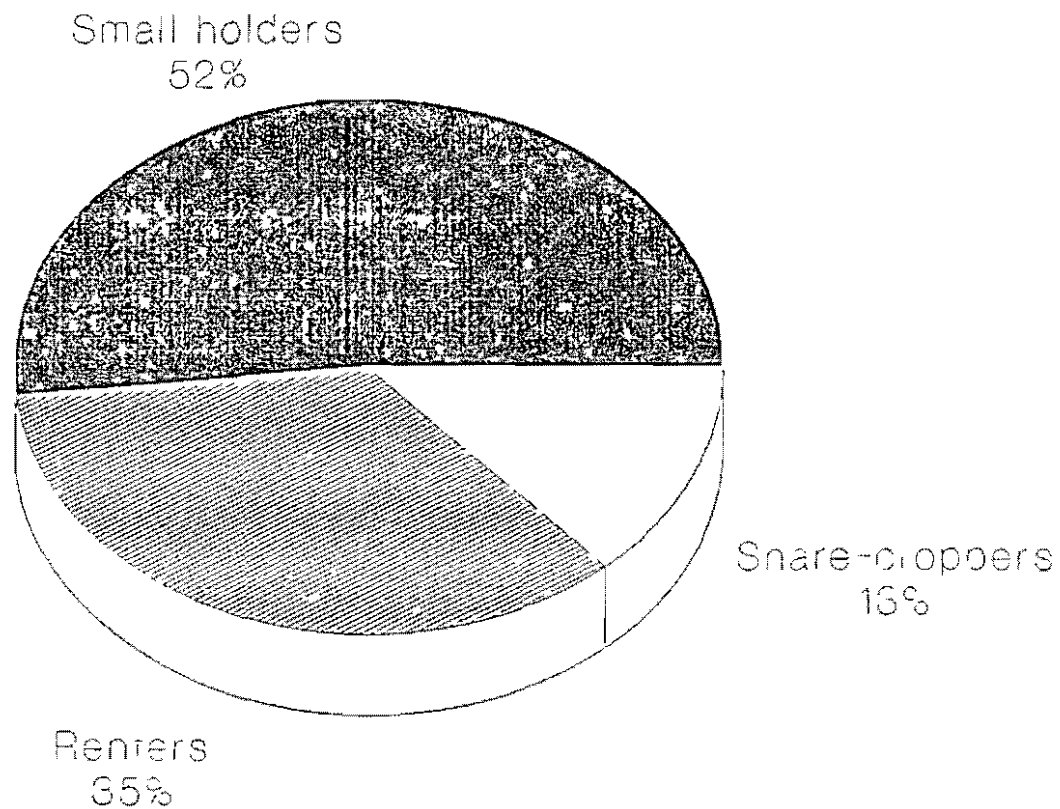
## 5. Sustainability

During the first year of operation the project has encountered two important constraints which may impact negatively on the sustaining of activities after the grant is expired These constraints are (1) financial, and (2) organizational

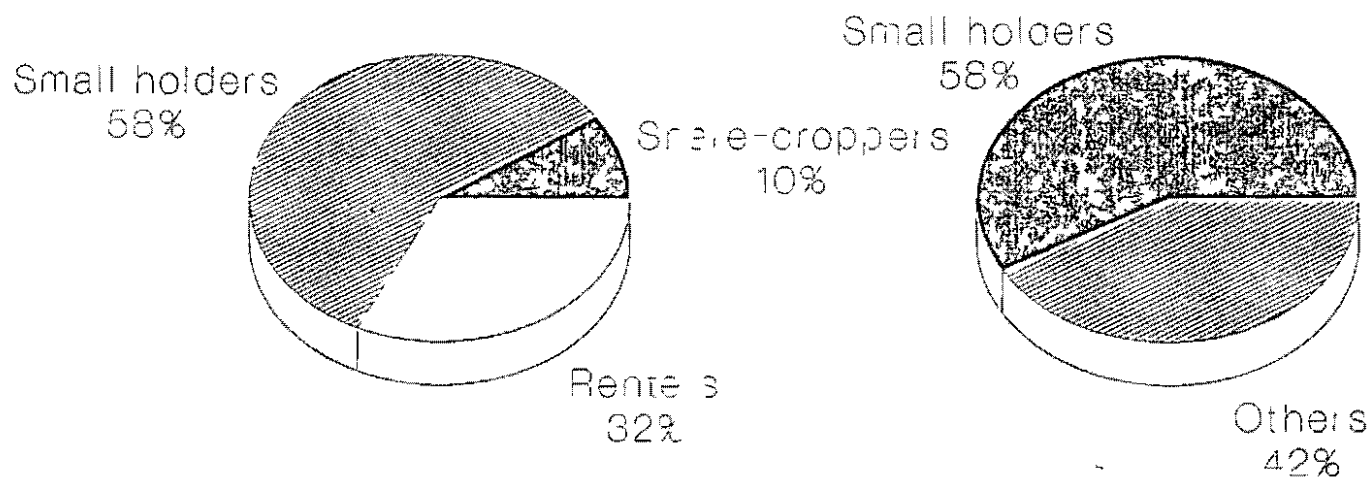
Financial Constraint Since the initiation of the project, continuing effort is being made to attract local public and private funding to support the activities stimulated by the project So far there has not been much success in this area due in large part to the general national economic situation

The strategy being adopted to deal with this problem is the concentration of effort to articulate of farmers demand for financial resources through active participation in the newly formed "Constitutional Fund for North East Brazil" This recently established credit program is a potential source of

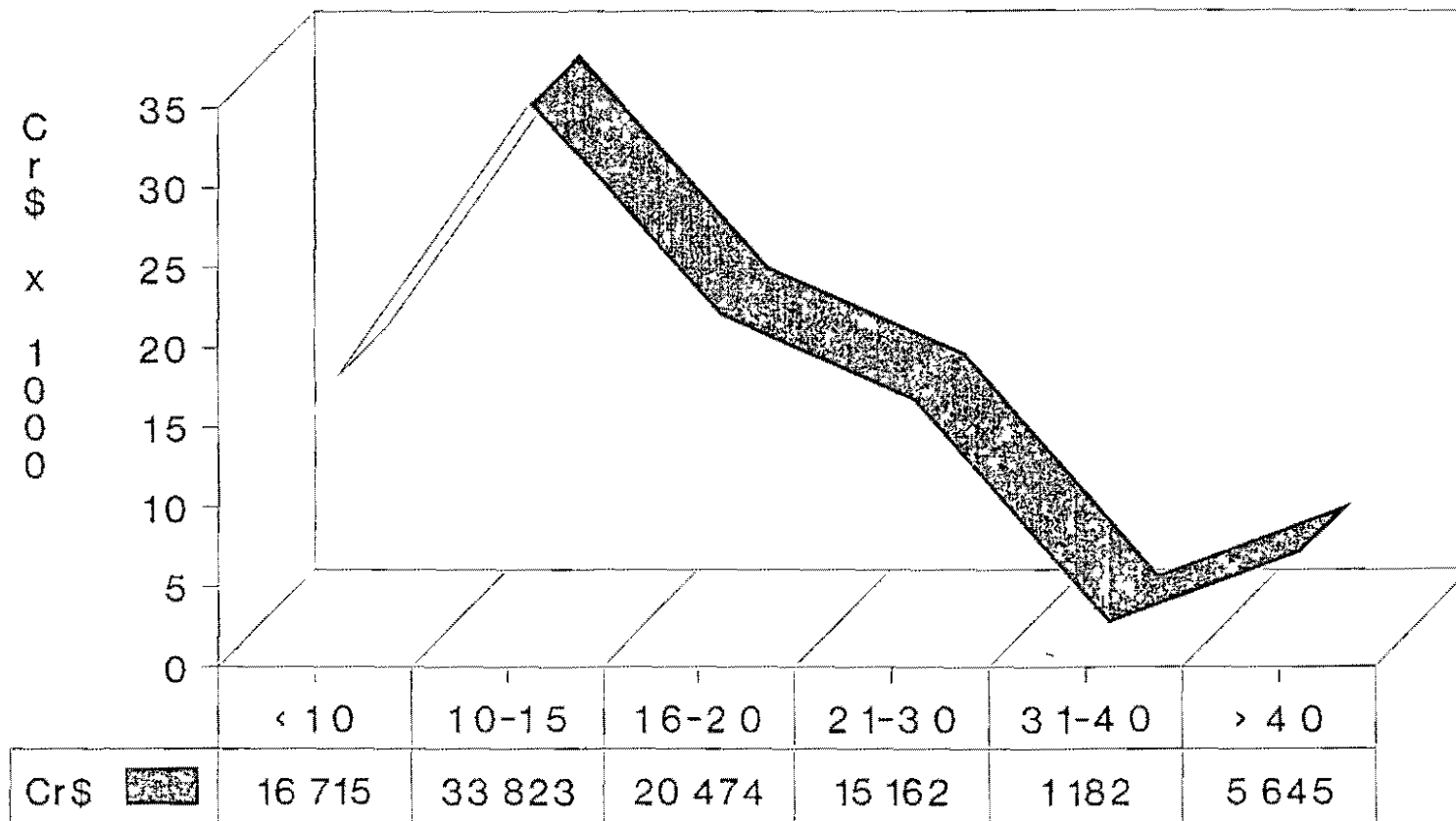
# WAGES 1989, (%) by LAND TENURE



# TOTAL INCOMES 1989, (%) by LAND TENURE



# Total Incomes, 1989 (Cr\$) by Cassava plot size, 89 (ha)



funding for the sustaining of project stimulated activities after the grant runs out

Organizational Constraint This constraint stems from the newness of the organizational structures being instituted. This necessitates time for understanding, acceptance and assimilation by the local agencies and project participants.

The strategy being used to deal with this constraint is to increase orientation efforts aimed at expanding the understanding of the need for these structures and their proper functioning, and providing training opportunities to develop local capacity for the management of these structures in the absence of the external support currently made available through this grant.



### FUTURE PLANS

A The activities that the project intends to pursue during the second year are as follows

Type of Activity	First Year		Second Year	
	Proposed	Realized	Proposed	Goal
1 Establishment of small scale cassava processing farmers groups	25	25	40	20 *
2 Installation of pre production trials	25	16	40	30 **
3 Installation of seed plots	25	16	40	30 ***
4 Training events				
4 1 Technicians	04	05	06	06
4 2 Farmers	03	03	04	04
5 Special studies				
5 1 Cassava production and Utilization systems in Ceara			01	01
5 2 Cassava Commercialization systems in Ceara			01	01
5 3 Socio Economic Study of project beneficiaries			01	01

\* A reduction in the originally proposed number of farmers groups is expected due to prevailing economic situation in Brazil

\*\* and \*\*\* Inflation rates in Brazil had caused increments in costs of these two activities and the goals have been reduced consequently

B Evidence of Project Replicability

This project is modeled after similar integrated cassava projects in Colombia and Ecuador. With specific reference to Brazil the CCC has already been contacted by local agencies of three other states - Bahia, Paraiba and Pernambuco - for advice on planning similar projects for which they are actively seeking funding support.

## ANNEX 1

## ACRONYMS\*

CEPA	Comissao Estadual de Planejamento Agricola (State Agricultural Planning Commission)
CIAT	Centro Internacional de Agricultura Tropical (International Center of Tropical Agriculture), Cali, Colombia
CNPMF	Centro Nacional de Pesquisa de Mandioca e Fruticultura (National Research Center for Cassava and Fruits)
COCENTRAL	Cooperativa Central dos Produtores de Algodao Ltda (Central Cooperative of Cotton Producers)
EMATERCE	Empresa de Assistencia Tecnica e Extensao Rural do Ceara (Ceara State Technical Assistance and Rural Extension Agency)
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuaria (Federal Agricultural Research Company)
EMBRATER	Empresa Brasileira de Assistencia Tecnica e Extensao Rural (Federal Assistance and Rural Extension Company)
EPACE	Empresa de Pesquisa Agropecuaria do Ceara (Ceara State Agricultural Research Agency)

---

\* Unless otherwise indicated, these acronyms refer to Brazilian  
Intitutions and Companies

IICA Instituto Interamericano de Cooperacao para a  
Agricultura  
(Inter-American Institute of Cooperation for  
Agriculture)

CETREX Centro de Treinamento da EMATERCE  
(Training Center of the Ceara State Technical  
Assistance and Rural Extension Agency)

BNB Banco do Nordeste do Brasil  
(Bank of Northeast of Brazil)

SBM Sociedade Brasileira de Mandioca  
(Brazilian Society of Cassava)

SEARA Secretaria de Agricultura e Reforma Agraria  
(Ceara State Secretariat of Agriculture and Land  
Reform)

SUDENE Superintendencia do Desenvolvimento do Nordeste  
(Superintendency for the Development of the  
Northeast)

UFC Universidade Federal do Ceara  
(Federal University of Ceara)

CCC Comite de Mandioca do Ceara  
(Ceara State Cassava Committee)

PAPP Programa de Apoio ao Pequeno Produtor  
(Program of Support for Small Farmer from SUDENE)

ETENE Estudos Tecnicos e Economicos no Nordeste  
(Technical and Economics Studies for North East -  
BNB)

SAO VICENTE Programa de Desenvolvimento Rural da SUDENE  
(Rural Development Program from SUDENE)

FADA Fundo de Apoio ao Desenvolvimento Agrícola  
(Fund of support for Agriculture Development from  
PAPP)

BIRD Banco Internacional para Reconstrucao e  
Desenvolvimento  
(International Bank for Reconstruction and  
Development)

OCEC Organizacao das Cooperativas do Estado do Ceara  
(Ceara State Cooperatives Organization)