REPORT ON MEXICO'S CASSAVA PROGRAM 1977-1987

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TABLE OF CONTENTS

INTRODUCTION

In November 1981 a group of 20 farmers initiated in Huimanguillo the cultivation of cassava under the auspices of the national Cassava Program This event constituted the culmination of years of patient preparation of the technological, institutional and political conditions conducive to the Program's implementation

As early as 1975 the Ministry of Agriculture (SAG today SARH) the National Institute for Agricultural Research (INIA today INIFAP) and the now closed College of Tropical Agriculture (CSAT) had shown interest in establishing technological cooperation with CIAT for cassava INIA had cassava seed collections dating from the 1950s that included international materials It also had cassava experimental plots in several states, In many cases economic endorsement had been provided by the National Bank for Rural Credit (Banrural) In 1976 the Bank of Mexico's Trust for Agricultural Concerns (FIRA) manifested its interest in the potential use of cassava as pig feed by supporting the organization of an International Seminar on Tropical Livestock Production

These institutions agreed that Mexico needed to create a national cassava program The first proposal defining the Program's objectives and strategies was drafted in early 1977 at the request of Banrural An official Project for Research on Cassava drafted by CSAT INIA FIRA and CIAT staff was sanctioned in June 1977 A few months later CSAT and INIA staff initiated the National Cassava Program's research activites

By 1980 INIA assessed that it had made sufficient progress on variety selection and production technology generation to warrant the organization of a training course for extension agents INIA and INIP researchers and functionnaries of agricultural support organizations One year later the commercial Cassava Program was launched

During its five years of development the commercial Program has provided farmers with important services and large amounts of capital and other resources have been invested by the state in this effort Yet the results are still disconcertingly unstable

The Program has been organized in such a way that too many critical activities are controlled and managed by state agencies Farmers have a very limited opportunity to voice their views on ways in which the Program should operate and could be improved Production and processing input and output decisions market outlet and marketing strategy definition and even profit distribution decisions are all in the exclusive domain of Program officials This arrangement is not efficient The Program depends heavily on rigid and less than efficient institutional procedures which discourages increments not only in production but also in processing and selling Very little effort has been invested to tailoring cassava production according

to the particular conditions of the farmers and the product's commercial outlet There is an excessive concern on the part of state officials regarding the expansion of the area under cassava production without ensuring the conditions for such growth

Cassava development under the Program continues to be a highly risky business Production processing and marketing are planned and implemented without coordination nor clear linkages among each other Production and profitability are lower than expected because of the untimely delivery of state controlled inputs and services and the lack of incentives for farmers to carefully tend their fields There is plenty of processing technology resources available but they have been utilized in an unplanned and inefficient fashion Marketing of the produce has been conducted in an ad-hoc and rather passive manner, and has concentrated it efforts on very limited market outlets often with low capital liquidity As a result the Program is perceived by a disturbingly large proportion of the farmers as a disappointment and a postponement of many hopes and expectations

This report describes the elements that contribute to making the Cassava Program fall short of its potential It concludes that a broad spectrum of interventions are required to reorient the Program in a way which encourages the farmers' committed and stable participation and the economic soundness of the project These interventions are expected to alleviate the pressure that results from the Program's Achilles heels

Highlights of the Agroindustrial Cassava Program

The Cassava Program has provided farmers with several benefits Cassava cultivation incorporated into commercial production idle land which was marginal Prior to the creation of the Cassava Program farmers left a large proportion of their lots in bush fallow with no intention to produce from them For most farmers extensive cattle ranching on those lands is ruled out due to the relatively high capital requirements of this enterprise and the relative small size of the farmers' plots (Most family landholdings are less than 10 hectares)

Cassava production has increased from approximately 1% of the land under cultivation in the municipality of Huimanguillo in 1981 to some 20% in 1985 (These calculations are based on data provided in SPP 1985 This should be used with caution however because SPP's crop data is not exhaustive) Cassava rated higher in reference to the savannah region only Since then the proportion of cassava in the total agricultural land has probably reduced some but it is still very significant The main transformations in recent years have been the expansion in the production of citrus rubber and pineapple Pineapple occupied 250 hectares in 1986 It is perhaps the most profitable crop of the savannah Although it requires higher capital investment per hectare there is not bank credit available for its production Rubber trees were planted in 1982 and 1983, and cover some 700 hectares FIDEHULE has provided credit for planting and fertilization Most plants however have not been grafted and hence their productive development has been stunted Citrus trees were planted in 1984 and 1985 and cover a total of 825 hectares Competition for

resources with cassava is expected in the near future especially from citrus and pineapple

The Cassava Program has also created a source of employment for over 500 savannah inhabitants who have participated in the production of the crop since 1981 and some 45 farmers who are engaged in cassava drying some of whom are not cassava producers In addition the Program has been instrumental in setting up 14 pig farms and by providing raw material for feed, it has contributed to the operation of silos in the Plan Chontalpa development program 3 pig farms in Yucatan and Puebla Albamex of Merida and to a few other feed users

Another important gain for cassava producers but also farmers in general has been the construction of infrastructural facilities as a part of the state support of the Program Perhaps the most significant investment of this sort has been the building of roads It is calculated that the most direct beneficiaries of this intervention are the some 7 500 savannah inhabitants spread throughout 5 communities

Farmers have also profitted from the Program insofar as they have been able to broaden the use of production factors that were made available primarily for cassava cultivation A large proportion of the land that was cleared from brush and tress in 1983 and 1984 is no longer under cassava cultivation although it remains under crop production Also a considerable percentage of the farmers in the Cassava Program regularly use inputs included in its technological package for growing other crops Fertilizers stand out among these inputs On occasions herbicides and mechanical traction have also been diverted These inputs are used largely for the production of subsistence crops such as maize and beans Since there is no credit available for the production of either of these staples and the poor quality of the savannah's acidic soils is not conducive for their growth this is an important albeit unplanned benefit resulting from the Cassava Program

An important contribution of the Program which usually goes unmentioned is the reinforcement of the market for fresh cassava As previously stated the Program has concentrated on cassava production for feed Consequently the improved variety Sabanera that INIA released in B1980 was not bred for its pallatability or response to other desirable traits for human consumption In comparison to customary varieties this new variety is perceived by farmers as more resistant to plagues but more fibrous and woody Hence Sabanera generally is less suited for the preparation of some dishes These traits nevertheless have not prevented the use of finely shredded Sabanera mixed with corn dough in the making of tortillas The relevance of the cassava produced under the Program in the tortilla making business is partially indicated by the fact that private traders buy truck loads of Sabanera for this purpose At present, cassava produced in Huimanguillo is being sold in the municipalities of Cunduacan Jalpa and Nacajuca Although no studies are available to ascertain the proportion of cassava that is sold in Mexico's rural and urban markets my observations in Tabasco and other suggest that cassava has more commercial importance than it is commonly given credit for

The Cassava Program has also contributed to the general development of agriculture and indirectly to the livelihood of Tabasco s farmers It should be recalled that prior to the creation of the Program research on annual cultivars was virtually non-existent in Tabasco Only investigations on pastures for beef production were being carried out by CSAT This indicates the relatively low involvement of the government in the development of agriculture in the state up to that point with the exception of the Grijalba and Chontalpa development schemes In this setting the Cassava Program heightened the awareness of state officials of the many possible contributions that the tropical zone could grant to the nation as a whole Cassava gained national visibility for Tabasco and southern Mexico The Program was the most important catalyst for governmental interest in agriculture for the entire region in the early 1980s Hence it indirectly contributed to the development of many crops under the auspices of official institutions Certainly a critical mass of organizations and resources that were nucleated around cassava were eventually used for other annual crops Similarly a good deal of technical personnel who today work with other cultivars gained their initial expertise through their involvement in the Cassava Program

In synthesis the Cassava Program has contributed to the development of Tabasco on several areas It made possible the incorporation of underutilized land into commercial production and was instrumental in the creation of jobs for rural inhabitants The program served as a catalyst for the state to build roads and bridges and broaden the scope of agricultural production in the region Finally if reinforced the supply of foodstuff for rural and urban dwellers

Inadequacies of the Agroindustrial Cassava Program

While the contributions of the Cassava Program to date have been significant, there are still areas in which an improvement is needed There are impediments which have emerged throughout the implementation of the program that were not foreseen in the past but must be resolved today These impediments require immediate attention as they are intrinsic to the program goals By overcoming these obstacles the growth and strength of the cassava program will be facilitated both at the state and the national level

1 There was/is very limited integration between production, processing and marketing of cassava

When the Program was created in Southeast Mexico there had been relatively little history in production and utilization of the cassava root Most cassava was produced in small quantities in tiny areas within the farmers' plots Generally, farmers used either a team of horses or oxen to draw the plow or small tractors Manual weeding and harvesting were usually associated with this crop The norm was to use no chemical fertilizers and in general cash requirements were extremely low If investment were made these were short term By and large cultural practices were stable and well defined even though there was room for an improvement in the mean net return Most cassava was used for on-farm

consumption as a vegetable or as fodder This situation still largely applies to cassava production in areas outside the Program's domain

Thus the Program necessarily defined demand in terms of potential demand The argument was that Mexico was not self-sufficient in the production of carbohydrates Although some 8 5 millons of tons of corn and 5 5 millons of tons of sorghum had been produced yearly in the early 1970s, Mexico had been forced to import 2 millon tons of corn and 350 thousand tons of sorghum At that time these imports amounted to almost 320 000 dollars It was reckoned that if Mexico could produce cassava these imports could be at least reduced In order to substitute half of the imports however Mexico had to establish over 100,000 has At that time there were some 3 000 has cultivated to cassava most of them in Chiapas state Southeastern Mexico was importing grainfeed for swine and poultry production Very little sorghum was produced in the area

The Program's goals unmodified since 1977 called for a sharp increase in the production areas and productivity of cassava within a very short time period In 1977, the Program aimed at having 120 000 hectares under cassava production by 1983 In 1981 the target area for 1986 was sensibly reduced to 10 000 hectares During the past four years quoting specific production goals has become both unfashionable and politically unwise but the dramatic change is still expected to occur

The initial assessment of the potential demand for cassava as feed was perhaps too optimistic but there was enough potential demand to warrant the Program The Program was launched Alas the way it was planned and implemented was haphazard and uncoordinated The potential demand was not systematically estimated in a market analysis but in 1986 i e ten years after the program was initiated (Saez 1986) Furthermore the Program did not define a clear and consistent strategy for the potential demand to be realized

In 1977 the Program's plans recognized the need for interventions in the areas of production, processing and marketing of cassava Yet over time the Program's goals and activities became increasingly focused almost exclusively on production This is explained in part by the fact that practically all the professionals involved in one capacity or another were specialists on production but also because there was no plan showing the way in which production processing and marketing would be integrated By 1981 the Program was no longer an agroindustrial cassava program but rather a cassava production one The goals were defined in terms of expanding the area under production Production was not perceived as one step in a chain which comprised processing and marketing The aim was not to produce animal feed which was accepted in the market but instead to produce cassava Another source of distortion was the Program's definition of production tasks solely around technical concerns Very little effort was devoted to encouraging the active and profitable participation of farmers in the Program

In 1981 it was expected for an artificial drying plant operated experimentally by INIA to process all the cassava produced under the Program This drying plant turned out to be ineffective both technically

and economically Thus cassava planted in 1981 was harvested in 1983 and sold directly by farmers as a vegetable for human consumption Despite the lack of a reliable and cost-effective processing technology and the absence of linkages with feed processors Program officials encouraged an increment in cassava production One hundred and four hectares were cultivated in 1981 One year later 227 hectares were cultivated and 852 hectares were planted in 1983 By 1982 the group of 30 farmers who initiated the Program declined to continue producing cassava under its direction Since the soil was already prepared for cultivation extension agents were drafted to plant cassava instead of the farmers A high incidence of bacteriosis contributed to a decline in yields In 1983 it was necessary to use a mix of local varieties varieties from Centla Tab in addition to the new variety Cabanera Planting lasted till March in the midst of the dry season and then continued from June to August By now cassava was partly dried at INIA's drying plant and partly stored in silos in the neighboring Plan Chontalpa The construction of another drying plant started in 1983 but it was never functional

Although five sundrying patios were built in 1981 amounting to 1 400 sq meters in total they were not provided with chippers motors nor other supplementary equipment needed for their operation Thus did not process cassava until 1983 At the same time the Program did not launch a much needed strong campaign to render farmers aware of the potentials of sundrying and consumers knowledgeable of the uses of dried cassava This situation lasted till 1984 when processing began in two patios Active opening of market outlets for processed cassava was still inexistent though Processed cassava was sold to the now closed CSAT In 1985 as a result of the cassava glut a renewed interest in cassava sundrying emerged The Program built 10 more patios this time amountings to 12,000 m^2 total For these patios however only 7 had chippers and only 6 had motors to operate the chippers None of the patios built hitherto had wooden rackets, a weighing scale plastic cover for the product, shovels and wheel carts All of these tools are essential for the efficient operation of a patio The situation of unavailability of credit and market demand for processed cassava persisted Even under these conditions 211 tons of dried cassava were obtained in 1985 In 1986 Banrural gave credit for the operation of some patios for the first time Part of this credit was diverted by farmers for the purchase of tools needed for operation which were not provided by the Program Meanwhile extension agents could not provide technical assistance due to a lack of transportation vehicles Despite these constraints 763 tons of dried cassava were produced in 15 patios in 1986 At the end of 1986 7 more patios were incorporated into the Program totalling 14 000 m^2 Only one of them had chipper and motor None of them had the required support tools By March 1987 this situation was finally corrected All 17 patios were given the required instruments for their normal operation

During the past year Program staff have assigned a high priority status to getting the two industrial processing plants into full operation This focus however has inadvertedly conveyed to farmers the notion that these are mutually exclusive technologies Some patio operators have reported that they reduced or completely ceased sundrying cassava in response to official claims that the processing plants would soon be

functioning at full capacity As a result the potential complementarity of fuel - and sun-based processing technologies has been missed

Both methods of cassava drying are currently operating well below their capacities The drying patios have never processed over 10 tons of fresh cassava a day which would be their expected top performance Also the quality of the processed product is still very uneven The industrial plants still function at very low levels of economic efficiency with low outputs The estimated costs of producing one ton of cassava flour in the plants are 50% higher than its commercial price The plants are processing some 14 tons of fresh cassava per day about 80% lower than their originally advertised capacity Once technical and administrative adjustments are completed it is expected that their processing performance will be considerably higher

Thus the Program was characterized by a sustained offensive effort insofar as production is concerned but a rather improvised and uncoordinated effort on processing and marketing

2 The profitability of cassava production under the Program is very low

Every year an estimated cost of production statement is prepared by the officers of SARH for consideration by Banrural and ANAGSA staff Upon its approval Banrural agrees to grant credit for the crop and ANAGSA insures this investment It is the norm to estimate the costs of land preparation planting fertilization and weed control according to prevailing commercial rates The costs of plague control and harvesting that are included in the budget however are not real or even possible costs They are supposed to represent unknown figures that will vary due to inflation It is impossible to make these calculations since the period before harvest may last up to two years due to problems in findings market outlets or restrictions in the processing capacity of the Program Because of the use of such estimations the figures that the official budgets quote seriously underrate the real costs of some activities and hence reduce the total cost of production The costs of harvesting one hectare of cassava are for instance frequently stated at one-third the daily rate per laborer

Real harvest cost have been used to elaborate Table 1 which shows the costs of producing cassava and its returns under the program during the 1985-86 cycle In 1987 Program officials offered a credit for harvesting which amounted to M$5 per kilogram of the root harvested Costs for other items in the budget have been obtained from two reports on the development of the program by SARH and SEDES It should be stressed though that the costs presented in the Table are still short of the actual production costs, and hence better describe the amount of credit given to farmers than production expenses While there are no official records available that readily present the actual costs for an agricultural year both farmers and the program staff agree that the credit for cassava production does not fully cover all the costs for labor requirements Farmers reckon that under ideal conditions they would need up to 35% more capital than that officially budgeted for labor Labor costs constitute the most expensive direct costs of the budget

Table 1 Cassava costs of production and benefits per hectare, in Mexican pesos, agricultural cycle 1985-86

ITEM	1985-86	
Machinery		
Chapeo	3 000	
Barbecho	6 000	
Restreo	7 000	
Rayado	2 500	
Chapeo		
Subtotal		18 500
Labor		
Plantacion	6 600	
Tratamiento de semilla	2 100	
Aplicacion de fertilizante	6,600	
Aplicacion de herbicida	2 200	
Desyerbe	15 400	
Aplicacion de insecticida	6 000	
Arranque	60 000	
Subtotal		98 900
Inputs		
Material vegetativo	8 000	
Tratamiento de semilla	1 878	
Fertilizante	16 208	
Herbicida	3 000	
Insecticida	2 640	
Subtotal		31 726
Total direct cost		149 126
Seguro		7 456
Interes bancario		47 720
Total costs		204 302
Value of crop		225 000
Benefit		20 698

At the prevailing average yield of 12 tons/ha the profitability of cassava production for farmers is very low For the 1985-86 cycle, the estimated total benefit per hectare accrued from cassava cultivation under the program was less than $25 000 (approximately US$12) Program staff and farmers agree that a similar situation has characterized previous agricultural cycles (cf Tabasco Gobierno del Estado 1987 91)

3 The current credit structure hinders rather than facilitates the development of the Program

The Program heavily depends on bank credit to operate and concentrates around Banrural many of its crucial activities Participant farmers are required to receive credit for production from Banrural Agricultural inputs including access to machinery are distributed to all farmers from one single channel following Banrural disbursements The bank provides credit for some of the Program's most important buyers

Farmers nonetheless generally admit disappointment vis-a-vis Banrural's service to clients The bank's loan disbursements for cassava or any other crop have always been consistently untimely and slow In the case of cassava those delays have resulted in late field preparations shortages of fertilizer and other inputs overdue harvests and the general reduction of the capacity to process, sell or buy cassava

Credit is essential for agricultural production Capital rather than land is the most critical limiting factor for production in this part of the country Wealthier farmers tend to engage in livestock production Only small and medium-size-farmers cultivate the land

At the same time Banrural does not provide farmers with detailed and reliable account records Ejido members are unable to figure out the status of their accounts since the Bank does not produce disaggregate information for individuals in ejidos Yet frequently farmers entitled to individual accounts as colonos equally ignore the details of their accounts Furthermore farmers complain that the Bank does not register their repayments and thus they continue to pay interests on the total capital lent This has been the case for producers who sold their crop to independent buyers but especially those who traded with the Chontalpa silos The Banl does not issue periodic balance statements but rather yearly statements Even this agreement has not been fulfilled In November 1986 the Bank presented its first report on farmers accounts in the six years of the commercial program

Farmers have difficulty in understanding the banl's balance statements as do the Program staff who are well educated and relatively familiar with accounting procedures This creates a situation where the farmers control of their account is nearly non-existant This leads to extreme frustration and distrust regarding the Program on the part of the producers

Banrural's regulations result in exaggerated paperwork and administrative red tape The requirements to apply for credit are excessively convoluted Farmers must produce seven documents and have them

registered in three different institutions prior to turning in their application This process requires frequent trips to Villahermosa and Cardenas and imply relatively long waiting periods and considerable expenses for the farmers Once the application is submitted it has to go through another lengthy process which includes field inspections Only then are the documents presented to the bank's legal advisor who still may veto the application

As a result of this procedure a considerable amount of the extension agents' time is devoted to paperwork for the bank instead of agricultural advice for the farmers Program staff provide instructions on how to meet the requirements for bank loans They often present application on behalf of bewildered farmers They also convoke and lead meetings among farmers before, during and after the credit application period They often go house by house asking people in ejidos to sign on the program or at least authorize members of the community to join it If one adds to these bank-related activities other administrative demands it is not surprising that the extension agents' time tied to desk activities may well exceed the the time for direct contact with farmers in their fields even during months of peak agricultural activity

High interst on bank loans have acted in the recent past as one of the most important desincentives for cassava production since it contributed decisively to increasing the total cost of production Interest rates are calculated according to official inflation rates and hence have increased dramatically over time Whereas in the 1981-82 agricultural cycle the average bank loan interest rate was 16% by 1983-84 it reached the 37% mark and in 1986-87 it climbed to over 80%

Evidently Banrural officials are in no way responsible of setting interest rates They simply abide by instructions from the Ministry of Economy Farmers feel nonetheless that the interests on loans have contributed decisively to increasing the total costs of cassava production They however are not allowed to take small loans to reduce these costs The bank sets a fixed amount of credit for all cases regardless of the farmers' production plans or the quality of their fields Hence farmers are forced to either take the credit as it is even if this means increasing their chances of indebtedness or dropping out of the Program It is likely that there would be fewer farmers joining the Program in the immediate future unless the costs of production are considerably reduced the credt policies change so as to allow for the amount of each loan to vary according to farmers' preferrences and the yields sales volume and comercial price of the crop increse

Since Banrural is primarily concerned with the repayment of its loans it has taken an extremely strong role in the sale of cassava Most of the crop is commercialized through the bank's direct intervention In these cases Banrural also provides credit to the cassava buyers Another share is sold independently of the bank but Banrural discourages these types of exchanges The idea is that income from cassava sales should be used first to repay the bank debt and only once the debt is cancelled can the remaining funds be distributed among farmers

In practice Banrural's direct or indirect involvement in commercializing cassava has become a greater liability than asset Its participation has slowed down the selling process by withholding purchasing capital, restricting sales to a reduced selection of buyers, and discouraging the farmers' direct sale of their produce Also since the Bank's statements are frequently inaccurate very few debts have been cancelled regardless of the industriousness of the farmers The combination of these circumstances has seriously reduced the farmers enthusiasm for the Program

In addition most Bank loans for cassava production have represented high fiscal expenditure for the Banks The Program's loan recuperation rate is exceedingly low Up to the present Banrural has been fully repaid only for the loans extended for the first two production cycles During the first year, SARH paid the debt on behalf of the farmers in exchange for cassava stakes SEDES cancelled the second year's debt with payment in kind by providing access to machinery for land preparation during the 1985-86 cycle Forty-five percent of the loans of the 1983-84 cycle and the loans of the 1984-85 and 1985-86 cycles are past due and farmers have been charged delinquent interest rates Also the state government granted farmers virtually interest free production loans during the 1983-84 and 1984-85 agricultural cycles Only 11% of the 1983-84 loans have been repaid (cf Tabasco Gobierno del Estado 1987 86-88)

Most of these default cases are related to the fact that farmers have not been able to harvest within the year-long time limit on loan It has often taken the Program over 24 months to harvest cassava In fact half of the crop produced under the Program over the years remain to be harvested (Table 2) Harvest delays have resulted especially from the Program s inability to find commercial outlets for cassava and to a lesser extent Banrural's and Program staff's untimely provision of credit and machinery respectively

Relatively few cases of cassava loan defaults have resulted from crop failure due mostly to pest problems In theory, crop failure should not have a negative impact on farmers' accounts since all the fields which are cultivated with Banrural's credit are by law insured through ANAGSA In practice though less than 20% of the cases of crop failure are investigated by ANAGSA This happens since ANAGSA's insurance coverage runs out twelve months after the crop is planted Yet there has never been one single year in which cassava has been harvested within that twelve month grace period Hence farmers do not benefit from ANAGSA's insurance

4 <u>The Program has been unable to establish a strong position in the market</u>

From the Program's inception commercialization of cassava has been a major challenge In fact selling the crop has been the most crippling bottleneck in Program expansion During the first two years no substantial outlet for cassava was identified and producers were forced to

Table 2 Area of cultivated and harvested cassava, up to July 1987

	HECTARES					Tons
Cycle	Cultivated	Harvested	Unharvested	Failure	Ton/ha	Harvested
1981-82	104	101	-	3	18	1 818
1982-83	227	212	-	15	14 2	3 010
1983-84	852	843	-	9	11 7	9 863
1984-85	2,404	1 577 5	826 5	-	12 6	19 877
1985-86	667	191 5	433 5	42	11 4	2 183
1986-87	1 086	-	1 086	-	-	-
Total	5,340	2 925	2 346	69	13 5	36 751

sell their cassava to any buyer they could locate Both the Plan Chontalpa cassava silos and the sun-drying patios contributed to alleviating the cassava glut The volume of cassava processed by these means however was insignificant prior to 1985

In the 1981-87 period 21 488 tons of fresh cassava were marketed through the Program (Tabasco Gobierno del Estado 1987 76) as presented in Table 3

Table 3 Cassava commercial outlets 1981-1987

Outlet	Tons	%
Silos	11 009 7	51
Drying patios	5 586 8	26
Fresh feed and vegetable	3 221 7	15
Industrial plants	1 670 0	8
Total	21 488 2	100

The pace with which the crop has been sold however has been exceedingly slow As stated before, under the Program cassava has never been harvested within the prescribed 12 months Harvesting has taken place from 16 to 24 months after planting whereas customarily produced cassava is harvested 8 months after planting Presently 55% and 71% of the cassava grown in the 1984-85 and 1985-86 agricultural cycles respectively remain in the field while the farmers await its overdue harvest

These delays in harvesting have functioned as a way to coping with the oversupply of large volumes of fresh or processed cassava Although the social costs of this decision have been high especially in terms of lowering farmer morale its economic costs have been relatively low apart from credit costs By not harvesting 2 300 hectares cultivated to cassava have been put on hold

Processing has been the Program's second best approach to handling cassava oversupplies Thirty percent of all the cassava harvested has been used as feed for the Plan Chontalpa piggeries There are 10 silos in the Plan Chontalpa area each with a storage capacity of 1 200 tons of fresh cassava, but only five of these silos were actually used for processing the roots The Program also used cassava drying as a way to both prevent the crop's spoilage and create a new marketable product Some 5 590 tons of fresh cassava were sundried and additional 1 670 tons were dried in two large industrial plants This amounts to 16% and 4% of the total cassava harvested respectively

The most important obstacle however, has remained The lack of a sound market for cassava In lieu of identifying potential cassava buyers the program has concentrated its sales within a very small group of buyers Dried cassava has been sold to two factories which produce feed in Yucatan (SANJOR and ALBAMEX) a group of feed producers from Puebla the plan Chontalpa piggery operators and FERMEX an enterprise which is currently exploring industrial alternative uses for cassava To date the volumes sold have been low and the payments have been delayed

The program has not explored new uses for cassava nor new groups of buyers who could be convinced to switch animal feed for cassava Little or no effort has been made to educate others about the advantages of using cassava as animal feed No promotional campaigns with offers of free samples for instance has been attempted In short no attention has been paid to the needs or wants of the consumers

Although the silos have been the Program's most reliable outlet the Program can not base its strategy for commercial expansion on the silos alone As stated five out of the ten Plan Chontalpa silos are already using cassava in their piggeries Four of the remaining silos lack roofs and two silos and their respective piggeries are abandoned Above all the silos are operated by ejido famers None of the silos are sufficiently capitalized to buy large quantities of cassava

Given the Plan Chontalpa's present lack of funds it is improbable that the processing capacity of its silos will expand Actually it may decrease in the near future Expansion of silo operation depends on silo operators having access to credit or raising their own capital through marketing of the pigs they grow

It is unlikely, however that the solution will come from Banrural Although the bank may open credit accounts for silo operators to purchase cassava the loans are in practice only effective after a long and laborious process Some silos are authorized by Banrural only a fraction of the credit requested to operate at full capacity At the same time

cassava producers are frequently forced to advance deliveries of cassava to the silos months before the silo operators are actually extended the credit As a result entire cargos or large fractions thereof are bought on credit from small producers who can ill afford awaiting payment In April 1987 the silo operators had not paid to the cassava producers the equivalent of some 1 850 tons of cassava which they had purchased on credit one year earlier Undoubtedly few producers will remain willing to continue their commercial transactions with silo operators unless payment conditions are improved This situation has a strong negative impact on the Program's market Since it is critical to solve the plan Chontalpa's credit limitations, it will be extremely important, in the long run for credit sources other than Banrural's to be explored if this bank does not radically improve its performance

The core of the Program's constraints is the lack of markets for cassava rather than a reduced processing capacity The inexistence of a strong market to meet the increments in cassava production has created an ever expanding stock of cassava This situation has contributed to creating an impression that the Program's drying patios are inadequate and ineffective The proposed solution, then is to dry cassava in industrial plants The argument boils down to an appeal for a transformation of the available processing technology in order to solve the problem of cassava oversupply There is a chance however that the current excess of fresh cassava will turn into an excess of cassava flour produced in the industrial plants unless market outlets are identified and there is a guarantee that the product will be sold In other words processing clearly does not eliminate but rather in some instances increases the need for actively searching for a market Focusing on the patios purpoted ineffectiveness as the source of the problems for the cassava program prevents program staff and farmers from perceiving the real problem

A final note According to official sources the volume of fresh cassava has amounted to some 3 000 tons or 15% of the total cassava sales It seems however that the real share of fresh cassava is being underrated There are some 15 000 tons whose sale is not accounted for This figures represent the difference between total cassava harvested and total cassava marketed in the program (Tables 6 and 7 respectively) Conceivably some of that cassava was used for domestic consumption among the producers' house-holds It is also possible that some was transformed into feed The most traditional cassava market being that of human consumption though it is extremely likely that at least 10 000 tons of cassava produced in the Program have been introduced into customary markets If this is the case the fresh cassava outlet for human consumption may be as important as or even more important than cassava processing in silos This would also mean that almost half of the cassava produced in the market has been disposed of in one way or another directly by the producers

5 The Program's strategy has sought a rapid expansion of the area under cultivation but has not ensured the existence of necessary requirments to meet its goals

The Program's rationale and hence its challenge rests on its ability to increase production and yields of cassava in order to replace imported

grain feeds This goal necessitates the introduction of new varieties and technology for production and processing as well as developing a stable product market This notwithstanding it also requires a sound management of the technology transfer and its implementation In this section I will discuss the form in which these elements have been articulated

The Program's technological component has largely provided a solid foundation for cassava production A set of recommendations has been generated for the Huimanguillo area which encompasses the release and broad usage of the improved variety Sabanera and the prescription of norms for the selection and preparation of cuttings dosages for fertilizer application planting dates plant spacing and weed and pest control These recommendations have been tested and refined over time although there are still areas necessitating further research and evaluation

In 1981 INIA released two varieties Sabanera (M Pan 51) and Costeña (M Mex 59) Sabanera was resistant to bacteriosis and thrips and tolerant to superelongation Costena was tolerant to bacteriosis superelongation and thrips Under experimental conditions Sabanera and Costeña produced 32 tons/hectare when monocropped The local varieties on the other hand yielded an average of 12 tons/hectare without using fertilizers (Holguin Acosta et al 1981) By 1982 Costena was found to be susceptible to field problems and was discarded from INIA s technological package Since then Sabanera has been the only recommended cassava variety avaiable in Mexico

Despite the adoption of new varieties the Program's records have shown yields which have consistently been only slightly higher than yields of local varieties The average yield for the 1981-86 period is 13 6 tons/hectare Furthermore recommended variety yields have steadily decreased Yields in 1965 declined 37% over the 1981 yields (Table 4)

Table 4 Average cassava yields and farm-gate prices per agricultural cycle 1981-86

	Yields		Price	
Cycle	Ton/Ha	%	M$/Ton	%
1981-82	18	100	3 500	100
1982-83	14 2	79	6 000	171
1983-84	11 7	65	8 500	243
1984-85	12 6	70	17 000	426
1985-86	11 4	63	18 750	536

These registered low yields are not the consequence of purported deficiencies of the variety Sabanera Rather they are largely related

to the management of the Program Specifically they are the combined result of inaccurate record keeping lax administrative selection of farmers and fields deficient usage of improved varieties and the technological package insatisfactory harvest arrangements and farmers' resistence to the Program design which have resulted in poor crop management In turn all of these factors are derived from an excessive adherence among high level officials to a strategy based on the rapid expansion of the production area of the Program

The area that farmers report under cassava production tends to be significantly higher than that actually cropped with cassava This over-estimation is in response to the structure of input distribution Briefly stated, the larger the area claimed for cassava production the larger the share of fertilizers credit for labor and so on that the producer is entitled to After harvest calculations of the yield per hectare are based on the producer's proposed area for cassava production rather than the actual areas This result in the recording of lower yields per hectare than those actually obtained Program staff are aware of such situation but do not exercise tight control to prevent it from happening If it was more closely monitored provided that the staff had the resources required to measure the land under production, the overall area of the Program would shrink This decrease could then erroneously be interpreted by some higher level officials as a symptom of weakness both in the Program and the staff activities

Cassava's low yields under the Program are also related to the inclusion of poorly selected fields for cultivation and the farmers' lack of committment to cassava production Again, this is allowed to happen by staff in order to obtain an increase in the total area of the Program In many instances lowland fields susceptible to flooding are planted to cassava Also the Program includes small- to medium-size absentee landlords who produce cassava with the sole purpose of having their land under production thus preventing these lands from falling under the jurisdiction of the Agrarian Reform which could jeopardize their ownership of idle fields Neither these landowners nor the overseers managing their lands are interested in harvesting cassava Additionally, low yields result from the fact that there are farmers who permanently migrate to other states midway through the agricultural cycle abandoning their cassava plots in search of more profitable economic activites Sometimes this happens with the consent of the local authorities

Finally there are ejido farmers with established histories of bank loan defaults who nevertheless are extended additional credit for their continued participation in the Program and who may not be committed to agricultural production None of these farmers participate in the Program because of their commitment to cassava These free riders however not only damage the overall performance of the Cassava Program but they also reduce the opportunities for other farmers' participation

It is important to remember that individual ejido producers are not the direct recipients of bank loans Credit is awarded to the ejido as a corporate entity Generally though only a few ejido members submit a loan request together Once the loan is granted it is internally distributed

among those farmers partaking in the common project Theoretically an ejido may have more than one loan from the bank during any fiscal year for different crops and/or livestock projects If the loan is not repaid in full, the ejido becomes inelegible for further credit If one ejido member does not pay his debt to the bank the whole ejido is excluded even if all other loan recipients fully repaid their shares of the collective debt Ejido administration regulation includes mechanisms to bring pressure on individual loan defaulters However these regulations are infrequently enforced Credit default is one of the major reasons ejido farmers are prevented from continuing their participation in the Program Due to these reasons, it is critical to weed out free loaders who deprive industrious farmers of opportunities

In the past, there have been cases where the overwhelming concern for rapidly expanding area of the program has led to the production of cassava with little regard to the Program s technological package Communities that produce cassava with their own resources are included in the Program These communities however do not follow INIFAP's technological recommendations nor receive technical assistance They tend to use fertilization dosages other than those suggested in the program as well as unimproved varieties This situation results in either actual or reported lower yields per hectare At the same time facing a shortage of improved variety stakes to meet expected expansion goals Program staff have on occassions gained access to and widely distributed stakes of the unimproved varieties As a result whole crops have failed or yielded poorly Finally the planting dates recommended have only rarely been followed Cassava has frequently been planted well beyond the deadline

In addition low yields have resulted from frequent defoliations due to attacks of cassava horn worm (Errinyis ello), and uneven and deficient treatment of the cassava stakes with fungicide prior to planting These factors can be easily controlled from the technical viewpoint They however require the timely intervention of both Program staff and farmers In the past this has been the exception rather than the rule

Harvesting arrangements also contribute to yield reduction The use of mechanical harvesters presents several disadvantages This situation is due in part to limitations in the design of the harvester but moreover to the deficient way in which many fields are cultivated A large proportion of the fields are carelessly prepared by tractor operators When harvesting time comes the operator must harvest rows which are not parallel Also throughout the field the spacing between the rows is frequently uneven Once the cassava tops have been removed from the fields there is no marking to assertain where the roots are This situation is further exacerbated by the growth of thick vegetation since fields are weeded very infrequently Weeds prevent the harvester from moving through and the crops can not be harvested without causing a great deal of damage to the roots

Often as a result of the combination of those factors the machinery crushes many roots and leaves from one-fourth to one-third of crop in the ground Until recently the system of manual collecting of the roots once the harvester has unearthed them has been used This has generally been

arranged through contracts based on the area harvested rather than the quantity of the crop collected Motivated to complete the job quickly, the contract laborers moved through the field as fast as they could with no regard for thoroughness Presumably the unharvested cassava was collected and sold by the farmers to the market of their choice circumventing channels controlled by the Program The latter requires farmers to sell cassava primarily and almost exclusively through officially established outlets in order to insure that producers repay their loans to the bank Because few farmers have realized economic gain by following these channels, a partial harvesting of their fields may have been perceived as economically advantageous

All the above mentioned shortcomings of the Program can be related to the fact that the Program staff has been overly concerned with meeting ambitious production goals During the first four years of the commercial phase of the Program, political commitments were established on promises of rapid expansion of cassava production so as to effect an equally dramatic reduction of grain feed imports These commitments transformed the Program's goals into rigid expectations in terms of increases of areas cropped with cassava with no real focus on ascertaining the existence of necessary conditions for the expected increases Production goals were set too high in relation to the then available resources for cassava production processing and marketing As a result the official standards for selecting farmers and fields as well as the technological recommendations were frequently overlooked

6 The Program's performance has led to the disillusionment and disenchantment of both farmers and rank-and-file staff

Increasing numbers of farmers are opting for staying away from the Bank's sphere of influence Some of them are no longer participating in the Program but continue to plant cassava with their own resources Their cassava plots are understandably smaller and are often cultivated with a modified version of the Program's technological package The perceived advantages are double farmers gain flexibility not only in the production process but also in selling the crop This suggests that farmers can find cassava production profitable provided that institutional conditions allow more freedom for producers to exercise economic initiative

After six years of commercial operation the Program shows a general incremental trend regarding both the number of participating farmers and the area under cultivation (Table 5)

These figures on the development of the Program, however conceal the disquieting fact that entire communities are dropping out of the program at a rapid pace The only factor preventing more communities from withdrawing is the high turnover rate of the individual participants who live in these communities In fact roughly half of the communities joined the program for one agricultural cycle and three-fourths remained for two cycles (Table 6) The amount of change among farmers is even more pronounced Under the program 82% of the farmers produced cassava for only one agricultural

Table 5 Area under cultivation and number of Farmer Participants in the Cassava Program by cycle 1981 to 1986

Cycle	Hectares	Farmers
1981-82	104	20
1982-83	227	67
1983-84	852	92
1984-85	2 404	206
1985-86	667	92
1986-87	1 086	172

cycle and 94% joined the program for two years or less (Table 7) These statistics reveal that the social foundation of the program is extremely unstable This is a disturbing finding because paradoxically the supposed main beneficiaries of the program are continuously pulling out of it

As a result of these conditions even though the Cassava Program in Huimanguillo is growing in terms of numbers of farmers and communities participating it could soon reach a ceiling which would prevent its further growth This maximum limit may well be determined by the rate of turnover among farmers and communities (There are 39 communities in the savannah of Huimanguillo of which 23 are ejidos and the rest colonies) Needless to say this may also hinder the expansion of the total area devoted to cassava production Yet the program must develop a stable experienced and committed mass of producers to be able to ensure its self-sustenance in the medium to long run

Although farmers are aware that there are still problems with processing and selling cassava the two most important factors that explains their high turnover are the Program s low profitability rates and the prevailing credit structure

Table 6 Participation of communities in the Cassava Program by agricultural cycle 1981-86

Cycles	No Communities	%
1	15	46 9
2	9	28 1
3	3	9 4
4	4	12 5
5	1	3 1
Total	32	100 0

Table 7 Participation of farmers in the Cassava Program by agricultural cycle, 1981-86

Cycles	No Farmers	%
1	532	82 0
2	76	11 7
3	36	5 5
4	4	0 6
5	1	0 2
Total	649	100 0

Conclusions and recommendations

In the ten years of activities the cassava program has been able to establish a solid technological base for cassava production which has contributed to a large increase in the land area under cassava cultivation From 1981 to 1986 during the commercial phase of the program, 5300 hectares have been planted in cassava Several state and federal institutions as well as sundry farmer groups have participated in this effort As a result many hopes and expectations have been raised both at the local and national levels

There is a general awareness however that the Program's growth is fettered by certain factors In this report these factors have been identified through the discussion of three symptons of underlying difficulties These include the Program's relatively low cassava yields given its technological refinement and financial investment the overstocking of cassava as illustrated by the fact that almost half of the cassava produced has not been harvested and the Program's high level of participant turnover

Behind these symptoms several elements have emerged which have fed into each other Low yields are associated with limited use of improved production technology and lack of appropriate incentives to farmers caused by inadequate market integration This has been further exacerbated by untimely delivery of inputs and credit The common element to these shortcomings is that high-level program planners have relied too heavily on the Program's area expansion as its criteria for measuring success or failure of the program This focus on crop expansion unfortunately was not matched with the necessary preconditions for such growth More importantly no commercial outlet for fresh or processed cassava was secured Instead of seeking a steady market for cassava the Program lowered its production standards maintaining a passive commercialization strategy The Program also showed low earnings and symptons of unnecessary red tape The low return rates were explained by the low volumes traded and general low yields These low yields in turn increased the costs of production The bureaucratic delays reinforced the farmers' sense of

complete powerlessness vis-a-vis program staff and above all bank officials These conditions fueled the participating farmers' frustrations and passive resistance to the Program policies

Some recommendations to overcome these shortcomings and contribute to the Program's expansion into other areas besides Huimanguillo are given below

1 The Program must carefully define explicit plans for cassava agroindustrial development Its phasing should be stated It should insure that production processing and marketing are integrated and that each of these components expands in a balanced manner The goal will be for no component to ever be out of synchrony with the other two

There are hundreds of possible uses for fresh and processed cassava The Program must examine carefully which one of these product designs should be implemented given the available human financial and technological resources It must consider then which product designs are profitable i e which ones have a good cost-benefit ratio and can be reasonally expected to be accepted in a particular market segment The next step will not be full scale production of the selected designs but rather their commercial and technical testing on a small scale Pilot studies are essential in this process According to experienced industrialists out of every 100 concepts for new products 33 are technically feasible and only 3 will be commercially successful Pilot testing is the only way to insure that the Program develops the right product for the right market The Program should move forward to full scale commercial production only when the refining of the product and its technological requirements has been completed and the product has been successfully tested with a sample of the target market segment

2 It is critical for the Cassava Programs' sustainability that the Program officials avoid centralizing processing as well as commercialization through only one channel In processing as in other functions redundancy of organizations providing the same services is more efficient than concentrating functions in one organization The co-existence of several organizations increases the likelihood that at least one of them covers services which may have been overlooked by one single organization Extensive testing and refining is necessary before the processing plants will operate efficiently Until that transpires and thereafter it is important to keep open as many processing channels as possible

3 The current emphasis on production has amply demonstrated that all things being equal it is much easier to produce cassava than to sell it The technological success of the Cassava Program in Huimanguillo could lead to further research and eventually expansion of cassava production to other states of the country However a rapid increment in the supply of cassava would most likely create a glut and frustration for all those involved in the Program, unless a commercial outlet is guaranteed

4 The Program must formulate a new strategy for development At the present time it is critical that the program shift its primary emphasis

from producing fresh cassava to marketing processed cassava Program officers should re-evaluate the goal of the Program not in terms of producing a crop but rather in creating a commodity Until now, the Program has expanded both in terms of area under production and total production volume Production goals and the characteristics of processed cassava have been defined independently of solid analysis of the market structure The existence of a cassava demand has been taken as a given with no previous evidence based on research As a result large amounts of cassava have been produced but only a small fraction of that cassava has actually become a commodity For cassava to impact the feed grain market by reducing feed imports, helping to increase the availability of food for the population at large and expanding the producers family income it must become a commodity i e it must be sold

5 It is essential to conduct market research before committing the Program's resources to producing a new product This research will serve several purposes It will help Program planners to make sure that there will be enough sales to cover the variable and contribute significantly to meet fixed costs It will help them to define different prices different sales volumes different advertising models different sales and distribution programs according to different market segments Finally it will provide guidelines for the production of a commodity that will be accepted on the market In other words it will inform both the production process and the processing one as well Technology development on these areas will be oriented according to the results of market research

6 The new strategy should be extremely respectful regarding the producers Farmers must be given an illimited period to reflect compare experiment with different agricultural methods One must help them technically and financially but not force them The new strategy, them should also tailor the product according to what farmers are willing to produce

7 The Program should be administered by a group of staff each one with specific responsability for one of the Program's functions In the past the Program has concentrated most of its institutional resources to tasks related to cassava production Other program functions such as marketing and financial control however must receive careful consideration to facilitate the Program's harmonious development

8 The Program administrators team should minimally include personnel familiar with and responsible for respectively the Program's technological aspect marketing production and finances The person in change of technology would be responsible for research and development This person would be expected to generate solutions for specific problems in addition to doing other research The person with responsibility for marketing would devote his activities to coordination of cassava sales The goal of establishing this separate position is to ensure that sales requests materialize The staff person in change of production would be responsible for increasing production while decreasing time and cost investments Finally the staff in charge of finances would act as a comptroller striving for high level economic performance on the Program as a whole

9 In order to insure that all the Program's functions are equally represented there should be one person per function in the coordinating committee at the Programs's state level All the people designated for these tasks should have the same hierarchical level, and cooperation from rank-and-file staff should be equally available for all A clear mandate and support should be given to those designated from a selected groups of high-ranking authorities who would assume the coordination and general management of the Program Presumably the person in charge of research and development could be an INIFAP researcher The positions for marketing and production could be filled by staff from any of the institutions which participate in the Program The finance officer could be a Banrural or ANAGSA employee Above all, it is critical that these people count with the full support of the institutions they work for and that they are given enough power so that agreements signed by them are minimally binding on their institutions It is expected that by assuming responsibility for one Program component the organizations involved in the Program will be encouraged to participate more activity and constructively

10 One of the most important tasks of this board of managers would be to jointly establish evaluation criteria for the Program and to define Program objectives at the state and local levels Both the criteria and the objectives should be very explicit For instance, the Program' managers should define the total maximum allowed investment for product engineering and marketing the maximum time for development of a product concept or a technology They should also define the minimum expected utility after a designated period the product's growth rate, percentage of the product s market partipation up to a designated deadline the lowest acceptable return on investment and sales and the deadlines for sales requests Objectives and criteria other than economic and financial should also be defined Examples of this type include conditions for the Program to promote farmers' participation, and the Program's reputation and leadership to increase

11 A considerable amount of energy and institutional resources should be invested to support the development of the administrative capacity of program staff Creating and operating a successful cassava program is an extremely complex task, and a large part of the program's success rests on the cooperation of researchers and implementation program staff Due to these reasons it would be worthwhile to develop as soon as possible a training program for researchers and program staff which provides them with tools for improving their administrative and planning skills The objectives of this program would be to familiarize the trainees with the theory and practice of methods and techniques of collecting marketing data over time and space budgeting design and implementation of market analysis, methods for monitoring the program's implementation and techniques for program planning and evaluation Such training program could include intensive short-term hands-on sessions oriented toward gathering data which would be useful to the program This training could be sponsored by INIFAP Staff and researchers from states in which cassava programs are currently functioning or about to begin should be required to participate in the training To accompany this training adequately qualified staff should be appointed as administrative trainers Their task would include on-site follow up every six months as well as provision of

on-site assistance for program start-up While not on-site they should also be avaialable for consultation and evaluation

12 Processing in no way guarantees that cassava will be sold A new product must be introduced into the market that is competitive with and superior to customarily produced cassava While there is little elasticity in the current market demand for cassava as it has been traditionally produced, processed cassava may offer new marketing opportunities This is crucial as cassava is a highly perishable crop With this in mind the creation of a new product would most likely benefit from explorations of processing options Yet while processing does offer additional possibilities, it does not solve the problem of selling cassava The transformation of cassava into a non-perishable form which can be stored and transported more easily represents an extraordinary improvement Processing expands the crops flexibility Processed cassava however must also be sold If a market outlet is not defined processing only delays the crisis Furthermore there is not such thing as all purpose processing Processing is not a blind activity carried out independently of a targeted market One processes cassava into a particular form for a particular market Thus the market plays an important role by defining the parameters in which processing will take place Similarly the market specifications should determine the characteristics of the cassava to be produced It is perfectly conceivable that if the Program were to process cassava into a form which is not accepted in the market a new glut would be created

13 Short term yet sound studies should be conducted as soon as possible to ascertain the potential outlets for cassava It is essential that one of the Program's priorities be to develop an informed marketing strategy A marketing strategy does not mean creating plans on how to sell cassava It means tailoring production and processing according to what customers are interested in buying The Program strategy's starting point and constant reference will be the cassava consumer (and the producer as it will be discussed below) It is essential to know the characteristics of the consumer It is equally important to know the segments in which the market is divided and concentrate the Program efforts on one or two segments It is my impression that the market segments have been prematurily defined around feed users only A large share of the Program's cassava has been successfully marketed as a vegetable flour or starch for human consumption Rather than recommending that from now on the Program orients its production as to be used for human consumption I suggest that the potential of these and other market outlets be examined and measured

14 It would be a mistake to think that cassava consumption will significantly increase without an accompanying increase in consumer demand Regarding cassava as feed the Program strategy would have to target feed users who are not currently using cassava The aim would be to substitute the feed they are now using with cassava Some resistance to this change must be expected The Program would have to design means whereby pig farmers for example have the opportunity to try cassava-based feed at no risks This would require experimentation on the characteristics of cassava that best suit the needs of the feed users Some of the variables which might be the focus of experimentation include modification of the

shape in which cassava is presented its nutritional content the product s compatibility with the tools used in the piggeries, and the product's price competitiveness vis a vis commercial feed These adjustments could then help shape production and processing Consumer tests could determine for example, the required starch content of the cassava produced or the particular proportions of the ingredient in cassava-based mixes Hence, the Program could produce cassava with well-defined commercial characteristics and in fact turn out a product with an already existing demand

15 A similar approach should be used for cassava to be sold as a vegetable when possible In this case the Program's aim would be to enter the market with a type of cassava which fulfills the requirements that consumers associate with good cassava Again it would be essential to ascertain consumer's defined requirements and preferences Since this would imply direct competition with other commercial varieties the Program's cassava would have to adopt a brand name Ideally the consumers will associate this brand of cassava with a desirable product which is consistently superior to other varieties with regard to previously determined consumer preferences Conceivably the best quality roots could be traded for human consumption The rest could be channelled through other outlets

16 The Program's marketing strategy must be active Until now the transformation of cassava into commodities has been rather passive Most of the Program's sales have been restricted to a handful of users Intervention in the commercialization of cassava has been restricted to agreeing on a price for the roots themselves and then transporting This situation has to change and the Program has to take the initiative dynamically

17 More emphasis should be placed on the identification of market segments, i e consumers of products other than cassava who could be commercially persuaded to shift to cassava or cassava consumers who could be commercially persuaded to shift to the Program's cassava These segments must be precisely defined It is important to go beyond broad definitions of cassava's target market Instead of defining feed users as its target market the Program should identify smaller groups within that market who may be more open to switching to cassava The criteria for the definition of such groups can not be determined independently of a careful analysis of the market characteristics An analysis of the consumption patterns, buying process and organization of production, for instance will be required vis a vis users of products which could be substituted with cassava The goal will be to obtain an extremely clear definition of cassava's competitive advantages in those situations

18 When considering the crucial need to expand markets for dried cassava the geographical narrowness of current strategies must be re-evaluated In light of the fact that dried cassava can be more easily transported it would most likely be beneficial to the Program and its participants if some promotion of processed cassava was done in several areas of the country in particular in those areas where cattle feed is expensive or relatively unavialable This approach would require the active and systemic

organization of demonstrations on cassava's potentials for direct consumers commercial feed wholesalers and retailers as well as feed processing industries

19 In the particular case of the Program a marketing strategy will require in addition to an awareness of the consumers' interests a concern for the producers', as well In the past the Program has paid more attention to the availability of suitable fields for production than the interests and perceptions of farmers who produce in those fields The pace of the Program's development has been set solely on the basis of potential for production increase Such potential is equated with land agronomically suitable for cassava production Hence the Program has generally disregarded whether the farmers are interested and able to cultivate a relatively new and risky crop

20 The perspective and opinion of the producers must be taken into account in the planning phase of the program especially considering the risks involved Those plans that have been handed down from high level officials without producer input should expect to be met with resistance and should be avoided at all costs If producers are given more opportunities to be involved in decisions making, their commitmment to the program and their willingness to experiment will likely increase

21 It is essential for the Program's success to create a large institutional space for <u>real</u> farmer participation The Program must accept pluralism so farmers can chose from a wide range of possibilities the form in which they would organize themselves and the extent of their involvement The Program staff should not force farmers to form groups nor to merge into one single association Farmers will join only those groups that are perceived to represent their interests The Program should also recognize the producers' right to define the terms in which they will participate in the market This means that farmers should be allowed and encouraged to decide who they sell product to This is perfectly compatible with coordination among farmers and even agreement on a common bottom commercial price of cassava The goal is for farmers to be the center of the economic decision-making process

22 At the same time farmers should decide what kind of product they will sell There are farmers who are only interested in producing cassava, whereas there are others who also want to process the crop In addition there are those who do not produce cassava but only process it All of these groups should be given the chance to operate at the same time Farmers must be allowed to rent processing patios They should also be allowed to sell their crop and obtain direct and immediate returns without having to vertically integrate into processing of any sort Hence, the practice currently enforced that requires producers to advance cassava for processing in the industrial plants on promises that they will get a share once the processed cassava is sold should be discontinued

23 Farmers should have the right to select the processing means and the market outlets that best serve their economic interests Industrial processing plants and sundrying patios should be given an equal opportunity to succeed in terms of credit for operation facilities for access to

cassava as a raw material technical backup etc Likewise future Program investments should be diversified to include several relatively inexpensive infrastructural facilities rather than concentrating investment in one single unit of the same total monetary value Although several small units are less imposing than one large one it is likely that many small units will greatly enhance the chance of their efficient utilization

24 It should be stressed that organizing farmers for processing activities is even more important than providing them with infrastructure Motivated farmers have dried cassava in small make-shift patios whereas expensive patios have remained underutilized because there were no operators

25 As for patios their operators must be organized and motivated prior to initiating the construction of infrastructural facilities for cassava processing In the past the physical infrastructure of patios has been built by governmental agencies independently from the organization of farmers who are the target users This practice has not been evenly efficient There are patios that were built solely with the assumption that nearby farmers would produce cassava Despite these farmers' good intentions today they are not cultivating cassava and nobody uses these patios There are also several abandoned patios in cassava producing areas where producers are not interested in the processing phase At the same time however there are communities in which two or three groups of farmers or individuals compete with each other to obtain access to patio facilities These communities authorize groups to sundry cassava for a fortnight to ensure access to all

26 All patios must be equipped with all the necessary machinery for their independent operation and provisioned with technical back up for maintenance of motors and chippers' blades This outfitting is likely to be achieved in 1988 because as said before in 1987 government agencies have provided patios with the most essential implements However more extensive training on the proper use and maintance of the motors by farmers is urgently required

27 Credit must be available to patios operators for buying and processing cassava Since 1986, Banrural has extended credit for the operation of some patios but disbursement has consistently taken place after the officially defined optimal drying period (March to May) Although some patios continue to sundry cassava up to October the late delivery of capital seriously undermines the commercial viability of the patios

28 The price of dried cassava must be competitive vis-a-vis fresh cassava Producers complain that the price of dried cassava generally is only slightly higher than the price of fresh cassava Thus they prefer to sell the crop fresh The Program should refine its mechanisms for cassava price setting so as to respond not only to costs of production but also the commercial availability of sorghum in Southern Mexico

29 Farmer organization is one of the most critical conditions for the sucessfull operation of patios It is however, difficult to fulfill Over the years there have been 22 different groups of farmers participating

in the Program Most of these groups have been organized after 1983 Although some of them have had a short life-span the majority have operated for over two years An association of producer groups (ARIC) was formed in 1986 ARIC was created as a means to encourage famer participation in the cassava commercialization process Eventually its aims were expanded to include the management of the industrial processing plants Recent developments indicate that ARIC may be partaking in the administration of some drying patios as well One third of the farmer groups in the Program are part of ARIC Because of being a new organization, however ARIC has not been able to expand the pool of cassava buyers especially insofar as dried cassava is concerned The Program must provide specialized assistance to improve the performance of ARIC and any other farmer organization in the quest for new market outlets

30 In the future Program staff need to put more effort into the methodic and well conceived mobilization of farmers This organization entails reinforcing training in the technology of patio operation and accounting procedures which is a service already offered by Program staff The organization of patio operators, however should also include training that fosters skills for farmers in the identification of and direct participation in viable markets for their processed cassava Whereas today most of the fresh cassava sold through the Program is handled by ARIC until very recently the most prevalent practice employed by both cassava producers and patio operators has been the commercialization of their products through Program functionnaires The functionnaires contacted potential buyers negotiated prices and the volume per transaction for the farmers and quite often without the producers' participation and approval This practice was neither beneficial in the short nor long run On the contrary it reinforced farmer dependency on state interventions and further inflated the program's operational expenses

31 The Program must measure its progress from both the perspective of the nation as a whole and the local potential beneficiaries Until now the Program has concentrated above all on attempting to contribute to the solution of national problems The emphasis on the role of cassava to alleviate the nation's relative sorghum and corn scarcity and decrease the amount of feed grain imports should be coupled with a concern for meeting other goals with a more local focus The Program must spell out specific criteria to measure the benefits accrued from cassava commercial production by producers their communities the processing region and the state in which cassava is produced In this vein the Program should address specific local and regional problems The Program should be conceived by its planners and perceived by the farmers in general as a solution to local problems

32 It is especially critical that the Program's expansion begin with farmers who are already producing cassava A potential area for cassava production should be defined on the basis of the existence of suitable land and institutions willing and able to lead in agricultural research and implementation It should also be based however on the existence of farmers committed to cassava who want to overcome the crop's limitations The Program will find strong supporters among farmers if they derive some

immediate benefits from their participation in it The Program should provide the tools for making customary cassava production more versatile and efficient Farmers who do not have a tradition of cassava production should be encouraged to partake in the Program not by means of promises but through the example of the actual success of those who joined the Program and benefited from it

33 It is also important to expand the Program especially among customary producers because, if allowed they will provide the feedback necessary for fine turning research activities on agronomy and improved variety development Technology diffusion will be facilitated if farmers are allowed to intervene from very early stages on the design and evaluation of research experiments, and the definition of research priorities In this way, researchers will contribute to generate technology which is useful to farmers

34 INIFAP's Cassava Program was created under the assumption that the national program for cassava production could not operate without solid research component Over the years the research program has become one of the most important elements for the program's development Today, however it faces new challenges which could seriously reduce its potential contributions in the near future Limitations of the commercial production program have forced the research program to concentrate on short term interventions Whereas ten years ago the program was conceived with a a national scope in mind in practice it has operated almost exclusively within Huimanguillo The program's research agenda has become subordinate to the strategy of the production program and its implementation This is an admirable case of integration of research and operation components Yet one must face the fact that as a result of this decision the production program is not as adequately prepared to expand to states other than Tabasco as had been originally intended In this context the research program has been forced to relinquish its role as a pioneer in the area of innovative planning for the expansion of the production program

35 The research program should recover its original strength as a pathbreaking institution More emphasis should be given to the development of the cassava program's capacity to administer and direct new research schedules The program must define a clear development strategy for research activities with specific stages goals and criteria of success so as to prioritize certain areas of investigation This should result in better integration of individual research projects into one common expected goal

36 Because of INIFAP's current restructuring, the flow information and the movement of researchers from one state to another have become increasingly more difficult The research program's activities have shifted from national to single state level Yet it is essential to guarantee that agricultural research is conducted as soon as possible in all those geographical areas targeted for potential expansion of the cassava production program Also specific channels should be created to ensure the regular flow of information among researchers and program staff working in different states Intervention at a high level of INIFAP and, possibly, SARH is required to insure that the Tabasco-based cassava

research program not only continues to have a national mandate but also is given the resources to implement it

37 It is especially crucial to encourage the growth of a permanent socio-economic unit within INIFAP which acts as liaison between farmers and researchers and betweeen researchers and extension agents This unit's input should be given prior to the formation for the program's development as well as during and after its implementation Instead of acting primarily as an accountant for the program the unit should be involved in and responsible for designing the program's operational strategy After the creation of such a unit, support training for senior agricultural economists, anthropologists and sociologists should be consider as a priority in INIFAP

Appendix 1.

The Institutional Interest and Support for the Cassava Program

The amount of institutional support both in terms of funding and staffing for the Cassava Program throughout time has been remarkably high and commendable In its initial stages, the role of INIA researchers and administrators was extremely critical in laying the foundations for the Program This involved a two pronged strategy development of production technology for the specific characteristics of the Huimanguillo savannah, and public relation campaigns to increase the awareness of cassava's potential among officials of banks and trusts high level administrators of the Ministry of Agriculture (SARH) extension agents and technology diffusors and politicans INIA was also instrumental in creating a nucleus of permanent support for the crop among Banrural SARH's District in Cardenas, and CSAT When the commercial program was actually launched, the coincidence of enthusiam by INIA and the SARH's district's top administrators gave the Program additional impetus

The state government of Tabasco joined the federal initiative early in the Program's development but has been especially active from the 1983 cycle onwards At that time, it provided the Program with essential inputs, such as credit and access to tractors and technical assistance which, along with the inputs facilitated by the federal government created a powerful enticement for farmers to join the Program Over time, the state's involvement in the Cassava Program has increased to encompass the setting up of industrial organic fuel based processing plants

In 1985, the Cassava Program received a very important boost from the federal government The National Program for Rural Integrated Development (PRONADRI) for the years between 1985 and 1988 officially defined cassava as a strategic crop for the nation The document also defined corn rice (in the southeastern states) and oil seeds (in non-irrigated lands) as strategic crops In reference to cassava, PRONADRI's goal was to support its cultivation, expansion and industrialization in order to use cassava as feed and thereby reduce importation of feed grains The Program's scope was defined in the document as including Tabasco, Campeche parts of Jalisco, Quintana Roo, Veracruz and Yucatan The expected increase in production during the 1985-88 period is estimated to be from 6,000 hectares to 100 000 hectares (Poder Ejecutivo 1985 161)

Renewed institutional commitment to cassava ensued PRONADRI s strategic plans An Institutional Coordination Task Group was established in the production area which integrated the representatives of SARH the state's Secretary of Development (SEDES) Banrural Anagsa INIFAP the state's Secretary of Industrial Promotion Commerce and Tourism (SEFICOT) the federal Secretary of Agrarian Reform and cassava producer organizations Eventually a society of farmers (ARIC) was formed that is in charge of the commercialization of cassava and the management of the industrial processing plants ARIC the Rural Association of Collective Interests was composed of farmers from two colonies and two ejidos in 1986 Henceforth it has expanded its membership to include four more

ejidos At the federal level the National Committee for Cassava Promotion took a stronger stance in the coordination of cassava production plans

A clear indicator of the level of continuous commitment to the development of the Cassava Program on the part of federal and state agencies is found in the range of public investments that have been made up to the present in constant Mexican pesos

1 Purchase of cassava seed for the Program's growth

In 1982, SARH bought the stems of cassava produced by the farmers who first joined the commerical program These cuttings were used for the 1982-83 agricultural cycle SARH paid M$2 836,000 for them

2 Road infrastructure in support of the Cassava Program

SARH Invested M$46 403 000 in improving access roads for the cassava producing colonies Pino Suarez Martinez Gaitan and Laguna del Rosario and the ejidos Chicoacan and Tierra Nueva It also invested M$112 400 000 for paving such roads (Tabasco Gobierno del Estado 1987 30)

3 Machinery for soil preparation, cassava cultivation and harvesting

Since the inception of the agroindustrial phase of the Program in 1981, a total of 5 340 hectares have been prepared for cassava cultivation In the period 1981-83, 1,985 hectares were put under cultivation with agricultural implements provided by SARH Since 1984 SEDES implements operated by SARH personnel were used for the remaining 3,445 hectares SEDES contribution to this operation was M$186 315,000 (Tabasco Gobierno del Estado 1987 33) Also SEDES built two sheds for machinery in the ejido Tierra Nueva and the colony Pino Suarez with an investment of M$28 383,000 (Tabasco Gobierno del Estado 1987 34) SARH investment in this project is undetermined

4 Removal of the forest cover and preparation of those plots for cassava cultivation

In 1983 and 1984 SEDES cleared forested land as an incentive for farmers to join the Cassava Program The clearing did not entail any cost for the producers but committed them to participate in the Program for at least four consecutive cycles In 1983 34 hectares were prepared under this arrangement, while 1,481 hectares were cleared in 1984 A total of M$220,353,000 were invested in those 1 515 hectares (Tabasco Gobierno del Estado 1987 33)

5 Direct credit for cassava production

Banrural and the state government provided M$353,783,000 and M$59,059,000 respectively for covering the costs of production incurred by farmers (Tabasco Gobierno del Estado 1987 86)

6 Trucks for the transportation of agricultural inputs and machinery

SEDES bought trucks in support for input distribution, which amounted to an investment of M$50 372 000 (Tabasco, Gobierno del Estado 1987 35)

7 Infrastructural support for cassava sun-drying in cement patios

From 1982 to 1983, five patios ranging from 200 to 400 square meters each were built by SARH in the colony of Martinez Gaitan and the ejidos of Chicoacan, Tierra Nueva, La Nueva Esperanza and Tecominoacan Since 1984 17 additional patios of 2,000 square meters each have been built in 11 communities The investment for the first ten patios was M$120 000 000 For its part the state's office SEDES provided in 1987 operation equipment (motors and cutting disks for cassava chippers as well as scales and carts) for a total of M$130 000,000 (Tabasco Gobierno del Estado 1987 31)

8 Credit for cassava drying operation

In 1986, the state granted M$2,400 000 in credit for the operation of eight patios, and in 1987 credit extension amounted to M$4 500,000 for nine patios

9 Building of silos for cassava storage

There are today 10 silos with a storage capacity of 1,200 tons each Seven of these were built by SEDES with the disbursement of M$153 135,000 (Tabasco, Gobierno del Estado 1987 35) Banrural's investment in the remaining three silos is undetermined

10 Establishing industrial plants for cassava processing into flour

INIA invested M$15 000 000 in the early 1980s to set up a small processing plant located in Guacamote Eventually, SARH and SEDES contributed with a total of M$80 000,000 for the generation of an industrial plant in the ejido Tierra Nueva which was to be the prototype for other industrial settings The plant never developed beyond the experimental stage In the last two years two large scale cassava processing industrial plants were built One is located in the colony of Martinez Gaitan, and was expected to process 90 tons of fresh cassava per day The other one located in the colony of Pino Suarez was expected to process 120 tons of fresh cassava per day These industrial plants were built by reconditioning a fish-drying and an alfalfa-drying plant respectively The former plant was financed by SARH and SEFICOT and the latter one by Banrural and SEFICOT The total investment for the setting up of these plants was M$500 000 000 These figures do not include expenditures for operating costs (Tabasco Gobierno 1987 39)

11 Building pig pens to support commercial utilization of cassava

SARH the mayor's office of Huimanguillo and the state's Secretary of Urban Development and Ecology (SEDUE) have invested over M$70 000,000 to build 14 pig farms in 11 communities of the Huimanguillo savannah In these piggeries, 1,600 animals are fed with dried cassava (Tabasco, Gobierno del Estado 1987 38)

The above mentioned services represent only the main areas of intervention by the state It is necessary to add to that list that PRONAMEX granted in April 1986 agricultural machinery at reduced prices and convenient payment arrangements for farmers engaged in the Cassava Program The machinery included 5 International tractors of 70 HP each 6 MF tractors of 70 HP each and 3 International tractors of 120 HP each (Sanchez and Oliva 1986) Also state and federal funds were used to cover the payment of salaries and the operational costs of both technical assistance personnel and research staff Since 1983 extension agents from

the state organization CEDES have joined with federal personnel from SARH to provide technical advice to farmers participating in the Cassava Program Previously only SARH personnel assisted farmers Over time, the total number of the staff involved in these activities rose from 2 in the period 1981-84 to today's 16 technical assistants Half of this support personnel works for SARH and the rest are CEDES employees The number of vehicles used in support of this endeavor has also increased from 1 pickup truck in the period 1981-84 to 10 pickup trucks or other similar vehicles in 1987 INIFAP's cassava research team however, decreased in number from 10 investigators in 1981 to 4 in 1988

Keeping in mind that this list of state interventions is not exhaustive we can conclude that the public investment in support of the cassava Program's development over the six year period 1981-87 amounts to at least 3 thousand million pesos

Appendix 2

The Scope of the Program

While seeking to understand the Cassava Program's highlights and shortcomings, it is important to keep in mind that far from building upon relatively simple quantitative transformations in previously existing production and marketing systems the program's design has required a radical shift into a qualitatively different system The program's goals, unmodified since 1977 call for a sharp increase in the production area and productivity of cassava within a very short time period Cassava production under the Program is intended to reduce or eliminate the need for feed imports which create a negative burden on the nation's balance of payment In 1977, the program aimed at having 120 000 hectares under cassava production by 1983 At that time however, Mexico had only an estimated 3,000 hectares in production of cassava Thus the Program's designers expected to achieve a forty-fold increase in the cassava hectarage planted in merely six years When the Program moved from its research-only phase to its implementation phase in 1981 the target area for 1986 was sensibly reduced to 10 000 hectares During the past four years, quoting specific production goals has become both unfashionable and politically unwise but the dramatic change is still expected to occur

Yet the Cassava Program's current design requires a new and considerably more intricate production system This is revealed by comparing the customary and the agroindustrial systems In the customary system, cassava production does not depend heavily on purchased inputs Most cassava is produced in small quantities in tiny areas within the farmers' plots Generally, farmers use either a team of horses or oxen to draw the plow or small tractors The farmers own hire or borrow these instruments of land preparation Manual weeding and harvesting are usually associated with this crop Although chemical fertilizers are occasionally used, the norm is to use none In general, cash requirements are low and production does not depend on the availability of credit If investments are made, these tend to be short term By and large cultural practices are stable and well defined, even though there normally is room for an improvement in the mean net return

The Mexican agroindustrial Cassava Program on the other hand relies heavily on purchased or capital intensive inputs Soil preparation, planting, and harvesting are done mostly by machinery The program introduces chemicals for stake treatment, weed control, fertilization and sometimes for plague control when biological control has been ruled out due to the problem's severity Cash requirements for cassava production in the Program are much higher than in the customary system In addition to these variable costs, the program entails higher fixed set-up costs than the customary system for the tasks of learning and developing a new technology creating and disseminating technology and market information locating and developing product markets, obtaining credit, providing road infraestructure and training labor Admittedly, these fixed costs may decrease over time, but the Program requires a substantial financial human and physical investment especially in its initial period As a consequence the shift occurs towards favoring long term investments over

short term ones hence moving away from the low investment norm of the customary system

In the agroindustrial Cassava Program the mean net return is theoretically higher than in the customary system but the risks and the level of requirements associated with production are also higher for the farmer The Cassava Program treds on completely new ground by concentrating on producing cassava for feed whereas the customary use of cassava has been and continues to be mainly for human consumption Also, the production and processings technology continues to be in the process of being improved It is now 10 years after the research aspect of the Program was initiated, but there is much more to be done in terms of technology development for mechanized planting and harvesting The Program is at its earliest stage in terms of sound research on industrial processing of cassava into flour or starch The use of trays, small tractors, and other technological devices in sun-drying patios has not been fully explored Recommended diets for pigs and poultry using cassava and locally produced or commercially available protein sources remain on the agenda of pending research

Major adjustments are implied by the Program on the part of the producer and the production process By virtue of participating in the Cassava Program, the producer is vertically integrated into processing activities This event has no parallel in customary cassava production regardless of the operation's size This forward linkage with processing alters not only the nature of the farmer s final product but also the ability to realize profit In order to effectively participate in the Program, processed cassava must be produced instead of fresh cassava Under these conditions, access to reliable efficient, and cost effective processing technology, transportation means, as well as timing and coordination are extremely critical The combination of these circumstances renders cassava production riskier and thus less appealing to agriculturalists unless higher returns are guaranteed from these endeavors

A further challenge of the Cassava Program consists of creating a new product which is marketable This requires tailoring a product according to the specifications of a particular market It also requires linking production with consumption through promotion and advertisement efforts Because the use of processed cassava is contingent upon a whole range of new conditions, it cannot be assumed that a processed cassava market will develop spontaneously On the contrary, an extremely careful adaptation of the final product's main characteristics in accordance with the requirements of the consumer is essential The producers' and consumers' perceptions of cassava's potentials must be transformed User training and demonstrations of the comparative advantages of using cassava rather than feed grains may be indispensible in breaking pig farmers' resistance to the new product A pig farmer, for instance, may likely substitute cassava for the feed grains commonly used provided that cassava chips are consistently available packaged in volumes appropriate for piggeries and perceived as presenting low risks in terms of capital time and efficiency

These transformations take place only through a slow and laborious process All of these conditions spell a demand for increased levels of

efficiency and complexity in the Program's planning and implementation At the same time, new areas of expertise are required The Program's boundaries cease to be defined around production concerns and are expanded to include processing and marketing issues The input of agronomists phytopathologists, breeders, and entomologists must be matched by that of utilization experts, marketing analysts and social scientists with economic and behavioral expertise Furthermore the marketability takes pre-eminence over the crop's production and utilization despite the apparent contradiction with a logic based on the chronological sequence of these events

Finally, institutional arrangements also accentuate the risks of producing cassava in the Program The success of the Program -- and the ability of the farmer to obtain economic benefit thereof -- depends on the skills for long term planning Neither the farmer nor the average administrator necessarily possess these management skills Specialized retraining becomes necessary

The program is expected to run as a result of the concerted effort of heterogeneous institutions, but due to the nature of these organizations, institutional coordination is very hard to accomplish This is particularly critical because the Program operation is based on the timely and efficient provision of goods and services before, during, and after the production process takes places Agricultural know-how and inputs, extension service credit, producer/consumer linkages as well as other services are furnished by a host of institutions with different resources experience levels, ranges of activities and commitment to the Cassava Program Furthermore these institutions differ in terms of the audiences that they are accountable to whether to state or federal authorities political forces, and/or farmer organizations Although not all the goods and services are equally important the untimely or careless provisioning of some of them can paralyze the Program as a whole

It cannot be sufficiently stressed that the wide range of conditions that the Cassava Program requires to operate efficiently not only warrant but also prescribe the state's active intervention The Cassava Program requires a far greater social investment than the customary production system In fact it requires political will and support at the national level, which were not necessary conditions for the operation of the commonly used system Left to their own means farmers are unable to respond successfully to the program's new challenges Hence the Program's strategy cannot be efficient without state intervention Risks however are implicit in the state's involvement By striving to make the Program's implementation smooth farmers can be made too dependent on the state institutions Today, the state defines how much cassava will be planted in an agricultural cycle schedules the dates for planting weeding and harvesting determines how much credit will be extended to farmers for production and what activities the credit will cover identifies to whom the farmers must sell their cassava and establishes the farmgate price The state also assumes the responsability of organizing farmers for cassava production and sun-drying sets up industrial processing plants and provides capital for their operation As such the Program's growth has increasingly become the exclusive responsibility of the state's

administrators rather than the direct producers' All of the state interventions have left farmers very little space to exercise initiative and creativity This situation is pungently manifested by the farmers reference to the cassava that they produce in their fields as the bank's cassava Yet, without the farmers' identification with the Cassava Program, the prospects of a strong and self-sustaining Program are bleak

At the same time the state's commitment to the development of the Program creates a series of political obligations on the part of the Program administrators Even though some of these obligations reinforce and streamline program implementation some others can be counter productive An exaggerated concern for the Program's political ramifications has been conducive in the past to institutional impatience vis-a-vis farmers as well as rank-and-file support staff Occasionally high level authorities have demanded of Program implementation officials immediate and often urgent results rather than slower and more carefully planned actions Sometimes this pressure has induced Program expansion without first insuring the existence of viable conditions In the past the Program has been put into operation despite the fact that the delivery of some resources, such as fertilizers and credit, has consistently been untimely and factors, such as seeds or product market outlets, have been insufficient In this respect, the advice of technical support staff was overlooked by higher-level program staff

The Cassava Program's proposed radical transformations in the production system and the risks associated with these changes render implementation difficult In turn improper program implementation generates uncertainty among farmers which frequently lowers both the morale of participants and the enthusiasm for the Program among those farmers who have not yet joined it Although there is no way to completely eliminate all the risks involved in planning and implementing a program the goal should be to insure that only the necessary ones remain and that the impact of these risks is minimized It is only in this way that it will be possible for the Cassava Program to gain the widespread and active support of farmers and establish its own status as a self-sustaining and efficient project