PRIORITY SETTING FOR RESEARCH & DEVELOPMENT IN CASSAVA

An Assessment of Needs in Cassava Production and Post-Harvest Sectors in Latin America and Asia

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FOREWORD AND ACKNOWLEDGMENTS

This report represents part of my activities during my stay with the Cassava Biotechnology Network (CBN) at CIAT in Colombia During 2 5 years working on the project of priority setting for cassava research and development I learned many things I worked in an international environment in a multidisciplinary research program which helped me to look beyond trodden paths The experience of living in Colombia is unforgettable, I thank my friends for the time we shared together

Professionally I owe thanks to a number of persons First and most of all, Dr Guy Henry ex-Cassava Economist at CIAT, now with PROAMYL-CIRAD in France who supervised the work I did for the Cassava Biotechnology Network He did not lose his motivation to bring this project to a good end Also many thanks to Dr Ann Marie Thro Coordinator of CBN She contributed in a more personal way to the project With reference to the current study also thanks go to the following persons Dr Rupert Best, Project Leader of Rural Agro-Enterprises at CIAT for reviewing the first draft of this report, Dr Reinhardt Howeler, CIAT's Regional Representative for Asia, for his belief that this project was worth being done and the individuals from eight countries who contributed by completing sometimes complicated questionnaires

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CONTENTS

1	Introduction	1
2	Background and History	2
	2 1 User-based needs assessment and the Cassava Biotechnology Network	2
	2 2 CIAT s Cassava Program	2
	2 3 Global Cassava Development Strategy	3
3	Objectives	4
4	Methodology	5
	4 1 Survey instruments	5
	4 2 Data collection	6
	4 3 Consensus in data	7
5	Agro-ecological classification	8
	5 1 Climate zones	8
	5 2 Global edapho-climatic classification	9
6	Results	10
	6 1 Latin America	10
	6 1 1 Cassava root production	10
	6 1 2 Post-harvest subsectors	11
	6 2 Asia	12
	6 2 1 Cassava root production	12
	6 2 2 Starch products	13
7	Conclusions and Recommendations	14
	7 1 Data collection	14
	7 1 1 Survey instruments	14
	7 1 2 Target groups / Respondents	15
	7 2 Constraints and opportunities	16
References		18

Annexes

1 Survey instruments
2 Proposal for Agro-Ecological Classification
3 Classification maps for Latin America and Africa
4 Constraints data for Latin America cassava root production
5 Constraints data for Latin America post-harvest subsectors
6 Constraints data for Asia cassava root production
7 Constraints data for Asia starch production

1 INTRODUCTION

This report is the result of an assessment of needs in cassava root production, and cassava processing and marketing activities in Latin America and Asia The study is based on information from a variety of resource persons working with cassava in eight countries Brazil, Paraguay, Colombia, Thailand, Indonesia India, China, and Vietnam The current assessment originates from two events that occurred around the same time In 1996 the Cassava Biotechnology Network was looking for new ways to continue the assessment of constraints and opportunities in cassava, while the Global Cassava Development Strategy launched the plan for needs assessment in the three cassava growing continents More information about these and other initiatives is given in Chapter 2 on background and history of the study In Chapter 3 the objectives of the study are formulated The methodology that is followed is dealt with in the three paragraphs of Chapter 4 Chapter 5 discusses agro-ecological classification for cassava cultivation Results of the investigation are presented in Chapter 6, while conclusions and recommendations are given in the last Chapter 7

This report does not have the pretention of serving the reader with a quick list of ranked priorities It does not present a comprehensive overview of constraints and opportunities per continent by agro-ecological zone But it does give clear indications on needs in the different cassava sectors in the earlier mentioned eight countries, based on information from local respondents It adds to previous studies by providing a detailed and quantified assessment of constraints in post-harvest subsectors In earlier studies, cassava processing and marketing was not very well represented The present document can be used as a reference about limiting factors in principal cassava producing regions and countries in Latin America and Asia It may serve individual researchers and people working in cassava development to get more feeling for the context of the problems they are working on

2 BACKGROUND AND HISTORY

2 1 USER-BASED NEEDS ASSESSMENT AND THE CASSAVA BIOTECHNOLOGY NETWORK

The Cassava Biotechnology Network (CBN) is a special project headquartered at the International Center for Tropical Agriculture (CIAT), based in Cali, Colombia, and funded by the Dutch government during its first phase from 1992 - 1997 Major objectives of CBN are enhancing interaction and communication between biotechnology cassava researchers around the world, as well ensuring that farmers' and processors needs and demands with respect to cassava are represented in research agendas To accomplish the second objective a cassava literature review was done and a rapid rural appraisal of cassava constraints and opportunities in Northern Tanzania Also a research proposal was developed that targets the development and application of a socioeconomic, technical, and agro-ecological framework for cassava research priority setting, with special reference to biotechnology The present report is a result of one of the activities that was undertaken based on this research proposal

To CBN and its donor it was important to have present in the study the opinion of the people that economically rely on the cultivation and processing of cassava During the study various approaches were tried in order to involve users in the assessment of needs At a continental and global scale there is no example known of commodity priority setting that clearly involves end-users from the first up to the last step of such a study It is a fact that especially in the past, research agendas were set by researchers policy makers and donors Nowadays, a strong tendency is observed towards the involvement of target groups in multiple ways transforming research into participatory research

2 2 CIAT'S CASSAVA PROGRAM

In 1993, the CIAT Cassava Program was faced by demands from both national and international cassava research and development (R & D) institutions, to quantify cassava sector constraints and opportunities The result was a global study (Henry 1995) and included two major elements The first element was an assessment of constraints and opportunities that existed in the cassava sector worldwide The methodology consisted of a Delphi survey in which two levels of the sector were targeted production and processing/marketing Questionnaires were developed and sent for completion to selected national agricultural programs and to IITA, CIAT's sister centre which also undertakes cassava research Production regions were classified into five agro-ecological zones

The second element in the study was an ex-ante benefit estimation of cassava research and development activities For this estimation three criteria were used

efficiency, equity, and sustainability R & D activities were subdivided in gene pool development, crop management and post-harvest utilization Furthermore, the agro-ecological classification was complemented by two classes for cassava product demand strength i e traditional and diversified markets

2 3 GLOBAL CASSAVA STRATEGY

The International Fund for Agricultural Development (IFAD) launched in 1996 the initiative for the creation of a Global Cassava Strategy, supported by institutes in the world that play a major role in cassava research and development The Strategy will be developed based on regional reviews and country case studies The regional reviews will identify constraints and opportunities in the different cassava subsectors for further development of the cassava crop and its products

CIAT was appointed as institute responsible for the regional review of Latin America and Asia In May 1996 a proposal was presented to IFAD for execution of these reviews Approval was received early October that same year The current document reports on the work that was done as a contribution to the regional review for the cassava commodity in Latin America and Asia

3 OBJECTIVES

The general objective of the present study is to present an assessment of quantified constraints and opportunities in cassava The study focuses on major cassava growing regions in the continents of Latin America and Asia We are limited to these two continents because of the mandate that CIAT has for cassava and the division that IFAD made in the execution of their regional reviews IITA is the executive institute for Africa's regional review, while CIAT is for Latin America and Asia

The study covers the entire commodity system of cassava, i e the cultivation of the cassava crop in the different agro-ecological zones that exist for cassava, the processing of roots into final or intermediate products, and the sale of these products into the different markets that exist for cassava derivatives By dealing with constraints and opportunities in the entire cassava commodity system, successive areas and fields in research and development are targeted

- germplasm development (root yield and root quality),
- crop management,
- processing technologies,
- marketing

The specific objective of the study is to make available to researchers, policy makers, and donors an assessment of quantified needs in cassava production processing, and marketing that is very much based on opinions of the people that directly earn part of their income from cultivating, processing, and/or marketing of cassava To achieve this goal the involvement is needed of as many clients of technology and advances in cassava as possible, or the involvement of people that are in direct contact with them like extensionists and development project workers Clients are the earlier mentioned, end-users of technology i e farmers, processors, and marketeers This group of people are the principal actors in the cassava commodity system and target group for many research and development activities

4 METHODOLOGY

4 1 SURVEY INSTRUMENTS

Three survey instruments were developed that capture the cassava commodity system Each instrument is a questionnaire that covers successively cassava production fresh cassava, and processed cassava products In the questionnaire respondents are asked for their opinion about the extent (affected area/product volume) of each constraint, the increase in yield or product price, and reduction in processing costs, that will be obtained once the constraint has been removed Also area, price and yield information were requested Respondents were asked for an estimate for potential yield product price, and processing costs, in order to check the reliability of the data given later in the questionnaire A copy of the survey instruments, preceded by explanatory notes is annexed (Annex 1)

The basic design for the questionnaires was taken from the prioritization exercise that was done by CIAT s Cassava Program (see paragraph 2 2) The units of measurement in the three different questionnaires were chosen in such a way that all sets of constraints could be expressed by a common denominator The US dollar was chosen as common denominator, satisfying the need for a unit that is comparable across different types of constraints, as well a unit that is quantifiable

In the production questionnaire a subdivision is made by agro-ecological zone This is necessary because constraints in cassava cultivation are to a large extent determined by climate and soil conditions Chapter 5 deals entirely with agro-ecological classification of cassava production The two questionnaires that capture post-harvest subsectors are subdivided by product groups The underlying concept is that similar products face more or less similar root quality technology and marketing constraints and opportunities

The reason to develop three different questionnaires was to link up with mainstream types of research Many research programs distinguish between the pre- and post-harvest phase of the commodity Thus a pre-harvest, i e production, questionnaire was developed, while the post-harvest one was subdivided into two separate questionnaires One for fresh cassava and another targeting processed cassava products, while both contain a section on marketing of the product The subdivision originated in the fact that fresh cassava for human or animal consumption does not receive any treatment and is marketed or used directly from the field where it was harvested, and within approximately 48 hours due to perishability Whereas, for processed products, technology is used for conversion of roots into different types of product

Each instrument contains a set of constraint sections It is logical to group together constraints that are of the same nature For example bacterial blight,

stem rot, etc in 'pathogen & virus pressure', and drought susceptibility, poor germination, etc in 'genetic characteristics of cassava' This also facilitates analysis later on Another reason for grouping of constraints is that respondents are prevented hopefully from double-counting This is a serious problem In not few cases constraints are interrelated and could easily be counted twice It may never be possible to rule this out, and it helps us relativize the results of the needs assessment A scientist in particular likes to disaggregate as far as possible, but growing conditions do not always permit us to do so An example of interrelationship of two constraints is the following A cassava crop that does not receive sufficient nutrients to develop ('soils and crop management constraint) is more vulnerable to an attack of mealy bug ('pests' constraint) than a well-developed crop in which the first mentioned constraint is not a limiting factor

Survey instruments were preceded by extended explanatory notes These notes functioned as a guide to the respondent while completing the questionnaire Because of the complexity of the questionnaires such notes were expected to be necessary in order to obtain reliable data

4 2 DATA COLLECTION

Data collection had to be done in the continents of Latin America and Asia As mentioned in the chapter on Objectives , it was important in this study to involve end-users to the widest extent possible Since it was financially and technically not feasible to visit all principal cassava growing countries in the two continents and talk with farmers directly, a solution was sought in the regional seminars that were organized in Brazil and China in 1996

The *1 Congresso Latino Americano de Raizes Tropicais* in São Pedro -SP- Brazil, was a symposium on which participants from a variety of cassava growing countries in Latin America presented their work Representatives from research institutes, universities, governmental institutions, and commercial, wide-scale cassava processing factories were gathered in one place This facilitated a cost-effective data collection scheme for Latin America We visited the symposium and during three days collaborators were selected and interviewed Selection of respondents was based on

1 Representing a main cassava growing or processing area,
2 To get a mixture of different respondents working at a local level (researchers policy makers, commercial processors)

In November 1996 the *Fifth Asian Regional Cassava Workshop* was held in Hainan China It was the meeting place for Asian researchers and research policy makers In this workshop the present study was presented to the audience in a half-hour session Key people were asked to take home a copy of the questionnaires They were invited to complete the questionnaires with help and input from members of their program CIAT's Representative for Asia was in

charge of first collection of completed questionnaires He is the person with excellent knowledge of the region, and supervised the return of completed questionnaires from the different regions and countries in Asia

4 3 CONSENSUS IN DATA

Data that are collected through the questionnaires will show a divergence in severity and extent of constraints In order to make available one, overall assessment of constraints per continent, it is necessary to reach consensus with respect to the collected data To this objective a meeting with cassava experts was planned The ideal situation is that in an iterative process of discussion of results, finally one picture emerges for the needs assessment of the entire continent The experts have to have an integrated view regarding cassava on a continent-wide scale For Latin America this group of experts was found in the members of the ex-Cassava Program at CIAT They met in a workshop where all collected constraints information of cassava cultivation in Latin America was presented During execution of the workshop it appeared that the meeting had more the character of a consistency check of completed questionnaires rather than reaching a consensus in data

For Asia, a consensus meeting was more difficult to organize Although CIAT holds a mandate for cassava in Asia, in-depth knowledge of the cassava subsectors is not so much with the ex-Cassava Program but with CIAT's Representation Office for Asia, based in Thailand All collected constraints information was sent to the two CIAT-scientists in Thailand for review in order to reach consensus in data for the continent of Asia

The outcome of the data consensus meetings would provide us with the final form of the needs assessment that we are looking for For cassava cultivation an assessment of constraints per agro-ecological zone by continent, and for cassava processing and marketing an assessment of constraints and opportunities per product group by continent Unfortunately we are not able to present these entire assessments in the present study Nevertheless the data overviews that are presented give a good indication of needs in cassava sectors

5 AGRO-ECOLOGICAL CLASSIFICATION

5 1 CLIMATE ZONES

As mentioned in paragraph 4 1 in the production questionnaire a subdivision was made by agro-ecological zone This was necessary because constraints in cassava cultivation are to a large extent determined by climate and soil conditions For use in the prioritization exercise done by CIAT's Cassava Program in 1993 an agro-ecological classification was developed based on climate conditions only In the classification, the climatic differences in growing conditions for cassava were taken into account Four parameters were used to distinguish between five climate zones across the three cassava growing continents In Table 1 the zones are defined

Table 1 Climate zones for cassava production

	Rainfall, mm	Altitude, m	Dry period, months	Latitude, in °
Lowland Humid Tropics	≥ 1000	≤ 1000	≤ 3	
Lowland Subhumid Tropics	700–1000	≤ 1000	3 – 5	
Lowland Semi-arid Tropics	≤ 700	≤ 1000	≥ 5	
Highland Tropics		> 1000		
Sub-Tropics				> 20

Source Henry & Gottret, 1996

It was decided to make use of this classification in the analysis of the results This classification earlier has proven to be valuable and was defined in close collaboration with cassava and geographical scientists Nevertheless a proposal for the construction of a global classification that includes soil conditions, was presented as part of the present study (see next paragraph)

From the study by CIAT s Cassava Program data on cassava area by continent and climate zone were also obtained for use in the present study Original data come from various sources The area data are presented in Table 2

Table 2 Cassava area by continent and climate zone (1993)

	Latin America		Asia	
	Hectares (x 1,000)	% of total area	Hectares (x 1 000)	% of total area
Lowland Humid Tropics	417	15	690	18
Lowland Subhumid Tropics	918	33	1604	41
Lowland Semi-arid Tropics	222	8	1029	26
Highland Tropics	417	15	0	0
Sub-Tropics	807	29	598	15
Total	2 781	100	3 921	100

Source Carter et al 1992 Carter et al , 1986 Howeler personal communication

5 2 GLOBAL EDAPHO-CLIMATIC CLASSIFICATION

The classification of cassava production regions discussed in paragraph 5 1 has been used by CIAT to date CIAT s sister institute IITA in Nigeria uses a different classification for cassava production in Africa The two classifications are not compatible That is why in the Global Cassava Development Strategy a common global classification was proposed in order to serve as a common base in the regional reviews

As part of the present study a proposal was developed to come to such a common classification The classification will facilitate coordination of research efforts and improve the identification of research solutions for specific eco-regions For a full documentation see the proposal (Annex 2) The proposal was presented by Dr Clair Hershey, consultant of CIAT, to participants in the Global Cassava Strategy during a meeting in May 1997

The proposal targets the goal of obtaining a broadly acceptable classification that all research entities could coordinate their work around The access to research findings for clients (i e local institutes) and donors would be greatly improved

The mapping of the proposed classification for Africa and Latin America was done in July 1996 by Dr Peter Jones (CIAT) Black-and-white copies of the maps are included in this report in Annex 3

6 RESULTS

6 1 LATIN AMERICA

6 1 1 CASSAVA ROOT PRODUCTION

The data that were collected for Latin American cassava root production are included in this report as Annex 4 It is preceded by a comparative overview of the collected data with 1993 constraints data by climate zone A consensus workshop was organized in May 1997 among a good number of ex-members of the Cassava Program of CIAT In that meeting the data for Latin American cassava production were discussed, as well compared to the data that were collected in the exercise of CIAT's Cassava Program in 1993

A total of eleven questionnaires were completed and returned Questionnaire number (Qtn) LC1, LC5, and LC6 represent the subtropical climate zone Collected constraint data show similarity to the data of the 1993 exercise The three questionnaires together cover to a wide extent the subtropics in Latin America

Qtn LC9 is the only completed questionnaire obtained for the highlands For the Colombian Cauca region the data are representative but they do not give a good picture of the overall highlands climate zone in Latin America

For the humid lowlands we received data in questionnaire LC10 Like for the highlands the data represent well the situation in the Colombian Llanos, but are not representative for the humid lowlands in Latin America

Qtn LC2 LC8, and LC11 come from North Colombia The prevailing climate zone is subhumid lowlands The data of LC8 was considered to be 'not correct' They differed very much from the other two questionnaires LC2 and LC11 were accepted as representative for the climate zone Unfortunately data from other regions in Latin America for subhumid lowlands are not available

The semi-arid lowlands are not represented by a single questionnaire per se Qtn LC3 and LC4 both cover partly the semi-arid region in North-East Brazil At the same time these questionnaires include subhumid lowlands as well In LC3 humid lowlands are also included so three climate zones are represented by that particular questionnaire It implies that only one figure is given for each constraint, irrespective of the climate zone and thus the data are difficult to analyze Qtn LC7 covers all production regions in Brazil and was left aside in the consensus workshop for the earlier mentioned reason

In general the collected data for a particular climate zone showed agreement in the order of importance given to the principal constraints within constraint groups,

e g the constraint of bacterial blight in all returned questionnaires for the subtropics was a main contributor to the total of constraints (% yield gain) in the group of Pathogens & Viruses

It was evident that some of the completed questionnaires were biased Respondents with certain disciplinary backgrounds stressed the constraints and opportunities in their field of work In other cases there are indications of inconsistancies in the collected data The reason is that not all respondents read well the explanatory notes i e instructions, that preceded the questionnaire The result is double counting of constraints This also raises the question of whether or not there is common interpretation of the questions

Large discrepancies between estimated potential yield and calculated potential yield are observed In one questionnaire the discrepancy is more than six times This could point at constraint estimates that are not very serious The way in which these two parameters relate is an indicator for the reliability of the data that are provided by the respondent One may expect that the discrepancy is no more than one-and-a-half times In order to be able to make a judgement across questionnaires about the tendency of constraints (do similar constraints receive high-or-medium-or-low weight in the different questionnaires?) a solution may be to standardize constraint figures The problem with this procedure is that we loose part of the quantified nature of the data one of our objectives in the study

6 1 2 POST-HARVEST SUBSECTORS

A total of four subsectors were distinguished in the cassava post-harvest sector These are the production of starch flour and processed animal feed and the use of fresh roots for human/animal consumption The data that were collected are included in this report as Annex 5 Unfortunately no data consensus workshop could be organized The expertise that exists at CIAT on this matter is now low

Observations are

- All comparative overviews of the four subsectors show that the parameters 'Estimated decrease in processing costs' and 'Estimated increase in product price' are most of the times estimated lower than the calculated ones The difference is a factor two or more, only starch shows a somewhat different picture
- To starch, flour and fresh roots applies that the total revenues to be get from the three different constraint categories (i e root quality, processing technology, and product marketing) are quite equal Exception to this is processed animal feed With respect to this, one should notice that revenues from product marketing come from a product price increase only, by questionnaire definition
- Some of the completed questionnaires are not very consistent, e g starch-3 shows very opposite figures in estimated and calculated parameters Flour-4

showed 0% in both estimated parameters while giving revenues in the calculated parameters! Flour-2 and Flour-5 did not give figures on estimated parameters

Some completed questionnaires did not give us 'appropriate' data respondents did not understand well the concepts of decrease in processing costs nor increase in product price' In fact, they did not answer according to the instructions It is clear that the post-harvest questionnaires were more difficult to answer than the production questionnaire An explanation could be that processing and marketing are more complex issues to think about in terms of constraints, than cultivation is Another factor that may or may not contribute to this observation is the lower scientific attention to post-harvest matters About 15 years ago CIAT and CIP (Peru) started research in utilization and marketing of root and tuber crops and products Before that time there was less structured attention to these aspects Crop production has received research attention for a much longer time

6 2 ASIA

6 2 1 CASSAVA ROOT PRODUCTION

With respect to cassava cultivation in Asia a total of eight completed questionnaires were returned Four questionnaires covered parts of humid lowlands, subhumid lowlands and semi-arid lowlands (questionnaire numbers 1 – 4) The other four questionnaires (numbers 5 – 8) each covered one climate zone For the continent of Asia no highland climate zone exists The data are included in this report in Annex 6

No broad data consensus workshop could be organized for Asia Returned questionnaires were reviewed by CIAT's Regional Representative for Asia, Dr Reinhardt Howeler based in Thailand Collaboration from other outposted CIAT staff in Thailand was not received

From the raw data we learn the following

- The discrepancy between Estimated Yield Increase and Calculated Yield Increase is moderate from a factor 1 3 up to 2 1 Discrepancy in individual questionnaires is in both directions in four questionnaires the Estimated parameter is higher than the Calculated one, in the other four questionnaires it is the other way around
- Qtn Number 4 shows very big numbers on almost all constraints This questionnaire is an outlier and perhaps should not be taken into consideration No yield gain due to improvement of genetic characteristics was estimated but cassava breeding has been the main activity of the respondent's institute for the past 30 years, so he must believe that better varieties can increase yields!

- The exchange rate used in Qtn Number 7 is clearly incorrect The correct rate is about 36 rupees per dollar (as indicated for Kerala Qtn Number 4)
- From all completed questionnaires it is very clear that 'Pathogens & Viruses' and 'Pests" play a minor role in Asian cassava cultivation Most limiting constraint is Soils & Crop Management' for all climate zones Then comes "Genetic Characteristics', and after that "Planting Material"
- Qtn Numbers 1 – 4 have the problem that they cover more than one climate zone The constraint data are not subdivided for the different climate zones only one figure is available for each constraint In order to make some comparison with the 1993 data possible, a table is included in the comparative overview that shows the shares of climate zones in each of the questionnaires The table is based on data from Howeler (1996, personal communication)
- Comparing the constraints data in the present study with the data that were collected in 1993 we observe only few differences The conclusion is that the 1993 data are confirmed by the 1996 data A good explanation exists in the fact that data were collected among same type of respondents people at higher responsibility levels In 1996 data were collected from mostly research institute directors, in 1993 from outposted CIAT staff in Asia

6 2 2 STARCH PRODUCTS

For the post-harvest subsectors in Asia three questionnaires were received All deal with the production of native starch In Annex 7 questionnaires and comparative overview are included A fourth questionnaire is included in the Annex, but is perceived as useless for the analysis of constraints

All three questionnaires show a strange observation in the Estimated parameters In two questionnaires a decrease in product price is estimated beforehand, while the questionnaire definition did not allow respondents to do so Here the questionnaire was not interpreted correctly The other questionnaire showed an estimated increase in processing costs! It means that comparison of Estimated'-parameters with Calculated'-parameters becomes meaningless Furthermore the given processing costs and product prices seem way off in Kerala and South Vietnam (with no questionnaire number) and seem rather high in Tamil Nadu

According to the collected data the constraints in starch production in Guangxi China are larger than in India It stays unclear why such a huge difference in product price increase is given for Kerala and Tamil Nadu 5 % versus 61 %

7 CONCLUSIONS AND RECOMMENDATIONS

7 1 DATA COLLECTION

7 1 1 SURVEY INSTRUMENTS

From the data collection phase it became clear that the survey instruments were not interpreted correctly by the respondents in all cases We experienced that in many cases people did not take sufficient time to read the instructions carefully As a result double counting and unexpected ('strange') answers occurred Misinterpretation occurred less when questionnaires were completed with direct supervision of the data collector (as happened partly in the data collection for Latin America), but even then, due to a lack of patience, wrong data were sometimes given

As we knew at the beginning of the data collection, respondents would need to take good notice of the instructions, pretesting of the questionnaires had revealed this to us Carefully reading of the instructions eliminates exaggerations by one or other discipline and makes that everyone interprets the questions in the same way More than once during the study it was hard to understand why people who want to be taken seriously in their work, have so much difficulty in dedicating time on a survey that directly relates to their own field of work Related to this problem is the slow return of completed questionnaires Reminders had to be send to many of the respondents that were given a questionnaire -during the conferences in Brazil and China- to be completed back home These reactions may be due to a number of factors, not least of these is the relative complexity of the information requested A solution could be to provide a monetary incentive for people to spend time on completing the questionnaire

How to solve the conflict between having an appropriate survey instrument and having available something that is quick to complete for a respondent? For a complex issue like constraints and opportunities clear guidelines about what is included in a particular constraint, and what is not included need to be given

The post-harvest questionnaires were subdivided according to processed product and unprocessed product From an analytical viewpoint this is correct Practically it would have been more appropriate to have only one post-harvest questionnaire available Few questionnaires for fresh roots use were completed and returned By skipping the processing technology question section in the case of fresh roots, one questionnaire for the post-harvest sector would be sufficient

In the cassava cultivation questionnaire, a mistake appeared with respect to geographical zoning Initially it was thought that many local respondents, covering a relatively small geographical region, would contribute to the needs assessment That is why respondents received a map of their country together

with the questionnaire, on which they were asked to mark the zone to which their constraints information applies, before completing the questionnaire Respondents could define a region according to their knowledge of cassava It was expected that, in general, the regions to be chosen would not include two or more agro-ecological zones This would have meant that regions with same agro-ecological characteristics could easily be aggregated for data analysis purposes

Unfortunately, less local respondents contributed to the study than was foreseen This was especially the case for Asia It resulted in constraints data covering regions that include more than one agro-ecological zone These questionnaires are difficult to analyze A solution to this problem is to define first the different climate zones within a country, and have respondents completing questionnaires per climate zone Once the new edapho-climatic classification is in use this procedure can be followed for that classification

7 1 2 TARGET GROUPS / RESPONDENTS

For Latin America we received mostly input from people who work in relatively small geographical regions and/or work on limited subjects Asia was represented by people who work at a higher, and most often management level This leads to a different picture of the data, more about this in the next paragraph From the viewpoint of user involvement in the constraints assessment, the 'Latino'-way is preferred But it is necessary then to have a larger number of well-informed, local respondents in order to level out extremes and biases in data Such a survey design is organizationally difficult to implement and is financially a costly undertaking

After completing this study it is clear that it is difficult to base a continent-wide needs assessment for a commodity solely on contributions of people that work at a local level Always consensus in data has to be sought after the data collection phase User involvement is an important objective in priority setting studies but not easy to realize A solution exists in local case studies assess needs for a limited region and then extrapolate for other regions with similar characteristics With such in-depth studies one gets a precise view of constraints and opportunities for a particular region Examples of this approach exist in the rapid rural appraisal that was done by the Cassava Biotechnology Network in Northern Tanzania in October 1993 (Thro et al , 1994) as well the 'Biotechnology for small and medium scale farmers -project by the Dutch Directorate-General for International Cooperation (DGIS) in the Atlantic Coast Zone of Colombia (Anonymus, 1993)

7 2 CONSTRAINTS AND OPPORTUNITIES

The outcome of the needs assessment study cannot be phrased easily As stated before, data of individual questionnaires relied heavily on the disciplinary orientation of the respondent This was especially the case for Latin America Therefore it is not easy to come up with a quantified ranking of needs by agro-ecological zone for the two continents Nevertheless trends can be observed from the data collected and these are presented in the overviews that precede the individual data sheets in the Annexes

By comparing the results of the 1993 study with the 1997 study for Latin American cassava root production, we observe some significant differences with respect to the way data collection was done In the 1993 data collection, relative few input was received from people working with cassava outside CIAT The people from outside of CIAT that contributed all worked at a high level of abstractness with country-wide responsibilities Here it concerns contributions made by researchers of EMBRAPA the Brazilian national agricultural research institute In the 1997 study much input was received from local respondents, partly by data collection that was done by directly interviewing respondents during the Cassava Conference in Brazil in October 1996 The data consensus workshop that was done in 1993 had more detail than the one in 1997 The 1997 data consensus meeting had more the character of a consistency check

Therefore the author's feeling is that it would not be right to attach more weight to one study above the other The 1993 data are presented in a comprehensive format, but the problem of one-sided information is present The 1997 study does not give a continent-wide picture for all agro-ecological zones, but input from an interesting number of local respondents was received Therefore the two studies, in 1993 and 1997 are complementary in the assessment of constraints and opportunities in Latin American cassava cultivation, rather than one study having priority above the other The results of both studies together should be taken as guideline for the research priority setting that has to be done in coming years

For post-harvest subsectors in both Latin America and Asia, the present study serves well the objective of assessment of needs on a continent-wide scale Unfortunately no review panel could be found to evaluate the data They do, however give a good impression of limiting factors in the production of a number of cassava products The study that was done in 1993 hardly gives any specified data for constraints in the post-harvest phase of cassava

The constraints and opportunities that are assessed for Asian cassava cultivation show much similarity to the data presented in 1993 by CIAT's Cassava Program The obvious reason is that the same type of respondent acted in both the 1993 and 1997 study people working at a higher level The conclusion is that the use of same survey instruments delivers consistent data over time With respect to the objective in the present study regarding involvement of local respondents,

data collection thus was not optimal The survey instruments were presented during a 30 minutes' plenary session in the China conference in November 1996 Respondents took home the questionnaires and completed them at a much later date

What recommendations can be given for a next needs assessment? First and foremost collaborators have to be convinced about the usefulness of such a study A lack of interest frustrates heavily any type of needs assessment One might expect that in a situation of decreasing financial resources available to agricultural research and development, the importance of a thorough needs assessment is clear to anyone

An option for a future needs assessment is to appoint for each important cassava producing country a national institute that will be responsible for the country's needs assessment This institute should organize local committees that start with a data inventory like the one done in this study, perhaps with survey instruments that are modified according to the local situation After that all collaborators are invited for a data consensus workshop Once the local assessment is completed, all local committees in a country meet together and discuss a national needs assessment for the different agro-ecological zones in the country

Aggregation of country' assessments has to be done by an entity that is not directly interested in the results of the assessment and its financial consequences In order to increase the credibility of the needs assessment it may be necessary to have a consortium of financial donors that backs the work, and that is able to motivate local partners to collaborate with such a study The question is who pays? Although the costs may be high, the long term pay off to undertaking research and development activities based on a clearly defined and agreed upon set of priority constraints and opportunities would be substantial

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ANNEX 1

CIAT CASSAVA PROGRAM / CASSAVA BIOTECHNOLOGY NETWORK
Special Project on Priority Setting
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To
From Jan Gerrit VAN NOREL, Associate Expert CBN

SPECIAL PROJECT PRIORITY AREAS FOR CASSAVA RESEARCH
Constraints & Opportunities in CASSAVA CULTIVATION

Background.
The Cassava Biotechnology Network (CBN) is involved in a special project on priority setting for cassava research, technically supported by CIAT's Cassava Program The CBN project coincides with the recently initiated Cassava Global Strategy Development by the International Fund for Agricultural Development (IFAD) One of the projects in this initiative include Regional Reviews of the cassava subsectors in Africa, Asia and Latin America It is expected that the current data collection scheme will provide a comprehensive overview of constraints and opportunities in the cassava subsectors worldwide IFAD has provided partial funding to conduct this survey

During the Fifth Asian Regional Cassava Workshop, data collection for the needs assessment regarding Asia is planned For this objective two questionnaires have been designed, one on cultivation constraints and one questionnaire on post-harvest issues The latter questionnaire is subdivided in processed cassava products and fresh consumed cassava The questionnaire attached deals with cassava cultivation

The questionnaire, and how to complete it

I Annexed you find a questionnaire (in table format) on *constraints and opportunities* in cultivation of cassava The questionnaire has a matrix design you should link rows with columns to know what information is asked for Please refer in your answers to the situation over the last five years Fill out according to the average conditions during this time period (Please don't take very exceptional circumstances into account, i e situations that you may expect not to occur again within 10 years from now) The reference point with respect to location of the cassava plant *is, naturally, the farm* The questionnaire targets all farms on which cassava is produced, in the geographic area you are knowledgeable about (see paragraph II hereunder) In areas where cassava is intercropped please think of the yield that would have been obtained in case cassava was monocropped under similar conditions Take this mono crop yield when thinking about yield gains due to alleviation of constraints The reason for conversion of the yield is to make cassava yields and yield gains comparable between different areas

II The first, very crucial, question (with code 0 1) is about your coverage of cassava cultivation areas, i e cassava distribution Please think well about the geographic area for

which you are able to provide confident data, i e the area that is within your field of expertise or experience Complete the questionnaire for that specific region Note that we are looking for good quality data, not necessarily a big geographic area that is covered by an individual questionnaire

III Next you find questions (codes 0 3 - 0 6) on quantities and selling prices regarding the cassava varieties under consideration you are asked to complete the questionnaire for from two to four of the main varieties that are grown in the geographic area that you have mentioned under code 0 1

IV After the general questions, the questionnaire is subdivided into six constraints sections Planting material (code 1 1 - 1 5), Pathogens & viruses (code 2 1 - 2 11), Pests (code 3 1 - 3 10), Genetic characteristics (code 4 1 - 4 11), Soils & crop management (code 5 1 - 5 13) and Non-crop related constraints (code 6 1 6 7) Each section should be viewed as a whole In the first (i) column, you are asked to compare the constraints within the whole section The second (ii) and third (iii) column are aimed at quantification of individual, independent constraints Cells in blank have to be filled out

On behalf of CBN and IFAD, I thank you for your time and effort completing the questionnaires!! We'll make sure that you receive a copy of the results

Specific notes, only where necessary

Code 0 1 Please fill in the geographic area (department, country, region) for which you complete this questionnaire

Code 0 2 Please give the total area (in hectares) that is planted to cassava for the geographic area for which you answer this questionnaire

Code 0 3 Average yield in Ton/Ha, or in local unit (please give conversion to Ton/Ha)

Code 0 4 Please give the maximum cassava yield that is technically feasible, i e in case all constraints are relieved

Code 0 5 Farmgate price in local currency per metric ton (or per local unit, if so, please give conversion to MT)

Code 0 6 Local currency into US dollar (1996)

Code 1 1 This is a section on constraints regarding planting material

Code 1 2 i) SEVERITY RANKING
Please rank the constraints for the section as a whole in order of severity 1 is most severe 2 is second most severe, etc , etc
ii) SHARE OF CULTIVATED AREA THAT IS AFFECTED BY A CONSTRAINT
The share (in %) of the total cassava area that is affected by each constraint
iii) ROOT YIELD GAIN ONCE THE CONSTRAINT HAS BEEN REMOVED
Please give the percentage (%) increase in root yield due to the alleviation of a constraint

Code 1 3 Stakes that are too short, too thin, not fresh anymore, or that have too few nodes

Code 1 4 The quantity of stakes is not sufficient to obtain the preferred plant density, i e the maximum yield level

Code 1 5 Please specify other constraint(s)

Code 2 1 This section includes pathogens and viruses

Code 2 2 i) SEVERITY RANKING
Please rank the constraints for the section as a whole in order of severity 1 is most severe, 2 is second most severe, etc , etc
ii) SHARE OF CULTIVATED AREA THAT IS AFFECTED BY A CONSTRAINT
The share (in %) of the total cassava area that is affected by each constraint
iii) ROOT YIELD GAIN ONCE THE CONSTRAINT HAS BEEN REMOVED
Please give the percentage (%) increase in root yield due to the alleviation of a constraint

Code 2 5 Please specify type African or East-African or Indian

Codes 2 6 2 7, 2 9 2 10 Please specify other constraints

Code 3 1 This section deals with pests

Code 3 2 i) SEVERITY RANKING
Please rank the constraints for the section as a whole in order of severity 1 is most severe, 2 is second most severe, etc , etc
ii) SHARE OF CULTIVATED AREA THAT IS AFFECTED BY A CONSTRAINT
The share (in %) of the total cassava area that is affected by each constraint
iii) ROOT YIELD GAIN ONCE THE CONSTRAINT HAS BEEN REMOVED
Please give the percentage (%) increase in root yield due to the alleviation of a constraint

Codes 3 8 - 3 10 Please specify other constraints

Code 4 1 Here the genetic, i e intrinsic, characteristics of cassava varieties/landraces cultivated in your geographical area (code 0 1) are targeted

Code 4 2 i) SEVERITY RANKING
Please rank the constraints for the section as a whole in order of severity 1 is most severe, 2 is second most severe, etc , etc
ii) SHARE OF CULTIVATED AREA THAT IS AFFECTED BY A CONSTRAINT
The share (in %) of the total cassava area that is affected by each constraint
iii) ROOT YIELD GAIN ONCE THE CONSTRAINT HAS BEEN REMOVED
Please give the percentage (%) increase in root yield due to the alleviation of a constraint

Code 4 8 Wide canopy causing competition with intercrops

Codes 4 9 - 4 11 Please specify other constraints

Code 5 1 This section covers constraints in the direct environment (SOILS) and treatment (CROP MANAGEMENT) of the cassava crop

Code 5 2 i) SEVERITY RANKING
Please rank the constraints for the section as a whole in order of severity 1

is most severe, 2 is second most severe, etc , etc
ii) SHARE OF CULTIVATED AREA THAT IS AFFECTED BY A CONSTRAINT
The share (in %) of the total cassava area that is affected by each constraint
iii) ROOT YIELD GAIN ONCE THE CONSTRAINT HAS BEEN REMOVED
Please give the percentage (%) increase in root yield due to the alleviation of a constraint

Code 5 3 A soil type with a poor chemical capacity to make sufficient nutrients available to the crop

Code 5 4 A soil type with poor physical properties, so that a plant cannot grow and develop fully We assume that this constraint cannot be easily alleviated by men Example big rocks, etc

Code 5 5 Degradation of soil (=decreased nutrient availability) due to erosion

Code 5 9 Field management includes a o mulching, ridging, irrigation, and fertilization Sub-optimal land management does not have to do with poor soil physics (code 5 4)

Code 5 10 Inter-plant (cassava or intercrop) distance is too small or too big

Code 5 11 Crop care includes weed and pest control both chemically and manually

Codes 5 12 - 5 13 Please specify other constraints

Code 6 1 The last, sixth section is about constraints that are not directly related to the physical crop, but have to do with socio-economic circumstances in cassava cultivation

Code 6 2 i) SEVERITY RANKING
Please rank the constraints for the section as a whole in order of severity 1 is most severe, 2 is second most severe, etc , etc
ii) SHARE OF CULTIVATED AREA THAT IS AFFECTED BY A CONSTRAINT
The share (in %) of the total cassava area that is affected by each constraint
iii) ROOT YIELD GAIN ONCE THE CONSTRAINT HAS BEEN REMOVED
Please give the percentage (%) increase in root yield due to the alleviation of a constraint

Code 6 3 Credit to buy all types of inputs (planting material, fertilizers, pesticides, etc)

Codes 6 6 - 6 7 Please specify other constraints

CONSTRAINTS & OPPORTUNITIES in CASSAVA CULTIVATION

Questionnaire for cassava experts participating in the V Asian Regional Cassava Workshop in Hainan (China), November 1996

Name of Respondent
Institute (incl Program/Unit/Section)

Mailing address
Fax
E-mail

Position
Research activities in cassava, please give time share per separate activity

Activities in cassava, other than research (administrative and/or developmental)

Code		
0 1	Geographic area	
0 2	Cropped area, in ha	
0 3	Average root yield, in Ton/ha	
0 4	Potential root yield, in Ton/ha	
0 5	Average root price, in local currency	
0 6	Currency exchange rate	

Code 1 1	**Planting material**			
1 2		i) SEVERITY RANKING, 1 = most severe 3 = least severe	ii) SHARE OF CULTIVATED ARFA THAT IS AFFECTED	iii) ROOT YIELD GAIN ONCE THE CONSTRAINT HAS BEEN REMOVED
1 3	Poor biophysical quality			
1 4	Insufficient availability			N A
1 5	Other			

Code 2 1	**Pathogens & Viruses pressure**			
2 2		i) SEVERITY RANKING, 1 = most severe 9 = least severe	ii) SHARE OF CULTIVATED AREA THAT IS AFFECTED	iii) ROOT YIELD GAIN ONCE THE CONSTRAINT HAS BEEN REMOVED
2 3	Bacterial blight			
2 4	Anthracnose			
2 5	Mosaic disease, type			
2 6	Other leaf disease			
2 7	Other leaf disease			
2 8	Root rot, specify type			
2 9	Stem rot			
2 10	Other root disease			
2 11	Other root disease			

Code 3 1	**Pests pressure**			
3 2		i) SEVERITY RANKING, 1 = most severe 8 = least severe	ii) SHARE OF CULTIVATED AREA THAT IS AFFECTED	iii) ROOT YIELD GAIN ONCE THE CONSTRAINT HAS BEEN REMOVED
3 3	Mealy bug			
3 4	Green spider mite			
3 5	Red spider mite			
3 6	Trips			
3 7	Hornworm			
3 8	Other			
3 9	Other			
3 10	Other			

Code 4 1	Genetic characteristics of cassava			
4 2		i) SEVERITY RANKING, 1 = most severe 9 = least severe	ii) SHARE OF CULTIVATED AREA THAT IS AFFECTED	iii) ROOT YIELD GAIN ONCE THE CONSTRAINT HAS BEEN REMOVED
4 3	Drought susceptibility			
4 4	Low root yield per hectare (as intrinsic trait)			
4 5	Late bulking / Late maturity			
4 6	Poor germination			
4 7	Lack of early vigour			
4 8	Wide canopy			N A
4 9	Other			
4 10	Other			
4 11	Other			

Code 5 1	**Soils and Crop management**			
5 2		i) SEVERITY RANKING, 1 = most severe 11 = least severe	ii) SHARE OF CULTIVATED AREA THAT IS AFFECTED	iii) ROOT YIELD GAIN ONCE THE CONSTRAINT HAS BEEN REMOVED
5 3	Low soil fertility			
5 4	Poor soil physics			
5 5	Soil erosion			
5 6	Salinity			
5 7	Soil acidity			
5 8	Surface temperature			
5 9	Sub-optimal field management			
5 10	Inadequate spacing			
5 11	Insufficient crop care (weed and pest control)			
5 12	Other			
5 13	Other			

Code 6 1	Non-crop related constraints			
6 2		i) SEVERITY RANKING, 1 = most severe 5 = least severe	ii) SHARE OF CULTIVATED AREA THAT IS AFFECTED	iii) ROOT YIELD GAIN ONCE THE CONSTRAINT HAS BEEN REMOVED
6 3	Credit availability			N A
6 4	Technical assistance and training			N A
6 5	Labour availability			N A
6 6	Other			
6 7	Other			

N A Not Applicable

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To
From Jan Gerrit VAN NOREL, Associate Expert CBN

SPECIAL PROJECT PRIORITY AREAS FOR CASSAVA RESEARCH
Constraints & Opportunities in PROCESSED CASSAVA PRODUCTS

Background
The Cassava Biotechnology Network (CBN) is involved in a special project on priority setting for cassava research, technically supported by CIAT's Cassava Program The CBN project coincides with the recently initiated Cassava Global Strategy Development by IFAD One of the projects in this initiative include Regional Reviews of the cassava subsectors in Africa, Asia and LatinAmerica It is expected that the current data collection scheme will provide a comprehensive overview of constraints and opportunities in the cassava subsectors worldwide IFAD has provided limited funding to conduct this survey

During the Fifth Asian Regional Cassava Workshop, data collection for the needs assessment regarding Asia is planned For this objective two questionnaires have been designed, one on cultivation constraints and one questionnaire on post-harvest issues The latter questionnaire is subdivided in processed cassava products and fresh consumed cassava The questionnaire attached deals with processed cassava products

The questionnaire, and how to complete it.
I Annexed you find a questionnaire (in table format) on constraints and opportunities in consumption, processing and commercialization of processed cassava products Processed cassava products include cassava root (or leaf) that is being processed before consumption The questionnaire has a matrix design you should link rows with columns to know what information is asked for Please refer in your answers to the situation over the last year The reference point with respect to location of the product is the processing unit The questionnaire targets all processing units in your geographic area (be it part of a farm or be it an independent unit), and targets in the marketing section the products that are commercially sold

II The first, very crucial, question (with code 0 1) is about your coverage of cassava production and consumption areas Please think well about the geographic area for which you are able to provide confident data, i e the area that is within your field of expertise or experience Complete the questionnaire for that specific region Note that we are looking for good quality data, not necessarily a big geographic area that is covered by an individual questionnaire

III Next you find a choice option for a cassava product (code 0 2) For each product that you are able to complete a questionnaire you fill out a separate form This is because we don't want information about different products to be mixed up The following cassava products are distinguished Native Starch for Human Consumption, Native Starch for Industrial Purpose, Modified Starch, Chips for Human Consumption Chips for Animal Feed, and Pellets for Animal Feed You are asked to complete the questionnaire for the type of cassava product that you have marked

IV Then follow some questions on quantities, processing costs, and prices, regarding the cassava product under consideration (codes 0 3 up to 0 11)

V After the general product questions the questionnaire is subdivided into three constraints sections root quality (code 1 1 - 1 13), processing technology (code 2 1 - 2 13), and product marketing (code 3 1 - 3 11) Each section should be viewed as a whole In the first (i) column, you are asked to compare the constraints within the whole section The second (ii) third (iii), and fourth (iv) column are aimed at quantification of individual, independent constraints Due to the fact that the same questionnaire is used for different products, some constraints don't apply for certain products

On behalf of CBN and IFAD, I thank you for your time and effort completing the questionnaires!! We'll make sure that you in time receive a copy of the results

Specific notes.

Code 0 1 Please fill in the area (department, country, or region) for which you complete this questionnaire

Code 0 2 Please mark one product This cassava product portfolio is subdivided according to final destination of the product Please give the local name of the product, with a short description of the processing steps Use the blank space at the bottom of the page

Code 0 3 Please give the total volume of consumption (in 000 MT) for the geographic area mentioned under code 0 1

Code 0 4 Please give the conversion rate (root into product) for the product under consideration (Number of tons of fresh cassava required to produce one Ton of the product)

Code 0 5 Please give the price of fresh roots entering the processing unit for the product under consideration Due to differences in required quality, fresh root prices may vary according to destination AVERAGE means the average price over the last year for the raw material

Code 0 6 Current processing costs (not including raw material costs) under all current constraints Current constraints for example are the partial inefficient use of available labour time, the non-efficient input of capital, etc

Code 0 7 The optimal, lowered processing costs if, through root quality improvement (for example dry matter) and/or technology advance (for example reduction in process losses) all relevant constraints have been removed

Code 0 8 Conversion of local product unit into kg (only when a local unit was used before, in codes 0 6 and 0 7)

Code 0 9 Average factory price for the commercialized product, under current constraints AVERAGE means the average price over the last year (Factory = Processing unit)

Code 0 10 The optimal, altered factory price, that would reflect price premiums as a result of (a) root quality improvement and/or (b) processing technology improvement and/or (c) market development
Example A low fibre content, a better product quality obtained in the processing stage and less price fluctuations in the product market altogether would provoke a 50 % price premium for the product leaving the factory

Code 0 11 Local currency into US dollar (1996)

Code 1 1 This section deals with quality aspects of cassava roots

Code 1 2 i) SEVERITY RANKING
Please rank the constraints for the section as a whole in order of severity 1 is most severe, 2 is second most severe, etc , etc
ii) SHARE OF PRODUCT VOLUME THAT IS AFFECTED BY A CONSTRAINT
Please give the share (in %) of the total product volume in your geographic area that is affected by each constraint
iii) REDUCTION IN PROCESSING COST ONCE THE CONSTRAINT HAS BEEN REMOVED
Please give the percentage reduction in processing costs due to the alleviation of a constraint through root quality improvement
iv) PREMIUM ON PRODUCT PRICE ONCE THE CONSTRAINT HAS BEEN REMOVED
Please give the percentage increase in product price due to root quality improvement

Code 1 3 High cyanogen content that leads to an additional cost in one of the processing stages with a negative effect on profits

Code 1 4 Low dry matter content in the root

Code 1 5 This constraint applies to products made from roots and aims at physiological and microbial perishability

Code 1 6 High fibre content in the root

Code 1 7 Starch that is less appropriate for the processing steps under consideration

Code 1 8 These are characteristics that are not preferred by consumers

Code 1 9 Unusual root size/shape which incurr higher costs for peeling and slicing

Codes 1 10 - 1 13 Please specify other constraints

Code 2 1 This question section is about equipment and management in the various processing stages

Code 2 2 i) SEVERITY RANKING
Please rank the constraints for the section as a whole in order of severity 1 is most severe, 2 is second most severe, etc , etc

ii) SHARE OF PRODUCT VOLUME THAT IS AFFECTED BY A CONSTRAINT
Please give the share (in %) of the total product volume in your geographic area that is affected by each constraint
iii) REDUCTION IN PROCESSING COST ONCE THE CONSTRAINT HAS BEEN REMOVED
Please give the percentage reduction in processing costs due to the alleviation of a constraint through processing technology improvement
iv) PREMIUM ON PRODUCT PRICE ONCE THE CONSTRAINT HAS BEEN REMOVED
Please give the percentage increase in product price due to processing technology improvement

Code 2 3 Targets damaged roots, caused by maltreatment from harvest up to entering the processing unit

Code 2 4 Low product quality, caused in the processing stage Please specify the reason for the low quality Eg lack of quality control measures (management problem), or outdated equipment (technical problem)

Code 2 5 Targets the efficiency of the technology (modern or old) that is used re conversion of the raw material

Code 2 6 Targets the efficiency in the use of capital (represents for a part 'processing cost') Inefficient capital use relates to outdated, not properly designed equipment, with a high energy consumption

Code 2 7 Targets the efficiency in the use of labour (represents for a part 'processing cost') Inefficient labour use relates to bad organization of the work or in case only unskilled workers are available

Code 2 8 Contaminated water

Code 2 9 An excess use of water in processing causes higher costs for waste water treatment (which is obligatory now or soon in many countries) Higher costs for waste water treatment are reflected in a lower product price So, the question here is when less water is used what would be the product price premium?

Codes 2 10 - 2 13 Please specify other constraints

Code 3 1 This section focuses on the marketing of processed cassava products Own consumption at the processing unit is not taken into account here

Code 3 2 i) SEVERITY RANKING
Please rank the constraints for the section as a whole in order of severity 1 is most severe, 2 is second most severe, etc
ii) SHARE OF PRODUCT VOLUME THAT IS AFFECTED BY A CONSTRAINT
Please give the share (in %) of the total product volume in your geographic area that is affected by each constraint
iii) REDUCTION IN PROCESSING COST ONCE THE CONSTRAINT HAS BEEN REMOVED Not Applicable
Constraint alleviation in product marketing has effect on product price only
iv) PREMIUM ON PRODUCT PRICE ONCE THE CONSTRAINT HAS BEEN

REMOVED

Please give the percentage increase in product price due to market development

Code 3 3 Bad packaging material and/or poor packaging by factory workers which makes the product less attractive as it could be

Code 3 4 The loss in product value (product damage) from processing unit up to the consumer

Code 3 5 Examples are bad roads, no trucks available, cuts in water and energy supply, and few buyers at the processing unit These have a decreasing effect on product price, and on market functioning in general

Code 3 6 MANY INTERMEDIARIES means a long marketing channel and high marketing margins, in general

Code 3 7 Price fluctuations that prevent a market to develop and include a risk to producers, the absence of severe price fluctuations opens the opportunity for increased product supply (less risk!)

Codes 3 8 - 3 11 Please specify other constraints

CONSTRAINTS & OPPORTUNITIES for PROCESSED CASSAVA PRODUCTS, covering Quality, Technology, and Marketing.
Questionnaire for cassava experts participating in the V Asian Regional Cassava Workshop in Hainan (China), November 1996

Name of Respondent
Institute (incl Program/Unit/Section)

Mailing address
Fax
E mail

Position
Research activities in cassava, please give time share per separate activity

Activities in cassava, other than research (administrative and/or developmental)

Code 0 1	Geographic area	
0 2	Cassava product about which you are filling in this form Mark one!	__ Native Starch for Human Consumption, specify __ Native Starch for Industrial Purpose, specify __ Modified Starch, specify __ Chips for Human Consumption, specify __ Chips for Animal Feed, specify __ Pellets for Animal Feed, specify __ Other
0 3	Volume of the marked cassava product	
0 4	Fresh root equivalent	
0 5	Average root price	
0 6	Current processing cost, per unit of product	
0 7	Potential processing cost, per unit of product	
0 8	Equivalent of 'unit of product', in kg	
0 9	Average product price	
0 10	Potential product price	
0 11	Currency exchange rate	

Code 1 1	constraints in ROOT QUALITY				
1 2		i) SEVERITY RANKING, 1 = most severe 11 = least severe	ii) SHARE OF PRODUCT VOLUME THAT IS AFFECTED	iii) REDUCTION IN PROCESSING COST ONCE THE CONSTRAINT HAS BEEN REMOVED	iv) PREMIUM ON PRODUCT PRICE ONCE THE CONSTRAINT HAS BEEN REMOVED
1 3	High cyanogen				
1 4	Low dry matter content				
1 5	High perishability				
1 6	High fibre content				
1 7	Poor starch properties				
1 8	Bad taste, bad texture, bad colour				
1 9	Unusual root size or root shape				
1 10	Other				
1 11	Other				
1 12	Other				
1 13	Other				

Code 2 1	constraints in PROCESSING TECHNOLOGY				
2 2		i) SEVERITY RANKING, 1 = most severe 11 = least severe	ii) SHARE OF PRODUCT VOLUME THAT IS AFFECTED	iii) REDUCTION IN PROCESSING COST ONCE THE CONSTRAINT HAS BEEN REMOVED	iv) PREMIUM ON PRODUCT PRICE ONCE THE CONSTRAINT HAS BEEN REMOVED
2 3	Poor handling of raw material				
2 4	Low quality of the final product and by-products, specify reason				
2 5	Low conversion rate (kg raw material kg product)				
2 6	Low capital efficiency (kg output vs capital input)				
2 7	Low labour efficiency (kg output vs labour input)				
2 8	Low quality of the water used in processing				
2 9	Excess use of water in processing				
2 10	Other				
2 11	Other				
2 12	Other				
2 13	Other				

Code 3 1	constraints in PRODUCT MARKETING				
3 2		i) SEVERITY RANKING, 1 = most severe 9 = least severe	ii) SHARE OF PRODUCT VOLUME THAT IS AFFECTED	iii) REDUCTION IN PROCESSING COST ONCE THE CONSTRAINT HAS BEEN REMOVED	iv) (NET) PREMIUM ON PRODUCT PRICE ONCE THE CONSTRAINT HAS BEEN REMOVED
3 3	Poor product packaging			Not Applicable	
3 4	Poor handling of product				
3 5	Bad physical infrastructure				
3 6	Many intermediaries				
3 7	Severe price fluctuations in markets				
3 8	Other				
3 9	Other				
3 10	Other				
3 11	Other				

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To
From Jan Gerrit VAN NOREL, Associate Expert CBN

SPECIAL PROJECT PRIORITY AREAS FOR CASSAVA RESEARCH
Constraints & Opportunities in FRESH CONSUMED CASSAVA

Background
The Cassava Biotechnology Network (CBN) is involved in a special project on priority setting for cassava research, technically supported by CIAT's Cassava Program The CBN project coincides with the recently initiated Cassava Global Strategy Development by IFAD One of the projects in this initiative include Regional Reviews of the cassava subsectors in Africa, Asia and LatinAmerica It is expected that the current data collection scheme will provide a comprehensive overview of constraints and opportunities in the cassava subsectors worldwide IFAD has provided limited funding to conduct this survey

During the Fifth Asian Regional Cassava Workshop, data collection for the needs assessment regarding Asia is planned For this objective two questionnaires have been designed, one on cultivation constraints and one questionnaire on post-harvest issues The latter questionnaire is subdivided in processed cassava products and fresh consumed cassava The questionnaire attached deals with fresh consumed cassava

The questionnaire, and how to complete it.
I Annexed you find a questionnaire (in table format) on constraints and opportunities in consumption and commercialization of fresh consumed cassava Fresh consumed cassava is cassava root (or leaf) that is not being processed before consumption The questionnaire has a matrix design you should link rows with columns to know what information is asked for Please refer in your answers to the situation over the last year The reference point with respect to location of the product is the farm The questionnaire targets all farms in your geographic area on which cassava is cultivated, and targets in the marketing section the roots (and leaves) that are sold commercially

II The first, very crucial, question (with code 0 1) is about your coverage of cassava production and consumption areas Please think about the geographic area for which you are able to provide confident data, i e the area that is within your field of expertise or experience Complete the questionnaire for that specific region Note that we are looking for good quality data, not necessarily a big geographic area that is covered by an individual questionnaire

III Next you find a choice option for a cassava use (code 0 2) For each cassava use you fill out a separate form This is because we don't want information about different cassava uses to be mixed up In fresh consumed cassava the following uses are distinguished fresh roots for human consumption (boiled fried, or raw eaten), fresh roots for animal feed (no drying of roots), leaves for human consumption (utilized as a cooked vegetable), and leaves for animal feed You are asked to complete the questionnaire for the type of cassava use that you have marked

IV Then follow some questions on prices and quantities regarding the cassava use under consideration (codes 0 3 up to 0 6)

V After the general product questions the questionnaire is subdivided into two constraints sections root (or leaf) quality (code 1 1-1 13) and marketing (code 2 1-2 9) Each section should be viewed as a whole In the first (i) column, you are asked to compare the constraints within the whole section The second (ii) and third (iii) column are aimed at quantification of individual constraints Due to the fact that the same questionnaire is used for different cassava uses, some constraints don't apply for certain cassava uses

On behalf of CBN and IFAD, I thank you for your time and effort completing the questionnaires!! We'll make sure that you in time receive a copy of the results

Specific notes

Code 0 1 Please fill in the area (department, country, or region) for which you complete this questionnaire

Code 0 2 Please mark one

Code 0 3 Please give the total volume of consumption (in 000 MT) for the geographic area mentioned under code 0 1

Code 0 4 Average farm-gate price for the commercialized product, under current constraints AVERAGE means the average price over the last year

Code 0 5 The optimal, altered farm-gate price, that would reflect price premiums as a result of root quality improvement and/or market development
An example Toxic roots and market distortions are the only constraints in a certain situation Removal of cyanogen together with full market competition would provoke a 40 % price premium for the product at the farm-gate

Code 0 6 Local currency into US dollar (1996)

Code 1 1 This section deals with root quality, or leaf quality Root characteristics for uses 'fresh roots for human consumption' and 'fresh roots for animal feed , leaf characteristics for uses 'leaves for human consumption' and leaves for animal feed'

Code 1 2 i) SEVERITY RANKING
Please rank the constraints for the section as a whole in order of severity 1 is most severe, 2 is second most severe, etc , etc
ii) SHARE OF PRODUCT VOLUME THAT IS AFFECTED BY A CONSTRAINT

The share (in %) of the total product volume that is affected by each constraint

iii) PREMIUM ON PRICE ONCE THE CONSTRAINT HAS BEEN REMOVED

The percentage increase in price due to root (or leaf) quality improvement

Code 1 3 High cyanogen content that limits in one way or another the use of roots

Code 1 4 Low dry matter content in the root

Code 1 5 This constraint aims at physiological and microbial perishability

Code 1 6 High fibre content in the root

Code 1 7 Cassava roots that are not well suited for cooking

Code 1 8 High fibre content in the root

Code 1 9 Unusual root size/shape which incurr higher costs for peeling

Codes 1 10 - 1 13 Please specify other constraints

Code 2 1 This section focuses on the marketing of fresh consumed cassava Own consumption is not taken into account here

Code 2 2 i) SEVERITY RANKING

Please rank the constraints for the section as a whole in order of severity 1 is most severe, 2 is second most severe, etc , etc

ii) SHARE OF PRODUCT VOLUME THAT IS AFFECTED BY A CONSTRAINT

The share (in %) of the total product volume that is affected by each constraint

iii) PREMIUM ON PRICE ONCE THE CONSTRAINT HAS BEEN REMOVED

The percentage increase in price due to market development

Code 2 3 Examples are bad roads, no trucks available, and few buyers at the processing unit These have a decreasing effect on product price, and on market functioning in general

Code 2 4 MANY INTERMEDIARIES means a long marketing channel and high marketing margins, in general

Code 2 5 Price fluctuations that prevent a market to develop and include a risk to producers, the absence of severe price fluctuations opens the opportunity for increased product supply (less risk!)

Codes 2 6 - 2 9 Please specify other constraints

CONSTRAINTS & OPPORTUNITIES for FRESH CONSUMED CASSAVA, covering Quality and Marketing
Questionnaire for cassava experts participating in the V Asian Regional Cassava Workshop in Hainan (China), November 1996

Name of Respondent
Institute (incl Program/Unit/Section)

Mailing address
Fax
E-mail

Position
Research activities in cassava, please give time share per separate activity

Activities in cassava, other than research (administrative and/or developmental)

Code 0 1	Geographic area	
0 2	Cassava use about which you are filling in this form Mark one!	___ **Fresh Roots for Human Consumption (boiled or fried)** ___ **Fresh Roots for Animal Feed** ___ **Leaves for Human Consumption (as cooked vegetable)** ___ **Leaves for Animal Feed** ___ **Other**
0 3	Volume of the marked cassava use	
0 4	Average price	
0 5	Potential price	
0 6	Currency exchange rate	

Code 1 1	constraints in ROOT QUALITY (or LEAF QUALITY)			
1 2		i) SEVERITY RANKING, 1 = most severe 11 = least severe	ii) SHARE OF PRODUCT VOLUME THAT IS AFFECTED	iii) PREMIUM ON PRICE ONCE THE CONSTRAINT HAS BEEN REMOVED
1 3	High cyanogen			
1 4	Low dry matter content			
1 5	High perishability			
1 6	High fibre content			
1 7	Bad cooking quality			
1 8	Bad taste			
1 9	Unusual root size or root shape			
1 10	Other			
1 11	Other			
1 12	Other			
1 13	Other			

Code 2 1	constraints in MARKETING			
2 2		i) SEVERITY RANKING, 1 = most severe 7 = least severe	ii) SHARE OF PRODUCT VOLUME THAT IS AFFECTED	iii) PREMIUM ON PRICE ONCE THE CONSTRAINT HAS BEEN REMOVED
2 3	Bad physical infrastructure			
2 4	Many intermediaries			
2 5	Severe price fluctuations in markets			
2 6	Other			
2 7	Other			
2 8	Other			
2 9	Other			

ANNEX 2

EDAPHO-CLIMATIC CLASSIFICATION OF CASSAVA PRODUCTION FOR LATIN AMERICA AND ASIA

Proposal presented to the International Fund for Agricultural Development (IFAD), Italy, as part of the Cassava Global Strategy Development
by
Cassava Biotechnology Network (CBN) and Land Use Project (LUP),
International Center for Tropical Agriculture (CIAT), Colombia

March 1997

BACKGROUND

In May 1996 the initiative for the development of a global strategy for cassava was launched by IFAD during a planning meeting in Rome, Italy Working groups were established to undertake regional reviews of cassava subsectors One of the activities in the regional reviews include the assessment of constraints in cassava production and post-harvest sectors

Constraints in the cultivation of cassava many times are related to climate and soil type of the environment in which cassava is produced Research approaches also are based on subsets of climate and soil types This implies that an inventory of constraints in cassava must be preceded by a proper classification of cassava production zones Although the Cassava Global Strategy Development chose to work with regional reviews, the criteria for classification of production zones should be uniform among the three cassava growing continents in order to make comparison and summation of constraints possible at the global level

A classification of cassava production based on climate and soil type has been made for the continent of Africa (Carter et al , 1992) The resulting edapho-climatic classification is specific to cassava cultivation circumstances The classification criteria are derived from a set of climate and soil conditions for cassava cultivation that cover the production of cassava at the global level Furthermore the Africa classification is well-documented, referenced and contains exclusive classes that are not ambiguous

Four criteria for climate conditions were applied mean growing season temperature, dry season, daily temperature range, and seasonality For soil type eight classes were

distinguished depending on soil texture, drainage problems, and acidity, among others The 128 classes that resulted were grouped into seven main edapho-climatic classes for cassava production

OBJECTIVES

This proposal aims at preparation of edapho-climatic classification for cassava production in Latin America and Asia The criteria for classification are similar to the ones in the classification that was prepared for Africa before

Second objective is to distribute the classifications to national cassava research institutes in order to streamline research initiatives and strengthen interaction

METHODOLOGY

The Land Use Project at CIAT is responsible for the preparation of edapho-climatic classification of cassava production The classification for Asia requires the production of an interpolated climate file We will extract topographic data from the NOAA 10 minute digital elevation model Then using inverse square distance weighing and correction for lapse rate the rainfall, temperature and diurnal temperature range for each pixel are estimated from the 5 nearest stations Approximately 3500 stations are available from the CIAT Climate database A Fortran program is then used to read the monthly values for each pixel and assign the climate classification class An IDRISI image is formed of the climate classes This image is then overlaid on soil conditions in ARC/INFO using the digital version of the FAO Soils map of the world at 1 5 000,000 This procedure will probably not produce good results for certain small islands but should be robust for mainland Asia and the larger islands

The distribution of maps with edapho-climatic classification will be the responsibility of CBN The data base of CBN will be utilized to get a good coverage in the distribution of maps among national, and other, research entities all over the world

TIME FRAME

The edapho-climatic classification for Latin America has been prepared in July 1996, shortly after the start of the Global Strategy Development This took about two days of CIAT Senior Staff time

The preparation of the classification for Asia will take three weeks time of a LUP Associate, and three weeks time of LUP Senior Staff The work can be done at any moment since the necessary data are already available at CIAT, the only thing is that it has to fit in with other activities in the Land Use Project It is expected that the work is completed before July 1997

Distribution of maps is scheduled for August 1997

EXPECTED PRODUCTS

A classification system that covers cassava production worldwide will be available The classification serves a wide range of purposes First of all it is going to be used in the regional reviews for the Global Strategy, but thereafter international research centers as well as national research institutes may make use of the classification system in that they base their cassava research policy on a scientifically sound classification system Researchers worldwide will interact based on one, common platform for cassava classification A proper identification of target zones for cassava research initiatives will encourage progress in cassava research

BUDGET

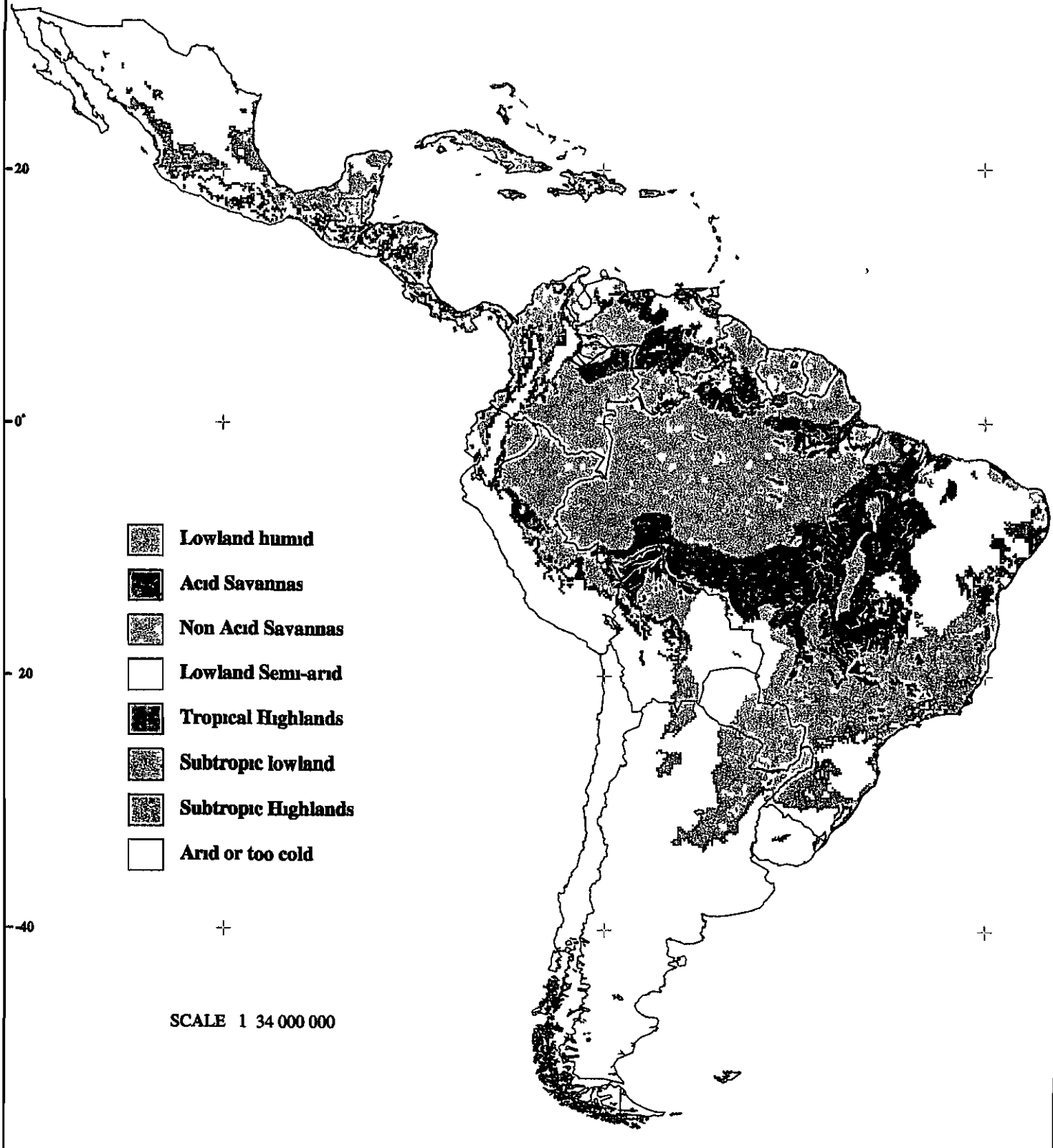
In USD terms

	IFAD	CIAT
Classification for Latin America		500
Classification for Asia,		
- data compilation	1,500	
- programming	3,500	
Printing of maps		250 *
Distribution of maps		750 *
TOTALS	5,000	1,500

* figures to be reviewed

ANNEX 3

EDAPHO-CLIMATIC CLASSIFICATION OF CASSAVA PRODUCTION FOR LATIN-AMERICA AND CARIBBEAN

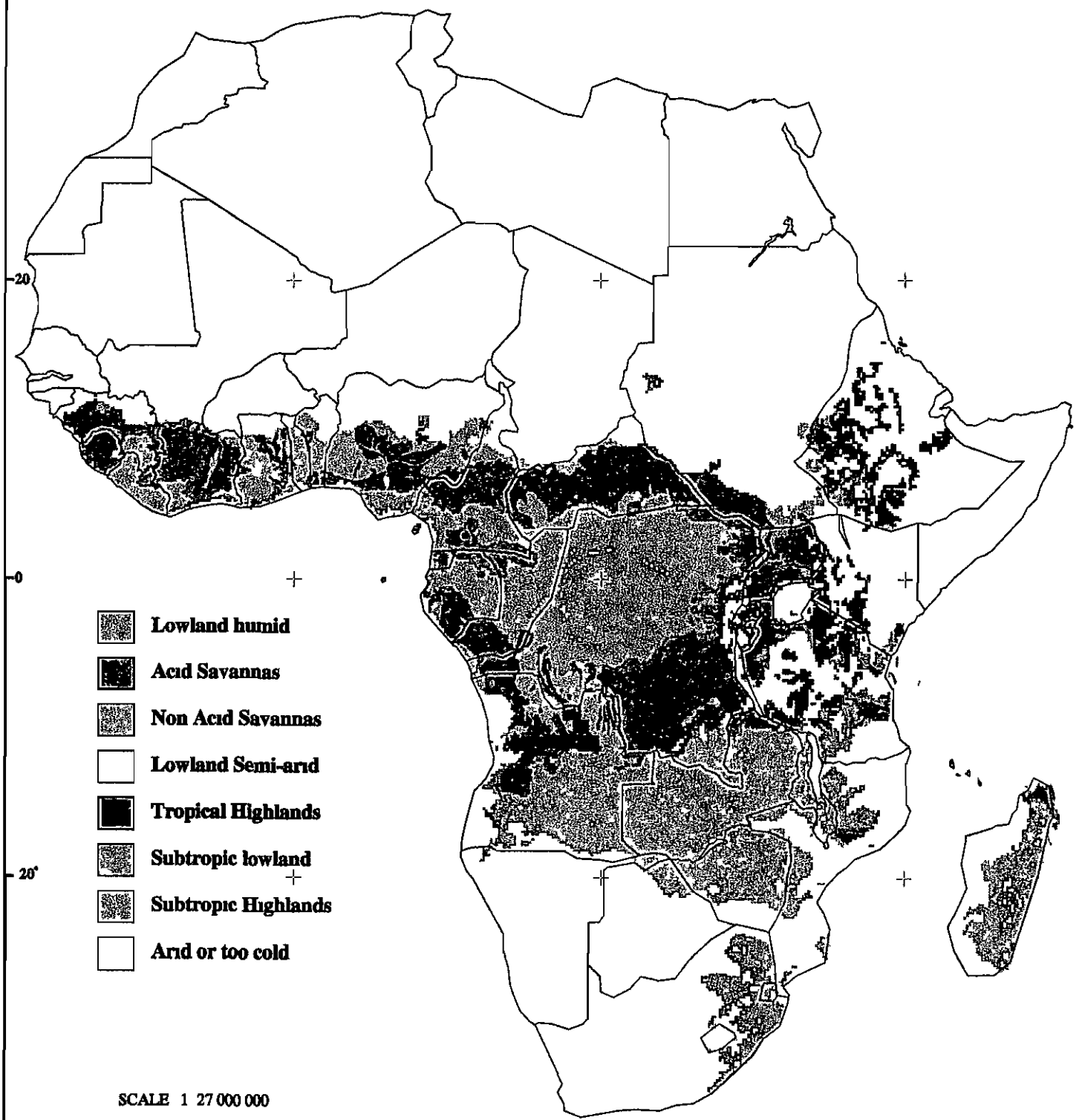


Jones P G (1996), "Carter" a Fortran subroutine for cassava classification. Version 2 1 CIAT Cali, Colombia

CIAT

July 1996

EDAPHO-CLIMATIC CLASSIFICATION OF CASSAVA PRODUCTION FOR AFRICA



Jones P G (1996), "Carter" a Fortran subroutine for cassava classification. Version 2 1. CIAT Cali, Colombia.

CIAT

July 1996

ANNEX 4

LATIN AMERICA - CASSAVA CULTIVATION in the SUBTROPICS

Respondent Number	LC1	LC5	LC6
Area	182000	30000	48800
Yield, in Ton/Ha	14 7	25	17 3
Price in USD/Ton	72 5	40	36 5
Estimated yieldincrease	104%	50%	131%
Calculated yieldincrease	166%	57%	210%
YIELDGAIN			
Planting material	30%	8%	3%
Pathogens&Viruses	34%	16%	6%
Pests	33%	9%	1%
Genetic characteristics	8%	2%	47%
Soils&Crop management	61%	22%	154%

	1997 - 3 Qtn weighted avg	**1997 - 3 Qtn non-weighted avg**	**1993 data ENTIRE SUBTROPICS**
Cassava area, in Ha	260800	260800	807000
Yield, in Ton/Ha	16	19	14
Estimated yieldincrease	103%	95%	71%
Calculated yieldincrease	162%	144%	89%
YIELDGAIN			
Planting material	22%	14%	6%
Pathogens&Viruses	27%	19%	21%
Pests	24%	14%	10%
Genetic characteristics	15%	19%	9%
Soils&Crop management	74%	79%	43%

LATIN AMERICA - CASSAVA CULTIVATION in the HIGHLAND TROPICS

Respondent Number LC9

Area	4000
Yield in Ton/Ha	12
Price, in USD/Ton	125
Estimated yieldincrease	50%
Calculated yieldincrease	438%
YIELDGAIN	
Planting material	47%
Pathogens&Viruses	49%
Pests	93%
Genetic characteristics	108%
Soils&Crop management	141%

1993 data
ENTIRE HIGHLAND TROPICS

Cassava area in Ha	417000
Yield in Ton/Ha	10
Estimated yieldincrease	100%
Calculated yieldincrease	121%
YIELDGAIN	
Planting material	7%
Pathogens&Viruses	14%
Pests	6%
Genetic characteristics	40%
Soils&Crop management	54%

LATIN AMERICA - CASSAVA CULTIVATION in the LOWLAND HUMID TROPICS

Respondent Number	LC10
Area	3000
Yield in Ton/Ha	12
Price in USD/Ton	100
Estimated yieldincrease	67%
Calculated yieldincrease	263%
YIELDGAIN	
Planting material	12%
Pathogens&Viruses	38%
Pests	12%
Genetic characteristics	88%
Soils&Crop management	114%

1993 data
ENTIRE LOWLAND HUMID

Cassava area, in Ha	417000
Yield in Ton/Ha	12
Estimated yieldincrease	103%
Calculated yieldincrease	109%
YIELDGAIN	
Planting material	17%
Pathogens&Viruses	15%
Pests	4%
Genetic characteristics	20%
Soils&Crop management	55%

LATIN AMERICA - CASSAVA CULTIVATION in the LOWLAND SUBHUMID TROPICS

Respondent Number	LC2	LC11	1997 - 2 Qtn non-weighted avg
Area	42000	4000	--
Yield, in Ton/Ha	12 5	10	11 3
Price in USD/Ton	79	55	67
Estimated yieldincrease	50%	150%	100%
Calculated yieldincrease	202%	310%	256%
YIELDGAIN			
Planting material	44%	16%	30%
Pathogens&Viruses	16%	32%	24%
Pests	12%	12%	12%
Genetic characteristics	28%	124%	76%
Soils&Crop management	102%	127%	115%

1993 data
ENTIRE LOWLAND SUBHUMID

Cassava area in Ha	918000
Yield, in Ton/Ha	10
Estimated yieldincrease	100%
Calculated yieldincrease	129%
YIELDGAIN	
Planting material	18%
Pathogens&Viruses	16%
Pests	19%
Genetic characteristics	20%
Soils&Crop management	56%

	LOWLAND HUMID LAC - 1993	LOWLAND SUBHUMID LAC - 1993	LOWLAND SEMI-ARID LAC - 1993
Cassava area, in Ha	{417000}	{918000}	{222000}
Yield, in Ton/Ha	12	10	7
Estimated yieldincrea	103%	100%	114%
Calculated yieldincre	109%	129%	177%
Planting material	17%	18%	40%
Pathogens&Viruses	15%	16%	9%
Pests	4%	19%	27%
Genetic characteristic	20%	20%	34%
Soils&Crop manage	55%	56%	68%

	North Brazil 1997 - LC3	North-East Brazil 1997-LC4
Cassava area in Ha	800000	1100000
Yield, in Ton/Ha	13	10
Estimated yieldincrea	97%	125%
Calculated yieldincre	228%	277%
Planting material	8%	30%
Pathogens&Viruses	18%	42%
Pests	35%	20%
Genetic characteristic	101%	80%
Soils&Crop manage	66%	105%

humid
subhumid
semi-arid

subhumid
semi-arid

Respondent Number	LC1				
0 0 Position	Extensionist				
0 1 Zone	Paraguay				
0 2 Area	182000	Producer price in USD per Ton		72 46	
0 3 AcualYield	14 7	Total volume of production in Tons		2675400	
0 4 PotentialYield	30	Financial value of production in US		1 9E+08	
0 5 ProducerPrice	150000	Potential yield increase estimate		104%	
0 6 ExchangeRate	2070				
Planting material	RANKING	AREA (%)	YIELDGAIN (%)	YIELDGAIN FOR THE ENTIRE ZONE	
1 3 Quality	1	100	30	30%	
1 4 Availability	3	n a		0%	
1 5 Other 1					
1 6 Other 2					
				total	30%
Pathogens & Viruses					
2 3 BactBlight	3	100	20	20%	
2 4 Anthracnose	5	80	5	4%	
2 5 Mosaic	6	30	5	2%	
2 6 AngularBrownLeaf	6	60	5	3%	
2 7 OtherLeaf 2				0%	
2 8 RootRot Soft type	4	50	10	5%	
2 9 StemRot				0%	
2 10 OtherRoot 1				0%	
2 11 OtherRoot 2				0%	
2 12 Witchess Broom	6	10	5	1%	
2 13 Superelongation	6	5	1	0%	
				total	34%
Pests					
3 3 MealyBug	5	30	10	3%	
3 4 GreenMite	7	20	5	1%	
3 5 RedMite	6	25	5	1%	
3 6 Trips	7	30	5	2%	
3 7 Hornworm	4	80	15	12%	
3 8 Other 1 White fly	4	80	10	8%	
3 9 Other 2 Gall midge	6	30	5	2%	
3 10 Other 3 Stem bore	6	50	10	5%	
				total	33%
Genetic characteristics					
4 3 DroughtSusc	9 n a	n a		0%	
4 4 LowYield	8	30	10	3%	
4 5 LateBulking/Matur	7	30	10	3%	
4 6 PoorGerm	7	20	5	1%	
4 7 LackEarlyVigour	7	20	5	1%	
4 8 WideCanopy	7	40 n a		0%	
4 9 Other 1					
4 10 Other 2					
4 11 Other 3					
				total	8%
Soils and Crop management					
5 3 LowSoilFertility	4	60	20	12%	
5 4 PoorSoilPhysics	8	30	5	2%	
5 5 SoilErosion	3	80	30	24%	
5 6 Salinity	11 n a	n a		0%	
5 7 SoilAcidity	9	50	10	5%	
5 8 SurfaceTemp	9	30	5	2%	
5 9 SuboptimalFieldMa	7	70	10	7%	
5 10 InadeqSpacing	10 n a	n a		0%	
5 11 InsuffCropCare	5	50	20	10%	
5 12 Other 1					
5 13 Other 2					
				total	61%
Non crop related constraints					
6 3 CreditAvailability	1	95 n a		0%	
6 4 TechnAssistance/Tr	2	80 n a		0%	
6 5 LabourAvailability	4	50 n a		0%	
6 6 Other 1					
6 7 Other 2					
				total	0%
					166%

Respondent Number	LC2						
0 0 Position	Consultant fytosanitation						
0 1 Zone	Sucre/Cordoba/Bolivar/Magdalena						
0 2 Area1-2	42000		Producer price A in USD per Ton		79 21		
0 3 ActualYield 1	14	9 8	Producer price B in USD per Ton		41 58		
ActualYield 2	7	7 9	Total volume of production in Tons				
0 4 PotentialYield	20		Financial value of production in US				
PotentialYield 2	12		Potential yield 1 increase estimate		43%	104%	
0 5 ProducerPrice A	80000		Potential yield 2 increase estimate		71%	52%	
ProducerPrice B	42000						
0 6 ExchangeRate	1010						
					YIELDGAIN FOR THE		
Planting material	RANKING	AREA (/)	YIELDGAIN (%)		ENTIRE ZONE		
1 3 Quality	2	40	40		16%		
1 4 Availability	1	70	40		28%		
1 5 Other 1							
1 6 Other 2							
					total	44%	
Pathogens & Viruses							
2 3 Bac Blight	1	80	20		16%		
2 4 Anthracnose					0%		
2 5 Mosaic					0%		
2 6 OtherLeaf 1					0%		
2 7 OtherLeaf 2					0%		
2 8 RootRot					0%		
2 9 StemRot					0%		
2 10 OtherRoot					0%		
2 1 OtherRoot 2					0%		
2 2					0%		
2 13 Superelongation					0%		
					total	16%	
Pests							
3 3 MealyBug					0%		
3 4 GreenMite	2	20	10		2%		
3 5 RedMite	4	5	5		0%		
3 6 Trips	3	20	10		2%		
3 7 Hornworm	5	1	15		0%		
3 8 Other 1 Stemborer	1	40	20		8%		
3 9 Other 2					0 %		
3 10 Other 3					0%		
					total	12%	
Genetic characteristics							
4 3 DroughtSusc	5	10	40		4 %		
4 4 LowYield	4	10	20		2 %		
4 5 LateBulking/Matur					0 %		
4 6 PoorGerm	2	20	30		6 %		
4 7 LackEarlyVigour	1	40	40		16%		
4 8 WideCanopy		n a			0%		
4 9 Other 1							
4 10 Other 2							
4 11 Other 3							
					total	28%	
Soils and Crop management							
5 3 LowSoilFertility	1	70	40		28%		
5 4 PoorSoilPhysics					0%		
5 5 SoilErosion	2	70	30		21%		
5 6 Salinity	7	10	10		1%		
5 7 SoilAcidity	6	20	20		4%		
5 8 SurfaceTemp					0%		
5 9 SuboptimalFieldMa	5	60	20		12 %		
5 10 InadeqSpacing	3	40	30		12%		
5 11 InsuffCropCare	4	80	30		24 %		
5 12 Other 1							
5 13 Other 2							
					total	102%	
						202%	
Non crop related constraints							
6 3 CreditAvailability	1	90	n a		0%		
6 4 TechnAssistance/Tr	3	30	n a		0%		
6 5 LabourAvailability			n a		0%		
6 6 O 1 BusinessAttitud	2	80	20		16%		
6 7 Other 2							
					total	16 %	
						218%	

Respondent Number	LC3						
0 0 Position	Researcher Pathology						
0 1 Zone	North Brazil						
0 2 Area	800000	**906419**	Producer price in USD per Ton		700 00		
0 3 AcualYield	12 7	**10 5**	Total volume of production in Tons		10160000	**9517400**	
0 4 PotentialYield	25		Financial value of production in US		7 1E+09		
0 5 ProducerPrice	700		Potential yield increase estimate		97%	**138%**	
0 6 ExchangeRate	1						

Planting material	RANKING	AREA (%)	YIELDGAIN (%)	YIELDGAIN FOR THE ENTIRE ZONE	
1 3 Quality	2	40	20	8%	
1 4 Availability	1	30	n a	0%	
1 5 Other 1					
1 6 Other 2					
				total	8%
Pathogens & Viruses					
2 3 BactBlight				0%	
2 4 Anthracnose	7	2	1	0%	
2 5 Mosaic				0%	
2 6 Other 1				0%	
2 7 OtherLeaf 2				0%	
2 8 RootRot	1	40	40	16%	
2 9 StemRot	6	15	12	2%	
2 10 OtherRoot 1				0%	
2 11 Frogskin Disease	2	1	2	0%	
2 12				0%	
2 13 Superelongation	7	2	3	0%	
				total	18%
Pests					
3 3 MealyBug	6	10	5	1%	
3 4 GreenMite	3	40	20	8%	
3 5 RedMite	6	20	5	1%	
3 6 Trips	8	60	2	1%	
3 7 Hornworm	2	100	20	20%	
3 8 Other 1 White fly	4	30	15	5%	
3 9 Other 2				0%	
3 10 Other 3				0%	
				total	35%
Genetic characteristics					
4 3 DrougntSusc	1	20	60	12%	
4 4 Low Yield	2	80	80	64%	
4 5 LateBulking/Matur	6	20	10	2%	
4 6 PoorGerm	3	20	15	3%	
4 7 LackEarlyVigour	3	40	20	8%	
4 8 WideCanopy	2	60	20	12%	
4 9 Other 1					
4 10 Other 2					
4 11 Other 3					
				total	101%
Soils and Crop management					
5 3 LowSoilFertility	2	80	40	32%	
5 4 PoorSoilPhysics	2	20	20	4%	
5 5 SoilErosion	2	10	15	2%	
5 6 Salinity	11			0%	
5 7 SoilAcidity				0%	
5 8 SurfaceTemp	5	20	12	2%	
5 9 SuboptimalFieldMa	4	80	15	12%	
5 10 InadeqSpacing	3	40	20	8%	
5 11 InsuffCropCare	9	10	2	0%	
5 12 O 1 Late Planting	5	30	20	6%	
5 13 Other 2					
				total	66%
Non crop related constraints					
6 3 CreditAvailability	1	80	n a	0%	
6 4 TechnAssistance/Tr	2	80	n a	0%	
6 5 LabourAvailability	5		n a	0%	
6 6 Other 1					
6 7 Other 2					
				total	0%
					228%

Respondent Number	LC4						
0 0 Position	Coordinator Training & Manager Project						
0 1 Zone	NorthEastBrazil						
0 2 Area	1100000	**1045940**	Producer price in USD per Ton		40 00		
0 3 ActualYield	10	**8 5**	Total volume of production in Tons		11000000	**8890490**	
0 4 PotentialYield	22 5		Financial value of production in USD		4 4E+08		
0 5 ProducerPrice	40		Potential yield increase estimate		125%	**165%**	
0 6 ExchangeRate	1						
Planting material	RANKING	AREA (%)	YIELDGAIN (%)		YIELDGAIN FOR THE ENTIRE ZONE		
1 3 Quality	2	100	30		30%		
1 4 Availability	2	100	n a		0%		
1 5 Other 1							
1 6 Other 2							
					total	30%	
Pathogens & Viruses							
2 3 BactBlight	9	3	5		0%		
2 4 Anthracnose	7	3	5		0%		
2 5 Mosaic	8	3	5		0%		
2 6 OthLeaf 1 WitchessBroo	3	5	30		2%		
2 7 OtherLeaf 2					0%		
2 8 RootRot	1	40	100		40%		
2 9 StemRot					0%		
2 10 OtherRoot 1					0%		
2 11 OtherRoot 2					0%		
2 12					0%		
2 13 Superelongation					0%		
					total	42%	
Pests							
3 3 MealyBug	7	100	5		5%		
3 4 GreenMite	1	100	10		10%		
3 5 RedMite					0%		
3 6 Trips					0%		
3 7 Hornworm	2	100	5		5%		
3 8 Other 1					0%		
3 9 Other 2					0%		
3 10 Other 3					0%		
					total	20%	
Genetic characteristics							
4 3 DroughtSusc					0%		
4 4 LowYield	1	100	50		50%		
4 5 LateBulking/Matur					0%		
4 6 PoorGerm	4	100	30		30%		
4 7 LackEarlyVigour					0%		
4 8 WideCanopy					0%		
4 9 Other 1							
4 10 Other 2							
4 11 Other 3							
					total	80%	
Soils and Crop management							
5 3 LowSoilFertility	1	70	50		35%		
5 4 PoorSoilPhysics	1	10	25		3%		
5 5 SoilErosion	3	30	25		8%		
5 6 Salinity					0%		
5 7 SoilAcidity					0%		
5 8 SurfaceTemp					0%		
5 9 SuboptimalFieldMan	4	100	20		20%		
5 10 InadeqSpacing	6	100	20		20%		
5 11 InsuffCropCare	5	100	20		20%		
5 12 Other 1							
5 13 Other 2							
					total	105%	
Non crop related constraints							
6 3 CreditAvailability	1	100	n a		0%		
6 4 TechnAssistance/Tr	2	80	n a		0%		
6 5 LabourAvailability			n a		0%		
6 6 Other 1							
6 7 Other 2							
					total	0%	
						277%	

Respondent Number	LC5					
0 0 Position	Senior researcher					
0 1 Zone	Sao Paulo state Re roots for processing purposes (not for fresh consumption)					
0 2 Area	30000		Producer price in USD per Ton		40 00	
0 3 ActualYield	25		Total volume of production in Tons		750000	
0 4 PotentialYield	37 5		Financial value of production in USD		30000000	
0 5 ProducerPrice	40		Potential yield increase estimate		50%	
0 6 ExchangeRate	1					
					YIELDGAIN FOR THE	
Planting material	RANKING	AREA (%)	YIELDGAIN (%)		ENTIRE ZONE	
1 3 Quality	2	50	15		8%	
1 4 Availability	3	7 5 n a			0%	
1 5 Infected planting material	1	50	20		10%	
1 6 Other 2					0%	
					total	18%
Pathogens & Viruses						
2 3 BactBlight	1	50	20		10%	
2 4 Anthracnose	9	0	0		0%	
2 5 Common Mosaic virus	4	25	5		%	
2 6 OtherLeaf 1					0%	
2 7 OtherLeaf 2 Cercospora	3	25	5		1%	
2 8 RootRot Phytophthora	6	5	10		1%	
2 9 StemRot					0%	
2 10 OtherRoot 1					0%	
2 11 OtherRoot 2					0%	
2 12					0%	
2 13 Superelongation	2	15	20		3%	
					total	16%
Pests						
3 3 MealyBug	1	1	70		1%	
3 4 GreenMite	8	30	0		0%	
3 5 RedMite					0%	
3 6 Trips	8	30	0		0%	
3 7 Hornworm	1	25	35		9%	
3 8 Other 1					0%	
3 9 Other 2					0%	
3 10 Other 3					0%	
					total	9%
Genetic characteristics						
4 3 DroughtSusc	n a	n a	n a		0%	
4 4 LowYield	9	5	35		2%	
4 5 LateBulking/Matur					0%	
4 6 PoorGerm	9				0%	
4 7 LackEarlyVigour	9				0%	
4 8 WideCanopy					0%	
4 9 Other 1						
4 10 Other 2						
4 11 Other 3						
					total	2%
Soils and Crop management						
5 3 LowSoilFertility	4	30	30		9%	
5 4 PoorSoilPhysics	10	3	25		1%	
5 5 SoilErosion	2	25	10		3%	
5 6 Salinity	n a	n a	n a		0%	
5 7 SoilAcidity	10	12 5	3		0%	
5 8 SurfaceTemp					0%	
5 9 SuboptimalFieldMan	9	25	3		1%	
5 10 InadeqSpacing	3	30	7 5		2%	
5 11 InsuffCropCare	4	40	7 5		3%	
5 12 Control of	3	15	25		4%	
5 13 Other 2						
					total	22%
Non crop related constraints						
6 3 CreditAvailability	3	15 n a			0%	
6 4 TechnAssistance/Tr	2	45 n a			0%	
6 5 LabourAvail quant /qualit	2	15 n a			0%	
6 6 Planting/harvest machiner	3	35 n a				
6 7 Commercialization	3	35 n a				
					total	0%
						67%
						=========

Respondent Number	LC6		
0 0 Position	Researcher/Administrator		
0 1 Zone	Santa Catarina		
0 2 Area	48800	Producer price in USD per Ton	36 40
0 3 ActualYield	17 3	Total volume of production in Tons	844240
0 4 PotentialYield	40	Financial value of production in USD	30730336
0 5 ProducerPrice	36 4	Potential yield increase estimate	131%
0 6 ExchangeRate	1		

Planting material	RANKING	AREA (%)	YIELDGAIN (%)	YIELDGAIN FOR THE ENTIRE ZONE
1 3 Quality	1	50	5	3%
1 4 Availability	3	10 n a		0%
1 5 Storage	2	60 n a		
1 6 Other 2				
			total	3%
Pathogens & Viruses				
2 3 BactBlight	1	60	10	6%
2 4 Anthracnose	2	30		0%
2 5 Mosaic	6	15		0%
2 6 Cercospora Eenngsii	4	5		0%
2 7 Cercospora Vicosae	5	1		0%
2 8 RootRot	8	1		0%
2 9 StemRot				0%
2 10 Phythophtora Drechsleri	3	1		0%
2 11 Rosellinia Necatrix	7	0 5		0%
2 12				0%
2 13 Superelongation				0%
			total	6%
Pests				
3 3 MealyBug				0%
3 4 GreenMite				0%
3 5 RedMite				0%
3 6 Trips				0%
3 7 Hornworm	1	2	30	1%
3 8 Pseudococus mandium	2	30		0%
3 9 Neo Silba sp	3	5		0%
3 10 Bemisia sp	4	10		0%
			total	1%
Genetic characteristics				
4 3 DroughtSusc	9	4	30	1%
4 4 LowYield	2	70	50	35%
4 5 LateBulking/Matur	1	80 n a		0%
4 6 PoorGerm	7	15	5	1%
4 7 LackEarlyVigour	6	60 n a		0%
4 8 WideCanopy	8	25 n a		0%
4 9 Resist to Xanthomonas M	3	100	10	10%
4 10 Low dry matter >pharv t	4	100 n a		0%
4 11 Bad cooking quality >pha	5	20 n a		0%
			total	47%
Soils and Crop management				
5 3 LowSoilFertility	2	70	80	56%
5 4 PoorSoilPhysics	4	20	30	6%
5 5 SoilErosion	1	90	50	45%
5 6 Salinity	8	5		0%
5 7 SoilAcidity	7	70		0%
5 8 SurfaceTemp	9	40		0%
5 9 SuboptimalFieldMan	3	80	40	32%
5 10 InadeqSpacing	5	5	5	0%
5 11 InsuffCropCare	6	50	30	15%
5 12 Other 1				
5 13 Other 2				
			total	154%
Non crop related constraints				
6 3 CreditAvailability	5	30 n a		0%
6 4 TechnAssistance/Tr	2	70 n a		0%
6 5 LabourAvailability	3	100 n a		0%
6 6 Organization of the sector	1	90 n a		
6 7 Mechanization	4	95 n a		
			total	0%
				210%

Respondent Number	LC7		
0 0 Position	Research Director		
0 1 Zone	Brazil		
0 2 Area	1860000	Producer price in USD per Ton	60 00
0 3 ActualYield	12 4	Total volume of production in Tons	23064000
0 4 PotentialYield	50	Financial value of production in USD	1 4E+09
0 5 ProducerPrice	60	Potential yield increase estimate	303%
0 6 ExchangeRate	1		

Planting material	RANKING	AREA (%)	YIELDGAIN (%)	YIELDGAIN FOR THE ENTIRE ZONE	
1 3 Quality	1	80	50	40%	
1 4 Availability	3	30 n a		0%	
1 5 Diseases/Pests infections	2	60	60	36%	
1 6 Other 2					
				total	76%
Pathogens & Viruses					
2 3 BacBlight	1	30	50	15%	
2 4 Anthracnose	8	100	2	2%	
2 5 Mosaic virus Vein	7	30	2	1%	
2 6 Micoplasma	2	5	40	2%	
2 7 Superelongation	4	10	30	3%	
2 8 RootRot Soil disease (?)	1	40	70	28%	
2 9 StemRot	6	50	5	3%	
2 10 Frogskin Disease	2	2	40	1%	
2 11 OtherRoot 2				0%	
2 12				0%	
2 13				0%	
				total	54%
Pests					
3 3 MealyBug	7	10		0%	
3 4 GreenMite	2	40	30	12%	
3 5 RedMite	5	10	5	1%	
3 6 Trips	8			0%	
3 7 Hornworm	1	80	40	32%	
3 8 White fly	3	20	10	2%	
3 9 Other 2				0%	
3 10 Other 3				0%	
				total	47%
Genetic characteristics					
4 3 DroughtSusc	1	40	100	40%	
4 4 LowYield	3	100	10	10%	
4 5 LateBulking/Matur	5	30	20	6%	
4 6 PoorGerm	5	100	10	10%	
4 7 LackEarlyVigour	7	30	5	2%	
4 8 WideCanopy	6	30 n a		0%	
4 9 Root quality	2	100 n a		0%	
4 10 Harvestibility	3	30 n a		0%	
4 11 Production of stakes	3	30	20	6%	
				total	74%
Soils and Crop management					
5 3 LowSoilFertility	2	75	50	38%	
5 4 PoorSoilPhysics	7	30	20	6%	
5 5 SoilErosion	5	30	10	3%	
5 6 Salinity	11	0	0	0%	
5 7 SoilAcidity	7	40	10	4%	
5 8 SurfaceTemp				0%	
5 9 SuboptimalFieldMan	5	50	30	15%	
5 10 InadeqSpacing	5	50	10	5%	
5 11 InsuffCropCare	7	30	5	2%	
5 12 Other 1					
5 13 Other 2					
				total	72%
Non crop related constraints					
6 3 CreditAvailability		n a		0%	
6 4 TechnAssistance/Tr		n a		0%	
6 5 LabourAvailability		n a		0%	
6 6 Other 1					
6 7 Other 2					
				total	0%
					322%

Respondent Number	LC8					
0 0 Position	Research associate					
0 1 Zone	Colombia Magdalena & Atlantico					
0 2 Area	3500		Producer price in USD per Ton			45 00
0 3 AcualYield	9		Total volume of production in Tons			31500
0 4 PotentialYield	18		Financial value of production in USD			1417500
0 5 ProducerPrice	45000		Potential yield increase estimate			100%
0 6 ExchangeRate	1000					
					YIELDGAIN FOR THE	
Planting material	RANKING	AREA (%)	YIELDGAIN (%)		ENTIRE ZONE	
1 3 Quality	2	80	100		80%	
1 4 Availability	3	50	n a		0%	
1 5 Other 1						
1 6 Other 2						
					total	80%
Pathogens & Viruses						
2 3 BactBlight	3	70	45		32%	
2 4 Anthracnose	7	10	3		0%	
2 5 Mosaic					0%	
2 6 Anthracnose	8	10	2		0%	
2 7 OtherLeaf 2					0%	
2 8 Pathogens in soils		30	25		8%	
2 9 StemRot / Pudric Bacteri		20	15		3%	
2 10 OtherRoot 1					0%	
2 11 OtherRoot 2					0%	
2 12					0%	
2 13 Superelongation					0%	
					total	43%
Pests						
3 3 MealyBug	2	3	50		2%	
3 4 GreenMite	3	100	10		10%	
3 5 RedMite					0%	
3 6 Trips	3	60	50		30%	
3 7 Hornworm	6	100	30		30%	
3 8 Stemborer	1	70	60		42%	
3 9 (VIRUELA)	4	10	0		0%	
3 10 Other 3					0%	
					total	114%
Genetic characteristics						
4 3 DroughtSusc	9	85	55		47%	
4 4 LowYield	5	45	60		27%	
4 5 LateBulking/Matur	7	15	10		2%	
4 6 PoorGerm	6	65	80		52%	
4 7 LackEarlyVigour	7	50	70		35%	
4 8 WideCanopy	6	10	n a		0%	
4 9 Other 1					0%	
4 10 Not steady/(Volcamiento)	5	30	5		2%	
4 11 Post harvest deterioration	2	100	60		60%	
					total	224%
Soils and Crop management						
5 3 LowSoilFertility	4	50	70		35%	
5 4 PoorSoilPhysics	5	30	20		6%	
5 5 SoilErosion	3	60	50		30%	
5 6 Salinity	3	5			0%	
5 7 SoilAcidity	6	60	10		6%	
5 8 SurfaceTemp	4	70	0		0%	
5 9 SuboptimalFieldMan	4	80	60		48%	
5 10 InadeqSpacing					0%	
5 11 InsuffCropCare	3	90	70		63%	
5 12 Intercropped	6	70	20		14%	
5 13 Harvest periods	7	20	10		2%	
					total	204%
Non crop related constraints						
6 3 CreditAvailability	1	90	n a		0%	
6 4 TechnAssistance/Tr	2	100	n a		0%	
6 5 LabourAvailability	5	10	n a		0%	
6 6 Marketing	2	90	n a			
6 7 Fomento empresarial priva	2	60	n a			
					total	0%
						664%

Respondent Number	LC9				
0 0 Position	Research Assistant				
0 1 Zone	Colombia Cauca department				
0 2 Area	4000	Producer price in USD per Ton			125 00
0 3 AcualYield	12	Total volume of production in Tons			48000
0 4 PotentialYield	18	Financial value of production in USD			6000000
0 5 ProducerPrice	125000	Potential yield increase estimate			50%
0 6 ExchangeRate	1000				
Planting material	RANKING	AREA (%)	YIELDGAIN (%)	YIELDGAIN FOR THE ENTIRE ZONE	
1 3 Quality	2	20	10	2%	
1 4 Availability	2	20 n a		0%	
1 5 Shortage of improved mat	1	90	50	45%	
1 6 Other 2					
				total	47%
Pathogens & Viruses					
2 3 BactBlight	3	20	80	16%	
2 4 Anthracnose	5	25	20	5%	
2 5 Mosaic	8	3	5	0%	
2 6 OtherLeaf 1 (Phoma)	4	60	40	24%	
2 7 OtherLeaf 2 Cercospora	8	10	15	2%	
2 8 RootRot Fusarium	8	10	15	2%	
2 9 StemRot	8	2	2	0%	
2 10 Frogskin disease	7	3	20	1%	
2 11 Viruela	7	5	5	0%	
2 12				0%	
2 13				0%	
				total	49%
Pests					
3 3 MealyBug	7	2	2	0%	
3 4 GreenMite	7	5	2	0%	
3 5 RedMite	7	2	2	0%	
3 6 Trips	7	10	5	1%	
3 7 Hornworm	6	10	20	2%	
3 8 Chizas Worm type	2	70	80	56%	
3 9 Hormiga arriera	3	60	50	30%	
3 10 Chinche de la viruela	4	20	20	4%	
				total	93%
Genetic characteristics					
4 3 DroughtSusc	8	5	5	0%	
4 4 LowYield	3	90	50	45%	
4 5 LateBulking/Matur	3	90	50	45%	
4 6 PoorGerm	6	20	20	4%	
4 7 LackEarlyVigour	8	2	2	0%	
4 8 WideCanopy	5	60 n a		0%	
4 9 Volcamiento	6	20	10	2%	
4 10 Excess of vigour	6	60	20	12%	
4 11 Other 3					
				total	108%
Soils and Crop management					
5 3 LowSoilFertility	2	90	80	72%	
5 4 PoorSoilPhysics	8	20	10	2%	
5 5 SoilErosion	3	60	20	12%	
5 6 Salinity	11	0	0	0%	
5 7 SoilAcidity	4	80	40	32%	
5 8 SurfaceTemp	10	2	2	0%	
5 9 SuboptimalFieldMan	9	40	20	8%	
5 10 InadeqSpacing	9	20	15	3%	
5 11 InsuffCropCare	7	40	30	12%	
5 12 Other 1					
5 13 Other 2					
				total	141%
Non-crop related constraints					
6 3 CreditAvailability	3	70 n a		0%	
6 4 TechnAssistance/Tr	2	80 n a		0%	
6 5 LabourAvailability	4	20 n a		0%	
6 6 No producer organization	3	100			
6 7 Availability of inputs	3	40			
				total	0%
					438%

Respondent Number	LC10					
0 0 Position	Research assistant					
0 1 Zone	Colombia LLanos orientales Meta					
0 2 Area	3000			Producer price in USD per Ton		100 00
0 3 ActualYield	12			Total volume of production in Tons		36000
0 4 PotentialYield	20			Financial value of production in USD		3600000
0 5 ProducerPrice	100000			Potential yield increase estimate		67%
0 6 ExchangeRate	1000					
						YIELDGAIN FOR THE
Planting material	RANKING	AREA (%)	YIELDGAIN (%)			ENTIRE ZONE
1 3 Quality	2	40	30			12%
1 4 Availability	1	20 n a				0%
1 5 Other 1						
1 6 Other 2						
					total	12%
Pathogens & Viruses						
2 3 BactBlight	2	20	80			16%
2 4 Anthracnose	5	5	5			0%
2 5 Mosaic						0%
2 6 OtherLeaf 1 Cercospora	4	40	20			8%
2 7 OtherLeaf 2 Superelongat	2	20	70			14%
2 8 RootRot						0%
2 9 StemRot						0%
2 10 OtherRoot 1						0%
2 11 OtherRoot 2						0%
2 12						0%
2 13						0%
					total	38%
Pests						
3 3 MealyBug	3	10	20			2%
3 4 GreenMite	7	30	10			3%
3 5 RedMite	8	10	5			1%
3 6 Trips	6	30	20			6%
3 7 Hornworm	5	0	0			0%
3 8 Other 1						0%
3 9 Other 2						0%
3 10 Other 3						0%
					total	12%
Genetic characteristics						
4 3 DrougntSusc						0%
4 4 LowYield	3	50	85			43%
4 5 LateBulking/Matur	4	50	50			25%
4 6 PoorGerm	2	60	25			15%
4 7 LackEarlyVigour	7	50	10			5%
4 8 WideCanopy	8	30 n a				0%
4 9 Other 1						
4 10 Other 2						
4 11 Other 3						
					total	88%
Soils and Crop management						
5 3 LowSoilFertility	1	90	35			32%
5 4 PoorSoilPhysics	4	10	15			2%
5 5 SoilErosion						0%
5 6 Salinity						0%
5 7 SoilAcidity	2	95	60			57%
5 8 SurfaceTemp						0%
5 9 SuboptimalFieldMan						0%
5 10 InadeqSpacing						0%
5 11 InsuffCropCare	3	60	40			24%
5 12 Other 1						
5 13 Other 2						
					total	114%
Non crop related constraints						
6 3 CreditAvailability	1	80 n a				0%
6 4 TechnAssistance/Tr	3	80 n a				0%
6 5 LabourAvailability						0%
6 6 Other 1						
6 7 Other 2						
					total	0%
						263%

Respondent Number	LC11				
0 0 Position	Research assistant				
0 1 Zone	Colombia Magdalena Atlantico				
0 2 Area	4000	Producer price in USD per Ton	55 00		
0 3 ActualYield	10	Total volume of production in Tons	40000		
0 4 PotentialYield	25	Financial value of production in USD	2200000		
0 5 ProducerPrice	55000	Potential yield increase estimate	150%		
0 6 ExchangeRate	1000				
Planting material	RANKING	AREA (%)	YIELDGAIN (%)	YIELDGAIN FOR THE ENTIRE ZONE	
1 3 Quality	2	40	40	16%	
1 4 Availability	3	20	n a	0%	
1 5 Other 1					
1 6 Other 2					
				total	16%
Pathogens & Viruses					
2 3 BactBlight	2	40	70	28%	
2 4 Anthracnose				0%	
2 5 Mosaic				0%	
2 6 OtherLeaf 1 Cercospora	5	70	5	4%	
2 7 OtherLeaf 2				0%	
2 8 RootRot				0%	
2 9 StemRot				0%	
2 10 OtherRoot 1				0%	
2 11 OtherRoot 2				0%	
2 12				0%	
2 13 Superelongation				0%	
				total	32%
Pests					
3 3 MealyBug	3	10	15	2%	
3 4 GreenMite	5	30	10	3%	
3 5 RedMite	4	15	10	2%	
3 6 Trips	6	15	15	2%	
3 7 Hornworm	2	10	5	1%	
3 8 Other 1 Stemborer	1	35	10	4%	
3 9 Other 2				0%	
3 10 Other 3				0%	
				total	12%
Genetic characteristics					
4 3 DrougntSusc	3	70	40	28%	
4 4 LowYield	2	80	80	64%	
4 5 LateBulking/Matur	6	40	35	14%	
4 6 PoorGerm	4	50	30	15%	
4 7 LackEarlyVigour	5	25	10	3%	
4 8 WideCanopy				0%	
4 9 Other 1					
4 10 Other 2					
4 11 Other 3					
				total	124%
Soils and Crop management					
5 3 LowSoilFertility	1	80	60	48%	
5 4 PoorSoilPhysics	10	40	50	20%	
5 5 SoilErosion	3	50	10	5%	
5 6 Salinity	9	10	30	3%	
5 7 SoilAcidity	8	0	0	0%	
5 8 SurfaceTemp	7	90	5	5%	
5 9 SuboptimalFieldMan	6	30	50	15%	
5 10 InadeqSpac ng	5	20	20	4%	
5 11 InsuffCropCare	4	90	30	27%	
5 12 Other 1					
5 13 Other 2					
				total	127%
Non crop related constraints					
6 3 CreditAvailability	1	90	n a	0%	
6 4 TechnAssistance/Tr	2	80	n a	0%	
6 5 LabourAvailability	3	20	n a	0%	
6 6 Other 1					
6 7 Other 2					
				total	0%
					310%

ANNEX 5

LATIN AMERICA STARCH

	Paraguay (1)		South Brazil (2)	
Conversion of root into starch	20%		25%	
Estimated decrease in Processing Costs	21%		38%	
Estimated inc ease in Starch price	25%		0%	
CONSTRAINTS	ProcCostsDec ease	ProductPriceIncrease	ProcCostsDecrease	ProductPriceIncrease
Root quality	32%	27%	13%	2%
Processing technology	10%	10%	15%	3%
Product marketing	0%	61%	0%	5%
TOTALS	42%	98%	28%	10%

	North Brazil (3)		South Brazil (4)	
Conversion of root into starch			30%	
Estimated decrease in Processing Costs	50%		11%	
Estimated increase in Starch price	8%		2%	
CONSTRAINTS	ProcCostsDec ease	Product'PriceIncrease	ProcCostsDec ease	ProductPriceIncrease
Root quality	4%	2%	2%	1%
Processing technology	0%	30%	11%	0%
Product marketing	0%	55%	0%	1%
TOTALS	4%	87%	13%	2%

AVERAGEAVERAGEAVERAGEAVERAG AVERAGE-VERAG AVERAGEAVERAGE AVERAGEAVERAG AVERAGEAVERAGE

Conversion of root into starch	25%		
Estimated decrease in Processing Costs	30%		
Estimated increase in Starch price	9%		
CONSTRAINTS	ProcCostsDec ease	ProductPriceIncrease	TOTAL REVENUES
Root quality	13%	8%	21%
Processing technology	9%	11%	20%
Produc marketing	0%	31%	31%
TOTALS	22%	49%	71%

STARCH 1

Respondent Number		LP1							
0 0	Position	Agricultural extension							
0 1	Zone	Paraguay							
0 2	Product	Native starch							
0 3	Product volume (in Ton)	13000			Conversion in %				20%
0 4	FreshRootEquivalent (in Ton)	65000			RawMaterialCosts in USD per Ton of produc				241 55
0 5	Average root price per Ton	100000							
0 6	CurrentProcessCosts per unit	380000			Processing Costs in USD per Ton				183 57
0 7	PotenProcCosts per unit	300000			Potential decrease				**21%**
0 8	Product unit equivalent								
0 9	Average product price	800000			Product price in USD per Ton				386 47
0 10	Potential product price	1000000			Potential increase				**25%**
0 11	Currency exchange rate	2070							
ROOT QUALITY		RANKING	PRODUCT VOLUME	COSTS DECREAS	PRICE INCREASE		ProcCostsDecrease		ProductPriceIncrease
1 3	High cyanogen	10	90	5			5%		0%
1 4	Low dry matter content	8	80	5	5		4%		4%
1 5	High perishability	4	70	10	15		7%		11%
1 6	High fibre content	7	80	10	5		8%		4%
1 7	Poor starch properties	8	80	5	5		4%		4%
1 8	Bad taste/texture/colour	8	30	5	10		2%		3%
1 9	Unusual root size/shape	8	30	10	5		3%		2%
1 10	Other						0%		0%
1 11	Other						0%		0%
							32%		**27%**
PROCESSING TECHNOLOGY							ProcCostsDecrease		ProductPriceIncrease
2 3	Poor handling of raw mater	4	80	15	20		12%		16%
2 4	Low quality of the product(s)	3	80	20	20		16%		16%
2 5	Low conversion rate	4	90	20	20		18%		18%
2 6	Low capital efficiency	3	90	30	25		27%		23%
2 7	Low labour efficiency	5	90	30	30		27%		27%
2 8	Low water quality	2	80				0%		0%
2 9	Excess water use	9	90				0%		0%
2 10	Other						0%		0%
2 11	Other						0%		0%
2 12	Other						0%		0%
							100%		**100%**
PRODUCT MARKETING							ProcCostsDecrease		ProductPriceIncrease
3 3	Poor product packaging	2	80	n a	25		0%		20%
3 4	Poor handling of product	2	80	n a	5		0%		4%
3 5	Bad physical infrastructure	2	80	n a	5		0%		4%
3 6	Many intermediaries	3	80	n a	30		0%		24%
3 7	Severe price fluctuations	8	90	n a	10		0%		9%
3 8	Other						0%		0%
3 9	Other						0%		0%
3 10	Other						0%		0%
							0%		**61%**

STARCH 2

Respondent Number	LP8							
0 0 Position	Large scale starch producer & Head producers organisation							
0 1 Zone	Central South of Brazil							
0 2 Product	Cassava starch							
0 3 Product volume (in Ton)	250000			Conversion, in %			25%	
0 4 FreshRootEquivalent (in Ton)	1000000			RawMaterialCosts in USD per Ton of produc			200 00	
0 5 Average root price per Ton	50							
0 6 CurrentProcessCosts per unit	80			Processing Costs in USD per Ton			80 00	
0 7 PotenProcCosts per unit	50			Potential decrease			**38%**	
0 8 Product unit equivalent								
0 9 Average product price	360			Product price in USD per Ton			360 00	
0 10 Potential product price	360			Potential increase			**0%**	
0 11 Currency exchange rate	1							
ROOT QUALITY	RANKING	PRODUCT VOLUME	COSTS DECREAS	PRICE INCREASE	ProcCostsDecrease	ProductPriceIncrease		
1 3 High cyanogen	10				0%	0%		
1 4 Low dry matter content	1	80	10		8%	0%		
1 5 High perishability	3	80	5	2 5	4%	2%		
1 6 High fibre content	5	20	2		0%	0%		
1 7 Poor starch properties	8				0%	0%		
1 8 Bad taste/texture/colour	9				0%	0%		
1 9 Unusual root size/shape	8				0%	0%		
1 10 O Resistance to rough handli	5	10	2		0%	0%		
1 11 Other					0%	0%		
					13%	**2%**		
PROCESSING TECHNOLOGY					ProcCostsDecrease	ProductPriceIncrease		
2 3 Poor handling of raw mater	4	15	2		0%	0%		
2 4 Deficient equipment No labara	4	30		7 5	0%	2%		
2 5 Low conversion rate	3	70	10		7%	0%		
2 6 Low capital efficiency	6	50	5		3%	0%		
2 7 Low labour efficiency	8	10	5		1%	0%		
2 8 Low water quality	7	20		5	0%	1%		
2 9 Excess water use	3	95	5		5%	0%		
2 10 Other					0%	0%		
2 11 Other					0%	0%		
2 12 Other					0%	0%		
					15%	**3%**		
PRODUCT MARKETING					ProcCostsDecrease	ProductPriceIncrease		
3 3 Poor product packaging	8	1	n a	2	0%	0%		
3 4 Poor handling of product	7	3	n a	2	0%	0%		
3 5 Bad physical infrastructure	7	50	n a	5	0%	3%		
3 6 Many intermediaries	4	10	n a	5	0%	1%		
3 7 Severe price fluctuations	3	20	n a	10	0%	2%		
3 8 Other					0%	0%		
3 9 Other					0%	0%		
3 10 Other					0%	0%		
					0%	**5%**		

STARCH 3

Respondent Number		LP11						
0 0	Position	Researcher						
0 1	Zone	Bahia						
0 2	Product	Starch						
0 3	Product volume (in Ton)					Conversion, in %		ERR
0 4	FreshRootEquivalent (in Ton)					RawMaterialCosts in USD per Ton of produc		ERR
0 5	Average root price per Ton	70						
0 6	CurrentProcessCosts perunit(	150				Processing Costs in USD per Ton		150 00
0 7	PotenProcCosts per unit (Ton	75				Potential decrease		**50%**
0 8	Product unit equivalent							
0 9	Average product price	600				Product price in USD per Ton		600 00
0 10	Potential product price	650				Potential increase		**8%**
0 11	Currency exchange rate	1						

		RANKING	PRODUCT VOLUME	COSTS DECREAS	PRICE INCREASE	ProcCostsDecrease	ProductPriceIncrease
ROOT QUALITY							
1 3	High cyanogen	7				0%	0%
1 4	Low dry matter content	2	20	10	0	2%	0%
1 5	High perishability	3	20	5	0	1%	0%
1 6	High fibre content	5	10	10	0	1%	0%
1 7	Poor starch properties	1	20		10	0%	2%
1 8	Bad taste/texture/colour	4	5			0%	0%
1 9	Unusual root size/shape	6				0%	0%
1 10	Other					0%	0%
1 11	Other					0%	0%
						4%	**2%**
PROCESSING TECHNOLOGY						ProcCostsDecrease	ProductPriceIncrease
2 3	Poor handling of raw mater	5	10		0	0%	0%
2 4	Low quality Microbiological c	3	100		30	0%	30%
2 5	Low conversion rate	1	100		0	0%	0%
2 6	Low capital efficiency	6	40		0	0%	0%
2 7	Low labour efficiency	4	60		0	0%	0%
2 8	Low water quality	2	90			0%	0%
2 9	Excess water use	7				0%	0%
2 10	Other					0%	0%
2 11	Other					0%	0%
2 12	Other					0%	0%
						0%	**30%**
PRODUCT MARKETING						ProcCostsDecrease	ProductPriceIncrease
3 3	Poor product packaging	1	100	n a	50	0%	50%
3 4	Poor handling of product	2	5	n a	5	0%	0%
3 5	Bad physical infrastructure	3	100	n a	5	0%	5%
3 6	Many intermedianes	4	0	n a	0	0%	0%
3 7	Severe price fluctuations	5	30	n a	0	0%	0%
3 8	Other					0%	0%
3 9	Other					0%	0%
3 10	Other					0%	0%
						0%	**55%**

STARCH 4

Respondent Number	LP12							
0 0 Position	Researcher							
0 1 Zone	South Brazil							
0 2 Product	Starch							
0 3 Product volume (in Ton)	150000			Conversion in %			30%	
0 4 FreshRootEquivalent (in Ton)	500000			RawMaterialCosts in USD per Ton of produc			183 33	
0 5 Average root price per Ton	55							
0 6 CurrentProcessCosts perunit(	45			Processing Costs in USD per Ton			45 00	
0 7 PotenProcCosts per unit (Ton	40			Potential decrease			**11%**	
0 8 Product unit equivalent								
0 9 Average product price	400			Product price in USD per Ton			400 00	
0 10 Potential product price	410			Potential increase			**2%**	
0 11 Currency exchange rate	1							
		PRODUCT	**COSTS**	**PRICE**				
ROOT QUALITY	**RANKING**	**VOLUME**	**DECREAS**	**INCREASE**	ProcCostsDecrease	ProductPriceIncrease		
1 3 High cyanogen	7	0	0	0	0%	0%		
1 4 Low dry matter content	2	10	7 5	0	1%	0%		
1 5 High perishability	3	10	5	0	1%	0%		
1 6 High fibre content	5	5	7 5	0	0%	0%		
1 7 Poor starch properties	1	15	0	5	0%	1%		
1 8 Bad taste/texture/colour	4	0	0	0	0%	0%		
1 9 Unusual root size/shape	6	0	0	0	0%	0%		
1 10 Other					0%	0%		
1 11 Other					0%	0%		
					2%	**1%**		
PROCESSING TECHNOLOGY					ProcCostsDecrease	ProductPriceIncrease		
2 3 Poor handling of raw mater	3	3	2	0	0%	0%		
2 4 Low quality of the product(s)	6	0	0	0	0%	0%		
2 5 Low conversion rate	2	90	0	0	0%	0%		
2 6 Low capital efficiency	4	20	0	0	0%	0%		
2 7 Low labour efficiency	5	10	5	0	1%	0%		
2 8 Low water quality	7	0	0	0	0%	0%		
2 9 Excess water use	1	100	10	0	10%	0%		
2 10 Other					0%	0%		
2 11 Other					0%	0%		
2 12 Other					0%	0%		
					11%	**0%**		
PRODUCT MARKETING					ProcCostsDecrease	ProductPriceIncrease		
3 3 Poor product packaging	4	5	n a	10	0%	1%		
3 4 Poor handling of product	3	20	n a	3	0%	1%		
3 5 Bad physical infrastructure	5	0	n a	0	0%	0%		
3 6 Many intermediaries	2	40	n a	0	0%	0%		
3 7 Severe price fluctuations	1	90	n a	0	0%	0%		
3 8 Other					0%	0%		
3 9 Other					0%	0%		
3 10 Other					0%	0%		
					0%	**1%**		

LATIN AMERICA FLOUR

	Bahia Brazil (1)		Bahia/Sergipe (2)	
Conversion of root into flour	30%			
Estimated decrease in Processing Costs	13%			
Estimated increase in Flour price	13%			
CONSTRAINTS	ProcCostsDecrease	ProductPriceIncrease	ProcCostsDecrease	ProductPriceIncrease
Root quality	18%	7%	9%	20%
Processing technology	26%	11%	6%	28%
Product marketing	0%	53%	0%	64%
TOTALS	44%	71%	15%	112%

	Bahia (3)	
Conversion of root into flour	25%	
Estimated decrease in Processing Costs	30%	
Estimated increase in Flour price	0%	
CONSTRAINTS	ProcCostsDecrease	ProductPriceIncrease
Root quality	37%	0%
Processing technology	74%	0%
Product marketing	0%	17%
TOTALS	111%	17%

	North Brazil farinha de agua (4)		South Brazil tostada (5)	
Conversion of root into flour	20%			
Estimated decrease in Processing Costs	0%			
Estimated increase in Flour price	0%			
CONSTRAINTS	ProcCostsDecrease	ProductPriceIncrease	ProcCostsDecrease	ProductPriceIncrease
Root quality	10%	1%	48%	0%
Processing technology	10%	7%	12%	2%
Product marketing	0%	48%	0%	30%
TOTALS	20%	56%	60%	32%

	AVERAGEAVERAGEAVERAGEAVERA	AVERAGEAVERAG	AVERAGEAVERAGE	AVERAGEAVERAG	AVERAGEAVERAGE
(1) (2) (3)					
Conversion of root into flour	28%				
Estimated decrease in Processing Costs	22%				
Estimated increase in Flour price	7%				
CONSTRAINTS	ProcCostsDecrease	ProductPriceIncrease		TOTAL REVENUES	
Root quality	21%	9%		30%	
Processing technology	35%	13%		48%	
Product marketing	0%	45%		45%	
	57%	67%		123%	

	AVERAGEAVERAGEAVERAGEAVERA	AVERAGEAVERAG	AVERAGEAVERAGE	AVERAGEAVERAG	AVERAGEAVERAGE
(1) (2) (3) (4) (5)					
Conversion of root into flour	25%				
Estimated decrease in Processing Costs	14%				
Estimated increase in Flour price	4%				
CONSTRAINTS	ProcCostsDecrease	ProductPriceIncrease		TOTAL REVENUES	
Root quality	24%	6%		30%	
Processing technology	26%	10%		35%	
Product marketing	0%	42%		42%	
	50%	58%		108%	

FLOUR 1

Respondent Number	LP3								
0 0	Position	Researcher	Economics						
0 1	Zone	Bahia							
0 2	Product	Farinha							
0 3	Product volume (in Ton)	400000				Conversion in %			30%
0 4	FreshRootEquivalent (in Ton)	1333333				RawMaterialCosts in USD per Ton of produc			200 00
0 5	Average root price per Ton	60							
0 6	CurrentProcessCosts per unit	60				Processing Costs in USD per Ton			60 00
0 7	PotenProcCosts per unit	52				Potential decrease			**13%**
0 8	Product unit equivalent								
0 9	Average product price	320				Product price in USD per Ton			320 00
0 10	Potential product price	360				Potential increase			**13%**
0 11	Currency exchange rate	1							
ROOT	QUALITY	**RANKING**	**PRODUCT VOLUME**	**COSTS DECREAS**	**PRICE INCREASE**		ProcCostsDecrease	ProductPriceIncrease	
1 3	High cyanogen	6	20	5			1%	0%	
1 4	Low dry matter content	7	30	15			5%	0%	
1 5	High perishability	6	80	10			8%	0%	
1 6	High fibre content	5	15	10	15		2%	2%	
1 7	Poor starch properties	6	20	10	10		2%	2%	
1 8	Bad taste/texture/colour	6	15		15		0%	2%	
1 9	Unusual root size/shape	4	10	5			1%	0%	
1 10	Other						0%	0%	
1 11	Other						0%	0%	
							18%	**7%**	
PROCESSING TECHNOLOGY							ProcCostsDecrease	ProductPriceIncrease	
2 3	Poor handling of raw mater	3	30	10	10		3%	3%	
2 4	LowQual ManagementProble	6	40	20	20		8%	8%	
2 5	Low conversion rate	5	30	20	0		6%	0%	
2 6	Low capital efficiency	7	30	10	0		3%	0%	
2 7	Low labour efficiency	4	40	15	0		6%	0%	
2 8	Low water quality						0%	0%	
2 9	Excess water use						0%	0%	
2 10	Other						0%	0%	
2 11	Other						0%	0%	
2 12	Other						0%	0%	
							26%	**11%**	
PRODUCT MARKETING							ProcCostsDecrease	ProductPriceIncrease	
3 3	Poor product packaging	4	80	n a	12 5		0%	10%	
3 4	Poor handling of product	7	60	n a	5		0%	3%	
3 5	Bad physical infrastructure	5	40	n a	5		0%	2%	
3 6	Many intermediaries	2	90	n a	20		0%	18%	
3 7	Severe price fluctuations	1	100	n a	20		0%	20%	
3 8	Other						0%	0%	
3 9	Other						0%	0%	
3 10	Other						0%	0%	
							0%	**53%**	

FLOUR 2

Respondent Number	LP6								
0 0	Position	Extension/Technology Diffusion							
0 1	Zone	Bahia Sergipe							
0 2	Product	farinha							
0 3	Product volume (in Ton)					Conversion in %			ERR
0 4	FreshRootEquivalent (in Ton)	10 3				RawMaterialCosts in USD per Ton of produc			ERR
0 5	Average root price per Ton	40							
0 6	CurrentProcessCosts per unit					Processing Costs in USD per Ton			0 00
0 7	PotenProcCosts per unit					Potential decrease			**ERR**
0 8	Product unit equivalent								
0 9	Average product price	400				Product price in USD per Ton			400 00
0 10	Potential product price					Potential increase		===	
0 11	Currency exchange rate	1							

	ROOT QUALITY	RANKING	PRODUCT VOLUME	COSTS DECREAS	PRICE INCREASE	ProcCostsDecrease	ProductPriceIncrease
1 3	High cyanogen					0%	0%
1 4	Low dry matter content		20		20	0%	4%
1 5	High perishability	2	100			0%	0%
1 6	High fibre content	8	30		20	0%	6%
1 7	Poor starch properties					0%	0%
1 8	Bad TEXTURE	6	20		20	0%	4%
1 9	Unusual root size/shape	8	30	30		9%	0%
1 10	Oth Root (Entrecasca) colour		30		20	0%	6%
1 11	Other					0%	0%
						9%	**20%**

	PROCESSING TECHNOLOGY					ProcCostsDecrease	ProductPriceIncrease
2 3	Poor handling of raw mater					0%	0%
2 4	Low quality of the product(s)	6	20		20	0%	4%
2 5	Low conversion rate					0%	0%
2 6	Low capital efficiency	9	20	20		4%	0%
2 7	Low labour efficiency	6	10	20		2%	0%
2 8	Low water quality					0%	0%
2 9	Excess water use					0%	0%
2 10	Other Hygiene	2	80		30	0%	24%
2 11	Other					0%	0%
2 12	Other					0%	0%
						6%	**28%**

	PRODUCT MARKETING					ProcCostsDecrease	ProductPriceIncrease
3 3	Poor product packaging			n a		0%	0%
3 4	Poor handling of product			n a		0%	0%
3 5	Bad physical infrastructure	3	30	n a		0%	0%
3 6	Many intermediaries			n a		0%	0%
3 7	Severe price fluctuations	1	80	n a	80	0%	64%
3 8	Other					0%	0%
3 9	Other					0%	0%
3 10	Other					0%	0%
						0%	**64%**

FLOUR 3

Respondent Number		LP10							
0 0	Position	Food technologist							
0 1	Zone	Bahia							
0 2	Product	Farinha							
0 3	Product volume (in Ton)	2000				Conversion in %			25%
0 4	FreshRootEquivalent (in Ton)	8000				RawMaterialCosts in USD per Ton of produc			280 00
0 5	Average root price per Ton	70							
0 6	CurrentProcessCosts per unit	100				Processing Costs in USD per Ton			100 00
0 7	PotenProcCosts per unit	70				Potential decrease			**30%**
0 8	Product unit equivalent								
0 9	Average product price	500				Product price in USD per Ton			500 00
0 10	Potential product price	500				Potential increase			**0%**
0 11	Currency exchange rate	1							
			PRODUCT	**COSTS**	**PRICE**				
ROOT QUALITY		**RANKING**	**VOLUME**	**DECREAS**	**INCREASE**		ProcCostsDecrease		ProductPriceIncrease
1 3	High cyanogen						0%		0%
1 4	Low dry matter content	5	100	15			15%		0%
1 5	High perishability	3	100	10			10%		0%
1 6	High fibre content	9	100	5			5%		0%
1 7	Poor starch properties	4	100	2			2%		0%
1 8	Bad colour of skin	7	40				0%		0%
1 9	Unusual root size/shape	8	30	5			2%		0%
1 10	Other Easy to peel	5	70	5			4%		0%
1 11	Other						0%		0%
							37%		**0%**
PROCESSING TECHNOLOGY							ProcCostsDecrease		ProductPriceIncrease
2 3	Poor handling of raw mater	8	20	5			1%		0%
2 4	Low quality of the product(s)	10	10	1			0%		0%
2 5	Low conversion rate	2	90	30			27%		0%
2 6	Low capital efficiency	6	80	20			16%		0%
2 7	Low labour efficiency	4	100	30			30%		0%
2 8	Low water quality						0%		0%
2 9	Excess water use						0%		0%
2 10	Washing raw material after pe	7	100	_5	5		0%		0%
2 11	Shortage of water	5	100	_10	10		0%		0%
2 12	Other						0%		0%
							74%		**0%**
PRODUCT MARKETING							ProcCostsDecrease		ProductPriceIncrease
3 3	Poor product packaging	2	100	n a	5		0%		5%
3 4	Poor handling of product	7	20	n a	2		0%		0%
3 5	Bad physical infrastructure	4	60	n a			0%		0%
3 6	Many intermediaries	5	70	n a	10		0%		7%
3 7	Severe price fluctuations	5	100	n a	_5		0%		0%
3 8	Other Business attitude	2	100		5		0%		5%
3 9	Other						0%		0%
3 10	Other						0%		0%
							0%		**17%**

FLOUR 4

Respondent Number	LP9						
0 0 Position	Research (Management)						
0 1 Zone	States of Para & Amazonas						
0 2 Product	Farinha de agua						
0 3 Product volume (in Ton)				Conversion, in %		20%	
0 4 FreshRootEquivalent (in Ton)				RawMaterialCosts in USD per Ton of produc			
0 5 Average root price per Ton							
0 6 CurrentProcessCosts per unit				Processing Costs in USD per Ton	=		
0 7 PotenProcCosts per unit				Potential decrease	=		
0 8 Product unit equivalent							
0 9 Average product price				Product price in USD per Ton	=		
0 10 Potential product price				Potential increase	=		
0 11 Currency exchange rate	1						

ROOT QUALITY	RANKING	PRODUCT VOLUME	COSTS DECREAS	PRICE INCREASE	ProcCostsDecrease	ProductPriceIncrease
1 3 High cyanogen	4				0 %	0%
1 4 Low dry matter content	3	35	5		2 /	0 %
1 5 High perishability	1	45	15		1%	0%
1 6 High fibre content	2	25	5	5	1%	1%
1 7 Poor starch properties	5				0%	0%
1 8 Bad taste/texture/colour	7				0 /	0 %
1 9 Unusual root size/shape	6				0%	0%
1 10 Other					0%	0%
1 11 Other					0%	0%
					10%	**1%**

PROCESSING TECHNOLOGY					ProcCostsDecrease	ProductPriceIncrease
2 3 Poor handling of raw mater	3	35	5	5	2 %	2%
2 4 Low quality of the product(s)	1	50		10	0%	5%
2 5 Low conversion rate	2	80	10		8 /	0%
2 6 Low capital efficiency					0 /	0%
2 7 Low labour efficiency					0 %	0%
2 8 Low water quality					0%	0%
2 9 Excess water use					0%	0%
2 10 Other CREDIT	4	20			0 %	0%
2 11 Other					0 %	0%
2 12 Other					0 /	0%
					10%	**7%**

PRODUCT MARKETING					ProcCostsDecrease	ProductPriceIncrease
3 3 Poor product packaging	3	100	n a	15	0 /	15%
3 4 Poor handling of product	4	30	n a	1	0%	0%
3 5 Bad physical infrastructure	5	100	n a	1	0%	1%
3 6 Many intermediaries	2	80	n a	30	0 %	24 %
3 7 Severe price fluctuations	1	80	n a	10	0%	8%
3 8 Other					0 %	0%
3 9 Other					0%	0%
3 10 Other					0%	0%
					0%	**48%**

FLOUR 5

Respondent Number	LP99						
0 0 Position	MSc student Chemical Engineering						
0 1 Zone	Parana Brazil						
0 2 Product	Tostada (a cassava flour)						
0 3 Product volume (in Ton)				Conversion in %			0%
0 4 FreshRootEquivalent (in Ton)	200000			RawMaterialCosts in USD per Ton of produc			ERR
0 5 Average root price per Ton							
0 6 CurrentProcessCosts per unit				Processing Costs in USD per Ton			ERR
0 7 PotenProcCosts per unit				Potential decrease			**ERR**
0 8 Product unit equivalent							
0 9 Average product price				Product price in USD per Ton			ERR
0 10 Potential product price				Potential increase			**ERR**
0 11 Currency exchange rate							
ROOT QUALITY	**RANKING**	**PRODUCT VOLUME**	**COSTS DECREAS**	**PRICE INCREASE**		ProcCostsDecrease	ProductPriceIncrease
1 3 High cyanogen		100	27 5			28%	0%
1 4 Low dry matter content						0%	0%
1 5 High perishability		100	20			20%	0%
1 6 High fibre content						0%	0%
1 7 Poor starch properties						0%	0%
1 8 Bad taste/texture/colour						0%	0%
1 9 Unusual root size/shape						0%	0%
1 10 Other						0%	0%
1 11 Other						0%	0%
						0%	0%
						48%	**0%**
PROCESSING TECHNOLOGY						ProcCostsDecrease	ProductPriceIncrease
2 3 Poor handling of raw mater						0%	0%
2 4 Low quality of the product(s)						0%	0%
2 5 Low conversion rate						0%	0%
2 6 Low capital efficiency		30	30	7 5		9%	2%
2 7 Low labour efficiency						0%	0%
2 8 Low water quality						0%	0%
2 9 Excess water use		10	25			3%	0%
2 10 Other						0%	0%
2 11 Other						0%	0%
2 12 Other						0%	0%
						12%	**2%**
PRODUCT MARKETING						ProcCostsDecrease	ProductPriceIncrease
3 3 Poor product packaging			n a			0%	0%
3 4 Poor handling of product		40	n a	22 5		0%	9%
3 5 Bad physical infrastructure		20	n a	30		0%	6%
3 6 Many intermediaries		50	n a	30		0%	15%
3 7 Severe price fluctuations			n a			0%	0%
3 8 Other						0%	0%
3 9 Other						0%	0%
3 10 Other						0%	0%
						0%	**30%**

LATIN AMERICA ANIMAL FEED

	North Colombia (1)		North East Brazil (2)	
Conversion of root into product	40%		23%	
Estimated decrease in Processing Costs	38%		33%	
Estimated increase in Product price			15%	
CONSTRAINTS	ProcCostsDecrease	ProductPriceIncrease	ProcCostsDecrease	ProductPriceIncrease
Root quality	43%	0%	11%	11%
Processing technology	57%	0%	32%	32%
Product marketing	0%	45%	0%	25%
TOTALS	100%	45%	43%	68%

AVERAGEAVERAGEAVERAGEAVERAG	AVERAGEAVERAG	AVERAGEAVERAGE	AVERAGEAVERAG	AVERAGEAVERAGE
Conversion of root into product	32%			
Estimated decrease in Processing Costs	36%			
Estimated increase in Product price	15%			
CONSTRAINTS	ProcCostsDecrease	Produc PriceIncrease		TOTAL REVENUES
Root quality	27%	6%		33%
Processing technology	45%	16%		61%
Product marketing	0%	35%		35%
TOTALS	72%	57%		128%

ANIMAL FEED 1

Respondent Number		LP2							
0 0	Position	Cassava Development							
0 1	Zone	North Coast Colombia							
0 2	Product	Animal Feed							
0 3	Product volume (in Ton)	8000				Conversion in %			40%
0 4	FreshRootEquival nt (in Ton)	20000				RawMaterialCosts in USD per Ton of produc			113 30
0 5	Average root price per Ton	46000							
0 6	CurrentProcessCosts per unit	21000				Processing Costs in USD per Ton			20 69
0 7	PotenProcCosts per unit	13000				Potential decrease			**38%**
0 8	Product unit equivalent								
0 9	Average product price	133500				Product price in USD per Ton			131 53
0 10	Potential product price					Potential increase		=	
0 11	Currency exchange rate	1015							
ROOT	QUALITY	**RANKING**	**PRODUCT VOLUME**	**COSTS DECREAS**	**PRICE INCREASE**		ProcCostsDecrease		ProductPriceIncrease
1 3	High cyanogen						0%		0%
1 4	Low dry matter content	5	20	9	0		2%		0%
1 5	High perishability	1	100	40	0		40%		0%
1 6	High fibre content	5	10	10	0		1%		0%
1 7	Poor starch properties						0%		0%
1 8	Bad taste/texture/colour						0%		0%
1 9	Unusual root size/shape						0%		0%
1 10	Other						0%		0%
1 11	Other						0%		0%
							43%		**0%**
PROCESSING TECHNOLOGY							ProcCostsDecrease		ProductPriceIncrease
2 3	Poor handling of raw mater	1	80	20	0		16%		0%
2 4	Low quality of the product(s)	1	80	20	0		16%		0%
2 5	Low conversion rate	11	10	10	0		1%		0%
2 6	Low capital efficiency	1	80	15	0		12%		0%
2 7	Low labour efficiency	5	80	15	0		12%		0%
2 8	Low water quality						0%		0%
2 9	Excess water use						0%		0%
2 10	Other						0%		0%
2 11	Other						0%		0%
2 12	Other						0%		0%
							57%		**0%**
PRODUCT MARKETING							ProcCostsDecrease		ProductPriceIncrease
3 3	Poor product packaging	1	95	n a	10		0%		10%
3 4	Poor handling of product	6	40	n a	2 5		0%		1%
3 5	Bad physical infrastructure	2	80	n a	30		0%		24%
3 6	Many intermediaries	4	50	n a	20		0%		10%
3 7	Severe price fluctuations	8	25	n a	0		0%		0%
3 8	Other						0%		0%
3 9	Other						0%		0%
3 10	Other						0%		0%
							0%		**45%**

ANIMAL FEED 2

Respondent Number		LP4						
0 0	Position	Training & Project manager						
0 1	Zone	NorthEastBrazil						
0 2	Product	Chips for animal feed (pellets)						
0 3	Product volume (in Ton)	2500			Conversion in %			23%
0 4	FreshRootEquivalent (in Ton)	11000			RawMaterialCosts in USD per Ton of produc			132 00
0 5	Average root price per Ton	30						
0 6	CurrentProcessCosts per unit	30			Processing Costs in USD per Ton			30 00
0 7	PotenProcCosts per unit	20			Potential decrease			**33%**
0 8	Product unit equivalent							
0 9	Average product price	130			Product price in USD per Ton			130 00
0 10	Potential product price	150			Potential increase			**15%**
0 11	Currency exchange rate	1						
ROOT	QUALITY	**RANKING**	**PRODUCT VOLUME**	**COSTS DECREAS**	**PRICE INCREASE**		ProcCostsDecrease	ProductPriceIncrease
1 3	High cyanogen						0%	0%
1 4	Low dry matter content	1	70	15	15		11%	11%
1 5	High perishability						0%	0%
1 6	High fibre content						0%	0%
1 7	Poor starch properties						0%	0%
1 8	Bad taste/texture/colour						0%	0%
1 9	Unusual root size/shape						0%	0%
1 10	Other						0%	0%
1 11	Other						0%	0%
							11%	**11%**
PROCESSING TECHNOLOGY							ProcCostsDecrease	ProductPriceIncrease
2 3	Poor handling of raw mater						0 %	0%
2 4	Low quality of the product(s)						0%	0%
2 5	Low conversion rate	3	70	10	10		7%	7%
2 6	Low capital efficiency	1	100	20	20		20%	20%
2 7	Low labour efficiency	5	100	5	5		5%	5%
2 8	Low water quality						0%	0%
2 9	Excess water use						0%	0%
2 10	Other						0%	0%
2 11	Other						0%	0%
2 12	Other						0%	0%
							32%	**32%**
PRODUCT MARKETING							ProcCostsDecrease	ProductPriceIncrease
3 3	Poor product packaging			n a			0%	0%
3 4	Poor handling of product			n a			0%	0%
3 5	Bad physical infrastructure			n a			0%	0%
3 6	Many intermediaries	4	100	n a	10		0%	10%
3 7	Severe price fluctuations			n a			0%	0%
3 8	Oth LackofCredit for proc/co	1	100		15		0%	15%
3 9	Other						0%	0%
3 10	Other						0%	0%
							0%	**25%**

LATIN AMERICA - USE OF FRESH ROOTS

	Paraguay (1)	Bahia (2)	North-East Brazil (3)
Estimated increase in Root price	15%	43%	33%
CONSTRAINTS	ProductPriceIncreas	ProductPriceIncrease	ProductPriceIncreas
Root quality	10%	26%	33%
Product marketing	37%	50%	30%
TOTALS	47%	76%	63%

AVERAGEAVERAGEAVERAGEAVERA	AVERAGEAVERAG	AVERAGEAVERAGE	AVERAGEAVERAG
Estimated increase in Root price	30%		
CONSTRAINTS	ProductPriceIncrease		
Root quality	23%		
Product marketing	39%		
	62%		

USE OF FRESH ROOTS - 1

Respondent Number		LF1				
0 0	Position	Extensionist				
0 1	Zone	Paraguay				
0 2	Product	Fresh roots for human consumption				
0 3	Product volume (in Ton)	564000 Tons commercialized & 987000 Tons auto-consumption				
0 4	Average product price per To	217000				
0 5	Potential product price	250000				
0 6	Currency exchange rate	2070				
	Product price in USD per Ton	105				
	Potential increase	15%				
ROOT	QUALITY	**RANKING**	**PRODUCT VOLUME**	**PRICE INCREASE**		ProductPriceIncrease
1 3	High cyanogen	9	5			0%
1 4	Low dry matter content	9	5			0%
1 5	High perishability	3	30	20		6%
1 6	High fibre content	5	30	5		2%
1 7	Bad cooking quality	8	30	5		2%
1 8	Bad taste	8	15	5		1%
1 9	Unusual root size or shape	8	10	5		1%
1 10	Other					0%
1 11	Other					0%
						==========
						10%
PRODUCT MARKETING						ProductPriceIncrease
2 3	Bad physical infrastructure	3	30	10		3%
2 4	Many intermediaries	2	90	30		27%
2 5	Severe price fluctuations	2	70	10		7%
2 6	Other					0%
2 7	Other					0%
2 8	Other					0%
						==========
						37%

USE OF FRESH ROOTS - 2

Respondent Number		LF2			
0 0	Position	Researcher Economics & Marketing			
0 1	Zone	Bahia Brazil			
0 2	Product	Fresh roots for human consumption			
0 3	Product volume (in Ton)	50000			
0 4	Average product price per To	70			
0 5	Potential product price	100			
0 6	Currency exchange rate	1			
	Product price, in USD per Ton	70			
	Potential increase	43%			
			PRODUCT	**PRICE**	
ROOT	QUALITY	**RANKING**	**VOLUME**	**INCREASE**	ProductPriceIncrease
1 3	High cyanogen	9			0%
1 4	Low dry matter content	7			0%
1 5	High perishability	1	100	20	20%
1 6	High fibre content	8			0%
1 7	Bad cooking quality	6	40	15	6%
1 8	Bad taste	7			0%
1 9	Unusual root size or shape	4			0%
1 10	Other				0%
1 11	Other				0%
					==========
					26%
PRODUCT MARKETING					ProductPriceIncrease
2 3	Bad physical infrastructure	3	25	10	3%
2 4	Many intermediaries	1	90	30	27%
2 5	Severe price fluctuations	1	100	20	20%
2 6	Other				0%
2 7	Other				0%
2 8	Other				0%
					==========
					50%

USE OF FRESH ROOTS - 3

Respondent Number		LF3			
0 0	Position	Trainer & Coordinator project			
0 1	Zone	North-East Brazil			
0 2	Product	Fresh roots for animal feed			
0 3	Product volume (in Ton)	2250000			
0 4	Average product price per To	30			
0 5	Potential product price	40			
0 6	Currency exchange rate	1			
	Product price in USD per Ton	30			
	Potential increase	33%			
ROOT	QUALITY	**RANKING**	**PRODUCT VOLUME**	**PRICE INCREASE**	ProductPriceIncrease
1 3	High cyanogen	2	70	15	11%
1 4	Low dry matter content	1	80	20	16%
1 5	High perishability				0%
1 6	High fibre content	5	70	5	4%
1 7	Bad cooking quality	6	50	5	3%
1 8	Bad taste				0%
1 9	Unusual root size or shape				0%
1 10	Other				0%
1 11	Other				0%
					==========
					33%
PRODUCT MARKETING					ProductPriceIncrease
2 3	Bad physical infrastructure				0%
2 4	Many intermediaries	2	100	15	15%
2 5	Severe price fluctuations	1	100	15	15%
2 6	Other				0%
2 7	Other				0%
2 8	Other				0%
					==========
					30%

ANNEX 6

ASIA CASSAVA CULTIVATION in LOWLAND HUMID LOWLAND SUBHUMID and LOWLAND SEMI ARID (Qtn Nr 1 7)

Constraints in Cassava cultivation, incl 7 questionnaires

	THAILAND 1	*THAILAND 2*	*(THAILAND AVG)*	*INDONESIA 3*	*KERALA 4*	*HAINAN 5*	*SOUTH VIETN 6*	*TAMIL NADU 7*
Area represented by qtn	1270000	1200000		1357000	227000	27000	144500	85983
Yield in Ton/Ha	14 5	14	14 3	12	22 2	18	8 96	30
Price in USD/Ton	38 5	40	39 3	20 4	69 4	36 1	31 25	35 5
Estimated yieldincrease	245%	79%	162%	150%	260%	67%	235%	33%
Calculated yieldincrease	138%	110%	124%	84%	178%	117%	114%	62%
YIELDGAIN FOR THE ENTIRE AREA								
Planting material	4%	12%	8%	9%	68%	4%	3%	4%
Pathogens&Viruses	0%	3%	2%	1%	25%	2%	5%	20%
Pests	0%	6%	3%	1%	36%	9%	3%	6%
Genetic characteristics	3%	16%	10%	12%	0%	48%	60%	16%
Soils&Crop management	131%	73%	102%	62%	50%	56%	42%	16%

Shares of Agro climatic Zones in each of the questionnaires

	LOWLAND HUMID	*LOWLAND SUBHUMID*	*LOWLAND SEMI ARID*
THAILAND - Qtn 1		65%	35%
THAILAND Qtn 2		65%	35%
INDONESIA - Qtn 3	70%	20%	10%
KERALA INDIA Qtn 4	75%	25%	
HAINAN CHINA - Qtn 5		100%	
SOUTH VIETN - Qtn 6		100%	
TAMIL NADU - Qtn 7			100%

Constraints in Asian Cassava cultivation per Agro climatic Zone 1993 data

	LOWLAND HUMID	*LOWLAND SUBHUMID*	*LOWLAND SEMI ARID*
TotalArea inthe Zone(Ha)	690000	1604000	1029000
Average yield (Ton/Ha)	13 3	12	13
Estimated yieldincrease	95%	108%	54%
Calculated yieldincrease	81%	91%	104%
YIELDGAIN FOR THE AGRO CLIMATIC ZONE			
Planting material	5%	7%	10%
Pathogens&Viruses	3%	2%	1%
Pests	3%	3%	4%
Genetic characteristics	27%	23%	23%
Soils&Crop management	44%	57%	67%

ASIA CASSAVA CULTIVATION THAILAND_Qtn 1

Respondent Number	AC1			
0 0 Position	Development/Research/Administration			
0 1 Zone	Thailand			
0 2 Area	1270000	Producer price in USD per Ton		38 46
0 3 ActualYield	14 5	Total volume of production in Tons		18415000
0 4 PotentialYield	50	Financial value of production in US		7 1E+08
0 5 ProducerPrice	1000	Potential yield increase *estimate*		245%
0 6 ExchangeRate	26			

	RANKING	AREA (%)	YIELDGAIN (%)	YIELDGAIN FOR THE ENTIRE ZONE
Planting material				
1 3 Quality	2	12	35	4%
1 4 Availability	2	70 n a		0%
1 5 Other 1				0%
1 6 Other 2				0%
			total	4%
Pathogens & Viruses				
2 3 BactBlight	8	1 5		0%
2 4 Anthracnose	9			0%
2 5 Mosaic	9			0%
2 6 OtherLeaf 1	9			0%
2 7 OtherLeaf 2	9			0%
2 8 RootRot	8	1 5		0%
2 9 StemRot	9			0%
2 10 OtherRoot 1	9			0%
2 11 OtherRoot 2	9			0%
2 12 Witchess Broom				0%
2 13 Superelongation				0%
			otal	0%
Pests				
3 3 *MealyBug*	8			0%
3 4 GreenMite	8			0%
3 5 RedMite	7	2 5		0%
3 6 Thrips	8			0%
3 7 Hornworm	8			0%
3 8 Other 1	8			0%
3 9 Other 2	8			0%
3 10 Other 3	8			0%
			total	0%
Genetic characteristics				
4 3 DroughtSusc	7	5	30	2%
4 4 LowYield				0%
4 5 LateBulking/Matur	9			0%
4 6 PoorGerm	7	5	30	2%
4 7 LackEarlyVigour	9			0%
4 8 WideCanopy	7	10 n a		0%
4 9 Other 1				0%
4 10 Other 2				0%
4 11 Other 3				0%
			total	3%
Soils and Crop management				
5 3 LowSoilFertility	5	70	100	70%
5 4 PoorSoilPhysics	5	70	50	35%
5 5 SoilErosion	8	30	20	6%
5 6 Salinity	11			0%
5 7 SoilAcidity	11			0%
5 8 SurfaceTemp	11			0%
5 9 SuboptimalFieldMa	11			0%
5 10 InadeqSpacing	11			0%
5 11 InsuffCropCare	5	40	50	20%
5 12 Other 1				0%
5 13 Other 2				0%
			total	131%
Non crop related constraints				
6 3 CreditAvailability	1	80 n a		0%
6 4 TechnAssistance/Tr	4	20 n a		0%
6 5 LabourAvailability	1	80 n a		0%
6 6 Other 1				0%
6 7 Other 2				0%
			total	0%
				138%

ASIA CASSAVA CULTIVATION THAILAND, Qtn 2

Respondent Number	AC2				
0 0 Position	Research representative				
0 1 Zone	Thailand				
0 2 Area	1200000	Producer price in USD per Ton		40 00	
0 3 AcualYield	14	Total volume of production in Tons		16800000	
0 4 PotentialYield	25	Financial value of production in US		6 7E+08	
0 5 ProducerPrice	1000	Potential yield increase estimate		79%	
0 6 ExchangeRate	25				

	RANKING	AREA (%)	YIELDGAIN (%)	YIELDGAIN FOR THE ENTIRE ZONE	
Planting material					
1 3 Quality	1	30	40	12%	
1 4 Availability	2	20	n a	0%	
1 5 Other 1				0%	
1 6 Other 2				0%	
				total	12%
Pathogens & Viruses					
2 3 Bac Blight	1	40	5	2%	
2 4 Anthracnose				0%	
2 5 Mosaic				0%	
2 6 OtherLeaf 1				0%	
2 7 OtherLeaf 2				0%	
2 8 RootRot ? type	2	5	20	1%	
2 9 StemRot				0%	
2 10 OtherRoot 1				0%	
2 11 OtherRoot 2				0%	
2 12 Witchess Broom				0%	
2 13 Superelongation				0%	
				total	3%
Pests					
3 3 MealyBug	2	10	20	2%	
3 4 GreenMite				0%	
3 5 RedMite	1	20	20	4%	
3 6 Thrips				0%	
3 7 Hornworm				0%	
3 8 Other 1				0%	
3 9 Other 2				0%	
3 10 Other 3				0%	
				total	6%
Genetic characteristics					
4 3 DroughtSusc				0%	
4 4 LowYield	1	80	20	16%	
4 5 LateBulking/Matur				0%	
4 6 PoorGerm				0%	
4 7 LackEarlyVigour				0%	
4 8 WideCanopy				0%	
4 9 O 1 LowStarchCont	2	80	n a	0%	
4 10 Other 2				0%	
4 11 Other 3				0%	
				total	16%
Soils and Crop management					
5 3 LowSoilFertility	3	80	10	8%	
5 4 PoorSoilPhysics	5	80	10	8%	
5 5 SoilErosion	4	40	20	8%	
5 6 Salinity				0%	
5 7 SoilAcidity	7	10	20	2%	
5 8 SurfaceTemp	8	10	10	1%	
5 9 SuboptimalFieldMa	1	80	30	24%	
5 10 InadeqSpacing	6	20	10	2%	
5 11 InsuffCropCare	2	50	40	20%	
5 12 Other 1				0%	
5 13 Other 2				0%	
				total	73%
Non-crop related constraints					
6 3 CreditAvailability	2	80	n a	0%	
6 4 TechnAssistance/Tr	3	50	n a	0%	
6 5 LabourAvailability	1	50	n a	0%	
6 6 Other 1				0%	
6 7 Other 2				0%	
				total	0%
					110%

ASIA CASSAVA CULTIVATION_ INDONESIA _Qtn_3

Respondent Number	AC6		
0 0 Position	Agronomist		
0 1 Zone	Indonesia		
0 2 Area	1357000	Producer price in USD per Ton	20 41
0 3 ActualYield	12	Total volume of production in Tons	16284000
0 4 PotentialYield	30	Financial value of production in US	3 3E+08
0 5 ProducerPrice	50000	Potential yield increase estimate	150%
0 6 ExchangeRate	2450		

	RANKING	AREA (%)	YIELDGAIN (%)	YIELDGAIN FOR THE ENTIRE ZONE	
Planting material					
1 3 Quality	2	35	25	9%	
1 4 Availability	2	20	n a	0%	
1 5 Other 1				0%	
1 6 Other 2				0%	
				total	9%
Pathogens & Viruses					
2 3 Bac Blight	3	10	10	1%	
2 4 Anthracnose				0%	
2 5 Mosaic				0%	
2 6 Brown Leaf Spot	2	5	n a	0%	
2 7 OtherLeaf 2				0%	
2 8 RootRot				0%	
2 9 StemRot				0%	
2 10 OtherRoot 1				0%	
2 11 OtherRoot 2				0%	
2 12 Witchess Broom				0%	
2 13 Superelongation				0%	
				total	1%
Pests					
3 3 MealyBug				0%	
3 4 GreenMite				0%	
3 5 RedMite	5	10	5	1%	
3 6 Thrips				0%	
3 7 Hornworm				0%	
3 8 Other 1				0%	
3 9 Other 2				0%	
3 10 Other 3				0%	
				total	1%
Genetic charac eristics					
4 3 DroughtSusc	4	15	10	2%	
4 4 LowYield	7	20	20	4%	
4 5 LateBulking/Matur				0%	
4 6 PoorGerm	4	20	10	2%	
4 7 LackEarlyVigour	7	20	20	4%	
4 8 WideCanopy	2	10	n a	0%	
4 9 Other 1				0%	
4 10 Other 2	(4 6) and (4 7) depend on rainfall and			0%	
4 11 Other 3	cropping system (4 7)			0%	
				total	12%
Soils and Crop management					
5 3 LowSoilFertility	10	60	60	36%	
5 4 PoorSoilPhysics	4	20	20	4%	
5 5 SoilErosion	8	50	20	10%	
5 6 Salinity				0%	
5 7 SoilAcidity	7	10	5	1%	
5 8 SurfaceTemp				0%	
5 9 SuboptimalFieldMa	5	10	5	1%	
5 10 InadeqSpacing	8	20	10	2%	
5 11 InsuffCropCare	8	30	30	9%	
5 12 Other 1				0%	
5 13 Other 2				0%	
				total	62%
Non crop related constraints					
6 3 CreditAvailability	5	1	n a	0%	
6 4 TechnAssistance/Tr	4	2	n a	0%	
6 5 LabourAvailability	2	20	n a	0%	
6 6 Other 1				0%	
6 7 Other 2				0%	
				total	0%
					84%

ASIA CASSAVA CULTIVATION KERALA (INDIA), Qtn 4

Respondent Number	AC5			
0 0 Position	Administrator			
0 1 Zone	Kerala India			
0 2 Area	227000	Producer price in USD per Ton		69 44
0 3 AcualY eld	22 2	Total volume of production in Tons		5039400
0 4 PotentialYield	80	Financial value of production in US		3 5E+08
0 5 ProducerPrice	2500	Potential yield increase estimate		260%
0 6 ExchangeRate	36			

Planting material	RANKING	AREA (%)	YIELDGAIN (%)	YIELDGAIN FOR THE ENTIRE ZONE	
1 3 Quality	1	80	45	36%	
1 4 Availability	3	n a		0%	
1 5 Other 1	1	90	35	32%	
1 6 Other 2				0%	
				total	68%
Pathogens & Viruses					
2 3 Bac Blight	9	1	0	0%	
2 4 Anthracnose	8	2	0	0%	
2 5 Indian Mosaic Virus	3	50	40	20%	
2 6 Brown Leaf Spot	6	50	7 5	4%	
2 7 WhiteAndDiffuseLe	8	0	0	0%	
2 8 RootRot Phytopthor	5	5	20	1%	
2 9 StemRot	7	5	5	0%	
2 0 ORoot Fusarium s	8	2	0	0%	
2 11 ORoot Bacterial wil	9	1	0	0%	
2 2 Witchess Broom				0%	
2 3 Superelongation				0%	
				total	25%
Pests					
3 3 MealyBug				0%	
3 4 GreenMite				0%	
3 5 RedMite	4	70	23 5	16%	
3 6 Thrips	8	50	7 5	4%	
3 7 Hornworm				0%	
3 8 Spiral Whitefly	5	70 n a		0%	
3 9 Scale Insect	7	10	7 5	1%	
3 10 Bemisia (as vector)	5	50	30	15%	
				total	36%
Genetic characteristics					
4 3 DrougntSusc	5			0%	
4 4 LowYield	7			0%	
4 5 LateBulking/Matur	8			0%	
4 6 PoorGerm	6			0%	
4 7 LackEarlyVigour	9			0%	
4 8 WideCanopy	8	n a		0%	
4 9 Cooking quality	6			0%	
4 10 Cyanogen	5			0%	
4 11 Starch	8			0%	
				total	0%
Soils and Crop management					
5 3 LowSoilFertility	3	70	25	18%	
5 4 PoorSoilPhysics	11	2 5		0%	
5 5 SoilErosion	4	60	40	24%	
5 6 Salinity	11			0%	
5 7 SoilAcidity	11	2 5		0%	
5 8 SurfaceTemp	11			0%	
5 9 SuboptimalF eldMa	5	70	7	5%	
5 10 InadeqSpacing	3	50	3	2%	
5 11 InsuffCropCare	11	20	10	2%	
5 12 Low keeping quality of stakes	7		15	0%	
				otal	50%
Non crop related constraints					
6 3 CreditAvailability	5	n a		0%	
6 4 TechnAssistance/Tr	2	n a		0%	
6 5 LabourAvailability	1	55 n a		0%	
6 6 Other 1				0%	
6 7 Other 2				0%	
				total	0%
					178%

ASIA CASSAVA CULTIVATION HAINAN (CHINA) Qtn 5

Respondent Number	AC3		
0 0 Position	??		
0 1 Zone	Hainan China		
0 2 Area	27000	Producer price in USD per Ton	36 14
0 3 ActualYield	18	Total volume of production in Tons	486000
0 4 PotentialYield	30	Financial value of production in US	17566265
0 5 ProducerPrice	300	Potential yield increase estimate	67%
0 6 ExchangeRate	8 3		

	RANKING	AREA (%)	YIELDGAIN (%)	YIELDGAIN FOR THE ENTIRE ZONE	
Planting material					
1 3 Quality	1	35	10	4%	
1 4 Availability	2	12	n a	0%	
1 5 Other 1				0%	
1 6 Other 2				0%	
				total	4%
Pathogens & Viruses					
2 3 Bac Blight	1	2	5	0%	
2 4 Anthracnose	2	10	8	1%	
2 5 Mosaic				0%	
2 6 Brown Leaf Spot	3	70	1	1%	
2 7 OtherLeaf 2				0%	
2 8 RootRot				0%	
2 9 StemRot				0%	
2 10 OtherRoot 1				0%	
2 11 OtherRoot 2				0%	
2 12 Witchess Broom				0%	
2 13 Superelongation				0%	
				total	2%
Pests					
3 3 MealyBug	2	5	10	2%	
3 4 GreenMite				0%	
3 5 RedMite	1	30	25	8%	
3 6 Thrips				0%	
3 7 Hornworm				0%	
3 8 Other 1				0%	
3 9 Other 2				0%	
3 10 Other 3				0%	
				otal	9%
Genetic characteristics					
4 3 DroughtSusc	2	70	25	18%	
4 4 LowYield	1	90	30	27%	
4 5 LateBulking/Matur				0%	
4 6 PoorGerm	3	30	10	3%	
4 7 LackEarlyVigour				0%	
4 8 WideCanopy		n a		0%	
4 9 Other 1				0%	
4 10 Other 2				0%	
4 11 Other 3				0%	
				total	48%
Soils and Crop management					
5 3 LowSoilFertility	2	85	10	9%	
5 4 PoorSoilPhysics				0%	
5 5 SoilErosion	1	85	20	17%	
5 6 Salinity				0%	
5 7 SoilAcidity				0%	
5 8 SurfaceTemp				0%	
5 9 SuboptimalFieldMa	4	85	15	13%	
5 10 InadeqSpacing				0%	
5 11 InsuffCropCare	3	70	25	18%	
5 12 Other 1				0%	
5 13 Other 2				0%	
				total	56%
Non crop related constraints					
6 3 CreditAvailability	3	95	n a	0%	
6 4 TechnAssistance/Tr	2	70	n a	0%	
6 5 LabourAvailability	1	60	n a	0%	
6 6 Other 1				0%	
6 7 Other 2				0%	
				total	0%
					117%

ASIA CASSAVA CULTIVATION SOUTH_VIETNAM Qtn 6

Respondent Number	AC8		
0 0 Position	Administrator		
0 1 Zone	South Vietnam		
0 2 Area	144500	Producer price in USD per Ton	31 25
0 3 AcualYield	8 96	Total volume of production in Tons	1294720
0 4 PotentialY eld	30	Financial value of production n US	40460000
0 5 ProducerPrice	350000	Potential yield increase estimate	235%
0 6 ExchangeRate	11200		

	RANKING	AREA (%)	YIELDGAIN (%)	YIELDGAIN FOR THE ENTIRE ZONE	
Planting material					
1 3 Quality	2	15	20	3%	
1 4 Availability	2	25 n a		0%	
1 5 Oth 1 Poor storage				0%	
1 6 Other 2				0%	
				total	3%
Pathogens & Viruses					
2 3 Bac Blight	6	70	6	4%	
2 4 Anthracnose	9	15	2	0%	
2 5 Mosaic Indian	7	5	1	0%	
2 6 OtL[f] Cercospora	8	20	2	0%	
2 7 OtL[f] 2 Colletatrichu	9	15	1 5	0%	
2 8 RootRot PhytophS	8	5	1	0%	
2 9 StemRot	9	5	0 5	0%	
2 0 OthRt 1 FusariumS	8	5	1	0%	
2 1 OthRt 2 DiplodiaMa	8	5	1	0%	
2 12 Witchess Broom				0%	
2 3 Superelongation				0%	
				total	5 %
Pests					
3 3 MealyBug	7	5	3	0%	
3 4 GreenMite	8	3	2	0%	
3 5 RedMite	8	1		0%	
3 6 Thrips	8	1	1	0%	
3 7 Hornworm(Chlorida	8	2	2	0%	
3 8 Other 1 Termites	5	20	15	3%	
3 9 O 2 Spodopteral(Pr	8	4	2	0%	
3 10 O 3 TiracolaPlagiat	8	4	2	0%	
				total	3%
Genetic charac eristics					
4 3 DroughtSusc	5	40	30	12%	
4 4 LowY eld	3	50	80	40%	
4 5 LateBulking/Matur (	7	20	20	4%	
4 6 PoorGerm	8	5 n a		0%	
4 7 LackEarlyVigour	9	5 n a		0%	
4 8 WideCanopy(forLoc	7	20 n a		0%	
4 9 FloodSusceptibility	8	10	10	1%	
4 10 WindSusceptibility(I	7	15	20	3%	
4 11 Other 3				0%	
				total	60%
Soils and Crop management					
5 3 LowSoilFertility	3	50	30	15%	
5 4 PoorSoilPhysics	6	18	6	1%	
5 5 SoilErosion	4	35	15	5%	
5 6 Salinity	11	5 n a		0%	
5 7 SoilAcidity(pHH2O<	4	70	10	7%	
5 8 SurfaceTemp	10	30 n a		0%	
5 9 SuboptimalFieldMa	7	30	15	5%	
5 10 InadeqSpacing	8	20	10	2%	
5 11 InsuffCropCare	5	35	20	7%	
5 12 Other 1				0%	
5 13 Other 2				0%	
				total	42%
Non crop related constraints					
6 3 CreditAvailability	2	40 n a		0%	
6 4 TechnAssistance/Tr	3	35 n a		0%	
6 5 LabourAvailability	4	30 n a		0%	
6 6 LackOfProcessingA	1	75 n a		0%	
6 7 DifficultiesOfTransp	4	30 n a		0%	
				total	0%
					114%

ASIA CASSAVA CULTIVATION TAMIL NADU (INDIA), Qtn 7

Respondent Number	AC7					
0 0 Position	Dean of Agr University					
0 1 Zone	Tamil Nadu					
0 2 Area	85983		Producer price in USD per Ton		35 50	
0 3 ActualYield	30		Total volume of production in Tons		2579490	
0 4 PotentialY eld	40		Financial value of production in US		91579527	
0 5 ProducerPrice	1800		Potential yield inc ease estimate		33%	
0 6 ExchangeRate	50 7					
Planting material	RANKING	AREA (%)	YIELDGAIN (%)	YIELDGAIN FOR THE ENTIRE ZONE		
1 3 Quality	3	25	15	4%		
1 4 Availability	1	30 n a		0%		
1 5 Oth 1 Poor storage	2	10	5	1%		
1 6 Other 2				0%		
				total	4%	
Pathogens & Viruses						
2 3 BactBlight	9	2	0 5	0%		
2 4 Anthracnose	9	2	0 5	0%		
2 5 Mosaic CMD Germ	3	60	30	18%		
2 6 OtLe 1 Phomopsis	7	5	2	0%		
2 7 OtLe 2 BrownLeafS	8	3	1	0%		
2 8 RootRot Phytoph s	4	20	10	2%		
2 9 StemRot				0%		
2 10 OtherRoot				0%		
2 11 OtherRoot 2				0%		
2 12 Witchess Broom				0%		
2 13 Superelongation				0%		
				total	20%	
Pests						
3 3 MealyBug	8	0 5	0 1	0%		
3 4 GreenMite	8	0 5	0 1	0%		
3 5 RedMite	8	1	0 2	0%		
3 6 Thrips	8	0 5	0 1	0%		
3 7 Hornworm	8	0 5	0 1	0%		
3 8 Other 1 WhiteScale	5	5	2	0%		
3 9 Other 2 White Fly	4	25	20	5%		
3 10 O 3 SpiralingWhite	4	10	5	1%		
				total	6%	
Genetic charac eristics						
4 3 DroughtSusc	6	30	15	5%		
4 4 LowYield	7	25	20	5%		
4 5 LateBulkingMatur	5	35	15	5%		
4 6 PoorGerm	7	15	5	1%		
4 7 LackEarlyVigour	8	10	3	0%		
4 8 WideCanopy	8	5 n a		0%		
4 9 O 1 BranchingNatur	7	5	2	0%		
4 10 Other 2				0%		
4 11 Other 3				0%		
				total	16%	
Soils and Crop management						
5 3 LowSoilFertility	10	10	5	1%		
5 4 PoorSoilPhysics	8	5	2	0%		
5 5 SoilErosion	11	1	0 2	0%		
5 6 Salinity	10	2	0 5	0%		
5 7 SoilAcidity	11	1	0 2	0%		
5 8 SurfaceTemo	8	5	1	0%		
5 9 SubootimalFieldMa	4	40	25	10%		
5 10 InadeqSpacing	11	5	1	0%		
5 11 InsuffCropCare	6	35	15	5%		
5 12 Other 1				0%		
5 13 Other 2				0%		
				total	16%	
Non crop related constraints						
6 3 CreditAvailability	3	40 n a		0%		
6 4 TechnAssistance/Tr	5	5 n a		0%		
6 5 LabourAvailability	3	30 n a		0%		
6 6 Other 1				0%		
6 7 Other 2				0%		
				total	0%	
					62%	

ASIA - CASSAVA CULTIVATION in the SUBTROPICS

Constraints in Cassava cultivation

	GUANGXI CHINA 8
Area represented by the questionnaire	220000
Yield, in Ton/Ha	13 7
Price, in USD/Ton	38 6
Estimated yieldincrease	119%
Calculated yieldincrease	224%
YIELDGAIN FOR THE ENTIRE AREA	
Planting material	9%
Pathogens&Viruses	0%
Pests	0%
Genetic characteristics	87%
Soils&Crop management	128%

Constraints for Asian Cassava cultivation in the Subtropics, 1993 data

Total area in the zone (Ha)	598000
Average yield (Ton/Ha)	11
Estimated yieldincrease	82%
Calculated yieldincrease	113%
YIELDGAIN FOR THE SUBTROPICS	
Planting material	14%
Pathogens&Viruses	3%
Pests	2%
Genetic characteristics	24%
Soils&Crop management	71%

ASIA CASSAVA CULTIVATION GUANGXI (CHINA), Qtn 8

Respondent Number	AC4					
0 0 Position	Administrator					
0 1 Zone	Guangxi China					
0 2 Area	220000			Producer price in USD per Ton		38 55
0 3 ActualYield	13 7			Total volume of production in Tons		3014000
0 4 PotentialYield	30			Financial value of production in US		1 2E+08
0 5 ProducerPrice	320			Potential yield increase estimate		119%
0 6 ExchangeRate	8 3					
Planting material	RANKING	AREA (%)	YIELDGAIN (%)		YIELDGAIN FOR THE ENTIRE ZONE	
1 3 Quality	3	30	30		9%	
1 4 Availability	3	n a			0%	
1 5 Other 1					0%	
1 6 Other 2					0%	
					total	9%
Pathogens & Viruses						
2 3 BactBlight					0%	
2 4 Anthracnose					0%	
2 5 Mosaic					0%	
2 6 OtherLeaf 1					0%	
2 7 OtherLeaf 2					0%	
2 8 RootRot					0%	
2 9 StemRot					0%	
2 10 OtherRoot					0%	
2 11 OtherRoot 2					0%	
2 12 Witchess Broom					0%	
2 13 Superelongation					0%	
					otal	0%
Pests						
3 3 MealyBug					0%	
3 4 GreenMite					0%	
3 5 RedMite	8	0 1			0%	
3 6 Thrips					0%	
3 7 Hornworm					0%	
3 8 Other 1					0%	
3 9 Other 2					0%	
3 10 Other 3					0%	
					total	0%
Genetic characteristics						
4 3 DroughtSusc	7	40	30		12%	
4 4 LowYield	5	80	30		24%	
4 5 LateBulking/Matur	3	90	40		36%	
4 6 PoorGerm	7	70	20		14%	
4 7 LackEarlyVigour	7	10	10		1%	
4 8 WideCanopy	4	70 n a			0%	
4 9 Other 1					0%	
4 10 Other 2					0%	
4 11 Other 3					0%	
					total	87%
Soils and Crop management						
5 3 LowSoilFertility	4	90	60		54%	
5 4 PoorSoilPhysics	4	50	30		15%	
5 5 SoilErosion	3	70	30		21%	
5 6 Salinity	11				0%	
5 7 SoilAcidity	5	80	20		16%	
5 8 SurfaceTemp	10				0%	
5 9 SuboptimalFieldMa	8	60	30		18%	
5 10 InadeqSpacing	11				0%	
5 11 InsuffCropCare	8	20	20		4%	
5 12 Other 1					0%	
5 13 Other 2					0%	
					total	128%
Non crop related constraints						
6 3 CreditAvailability	2	90 n a			0%	
6 4 TechnAssistance/Tr	2	90 n a			0%	
6 5 LabourAvailability	5	n a			0%	
6 6 Other 1					0%	
6 7 Other 2					0%	
					total	0%
						224%

ANNEX 7

ASIA NATIVE STARCH

	Guangxi China (1)		India Kerala (2)		India Tamil Nadu (3)	
Conversion of root into starch	25%		20%		25%	
Estimated decrease in Processing Costs	20%		29%		17%	
Estimated increase in Product price	3%		4%		13%	
CONSTRAINTS	ProcCostsDecrease	ProductPriceIncrease	ProcCostsDecrease	ProductPriceIncrease	ProcCostsDecrease	ProductPriceIncrease
Root quality	46%	39%	15%	2%	15%	14%
Processing technology	50%	45%	5%	2%	8%	8%
Product marketing	0%	11%	0%	1%	0%	39%
TOTALS	96%	95%	20%	5%	23%	61%

AVERAGEAVERAGEAVERAGEAVERA	AVERAGEAVERAG	AVERAGEAVERAGE	AVERAGEAVERAG	AVERAGEAVERAGEAVERAGE
Conversion of root into starch	23%			
Estimated decrease in Processing Costs	3%			
Estimated increase in Product price	4%			

CONSTRAINTS	ProcCostsDecrease	ProductPriceIncrease	TOTAL REVENUES
Root quality	25%	18%	44%
Processing technology	21%	18%	39%
Product marketing	0%	17%	17%
TOTALS	46%	54%	100%

NATIVE STARCH 1

Respondent Number		AP2							
0 0	Position	Administrator							
0 1	Zone	Guangxi China							
0 2	Product	Native starch Industrial purpose							
0 3	Product volume (in Ton)	263700				Conversion in %			25%
0 4	FreshRootEquivalent (in Ton)	1054800				RawMaterialCosts in USD per Ton of produc			154 40
0 5	Average root price per Ton	38 6							
0 6	CurrentProcessCosts per unit	75				Processing Costs in USD per Ton			75 00
0 7	PotenProcCosts per unit	60				Potential decrease			**20%**
0 8	Product unit equivalent								
0 9	Average product price	300				Product price in USD per Ton			300 00
0 10	Potential product price	290				Potential increase			**3%**
0 11	Currency exchange rate	1							
			PRODUCT	COSTS	PRICE				
ROOT	QUALITY	RANKING	VOLUME	DECRFAS	INCREASE		ProcCostsDecrease		ProductPriceIncrease
1 3	High cyanogen	4	80	10			8%		0%
1 4	Low dry matter content	4	80	20	20		16%		16%
1 5	High perishability	10	60	10	10		6%		6%
1 6	High fibre content	9	40	10	10		4%		4%
1 7	Poor starch properties	9	80	10	10		8%		8%
1 8	Bad taste/texture/colour	10	30	5	10		2%		3%
1 9	Unusual root size/shape	9	30	7 5	5		2%		2%
1 10	Other						0%		0%
1 11	Other						0%		0%
							46%		**39%**
PROCESSING TECHNOLOGY							ProcCostsDecrease		ProductPriceIncrease
2 3	Poor handling of raw mater	8	10	7 5	10		1%		1%
2 4	LowProductQual PoorTechnol	8	30	17 5	30		5%		9%
2 5	Low conversion rate	8	90	10	5		9%		5%
2 6	Low capital efficiency	9	90	15	10		14%		9%
2 7	Low labour efficiency	5	90	10	10		9%		9%
2 8	Low water quality	10	60	5	10		3%		6%
2 9	Excess water use	4	90	10	7 5		9%		7%
2 10	Other						0%		0%
2 11	Other						0%		0%
2 12	Other						0%		0%
							50%		**45%**
PRODUCT MARKETING							ProcCostsDecrease		ProductPriceIncrease
3 3	Poor product packaging	7	60	n a	5		0%		3%
3 4	Poor handling of product	9	30	n a			0%		0%
3 5	Bad physical infrastructure	7	60	n a	5		0%		3%
3 6	Many intermediaries	6	60	n a	7 5		0%		5%
3 7	Severe price fluctuations	7	80	n a			0%		0%
3 8	Other						0%		0%
3 9	Other						0%		0%
3 10	Other						0%		0%
							0%		**11%**

NATIVE STARCH 2

Respondent Number		AP3							
0 0	Position	Administrator							
0 1	Zone	India Kerala							
0 2	Product	Native starch for Ind purpose Sago							
0 3	Product volume (in Ton)	220000				Conversion in %			20%
0 4	FreshRootEquivalent (in Ton)	1100000				RawMaterialCosts in USD per Ton of produc			347 22
0 5	Average root price per Ton	2500							
0 6	CurrentProcessCosts per unit	350				Processing Costs in USD per Ton			9 72
0 7	PotenProcCosts per unit	450				Potential decrease			**29%**
0 8	Product unit equivalent								
0 9	Average product price	1150				Product price in USD per Ton			31 94
0 10	Potential product price	1200				Potential increase			**4%**
0 11	Currency exchange rate	36							
ROOT QUALITY		**RANKING**	**PRODUCT VOLUME**	**COSTS DECREAS**	**PRICE INCREASE**			ProcCostsDecrease	ProductPriceIncrease
1 3	High cyanogen	9						0%	0%
1 4	Low dry matter content	8	3					0%	0%
1 5	High perishability	1	40	25	3			10%	1%
1 6	High fibre content	8	5	10	1			1%	0%
1 7	Poor starch properties	9	20	5	1			1%	0%
1 8	Bad taste/texture/colour	11						0%	0%
1 9	Unusual root size/shape	11						0%	0%
1 10	Other Cracking of ind	4	30	10	2			3%	1%
1 11	Other							0%	0%
								15%	**2%**
PROCESSING TECHNOLOGY								ProcCostsDecrease	ProductPriceIncrease
2 3	Poor handling of raw mater	8	10	3	1			0%	0%
2 4	LowProductQual PoorHygCon	8	60	3	2			2%	1%
2 5	Low conversion rate	11						0%	0%
2 6	Low capital efficiency	11						0%	0%
2 7	Low labour efficiency	8	20	5	1			1%	0%
2 8	Low water quality	11						0%	0%
2 9	Excess water use	7	5	4	1			0%	0%
2 10	Other MechanizationOfProces	5	25	7	3			2%	1%
2 11	Other							0%	0%
2 12	Other							0%	0%
								5%	**2%**
PRODUCT MARKETING								ProcCostsDecrease	ProductPriceIncrease
3 3	Poor product packaging	9		n a				0%	0%
3 4	Poor handling of product	9		n a				0%	0%
3 5	Bad physical infrastructure	9		n a				0%	0%
3 6	Many intermediaries	9		n a				0%	0%
3 7	Severe price fluctuations	5		n a				0%	0%
3 8	Other Colour	6	20		3			0%	1%
3 9	Other							0%	0%
3 10	Other							0%	0%
								0%	**1%**

NATIVE STARCH 3

Respondent Number		AP4						
0 0	Position	Dean of Agr University						
0 1	Zone	Tamil Nadu						
0 2	Product	Native Starch for Human Consumption Sago						
0 3	Product volume (in Ton)	720000			Conversion, in %			25%
0 4	FreshRootEquivalent (in Ton)	2876000			RawMaterialCosts in USD per Ton of produc			141 81
0 5	Average root price per Ton	1800						
0 6	CurrentProcessCosts per unit	12000			Processing Costs in USD per Ton			236 69
0 7	PotenProcCosts per unit	10000			Potential decrease			**17%**
0 8	Product unit equivalent	1000						
0 9	Average product price	16000			Product price in USD per Ton			315 58
0 10	Potential product price	14000			Potential increase			**13%**
0 11	Currency exchange rate	50 7						
			PRODUCT	COSTS	PRICE			
ROOT QUALITY		RANKING	VOLUME	DECREAS	INCREASE	ProcCostsDecrease		ProductPriceIncrease
1 3	High cyanogen	11	2	0 5	5	0%		0%
1 4	Low dry matter content	10	1	0 5	3	0%		0%
1 5	High perishability	2	60	25	20	15%		12%
1 6	High fibre content	11	5	2	5	0%		0%
1 7	Poor starch properties	10	5	3	10	0%		1%
1 8	Bad taste/texture/colour	10	5	2	10	0%		1%
1 9	Unusual root size/shape	10	5	2	5	0%		0%
1 10	Other					0%		0%
1 11	Other					0%		0%
						15%		**14%**
PROCESSING TECHNOLOGY						ProcCostsDecrease		ProductPriceIncrease
2 3	Poor handling of raw mater	6	10	7	10	1%		1%
2 4	LowProductQual IndigenousP	7	5	10	20	1%		1%
2 5	Low conversion rate	10	15	5	5	1%		1%
2 6	Low capital efficiency	9	10	10	10	1%		1%
2 7	Low labour efficiency	7	20	15	5	3%		1%
2 8	Low water quality	7	15	10	15	2%		2%
2 9	Excess water use	6	5	15	10	1%		1%
2 10	Other					0%		0%
2 11	Other					0%		0%
2 12	Other					0%		0%
						8%		**8%**
PRODUCT MARKETING						ProcCostsDecrease		ProductPriceIncrease
3 3	Poor product packaging	6	20	n a	25	0%		5%
3 4	Poor handling of product	3	25	n a	30	0%		8%
3 5	Bad physical infrastructure	3	35	n a	30	0%		11%
3 6	Many intermediaries	5	10	n a	10	0%		1%
3 7	Severe price fluctuations	2	50	n a	30	0%		15%
3 8	Other DelayInPaymentFrom FactoryOwners	2	50		n a	0%		0%
3 10	Other					0%		0%
						0%		0%
						0%		**39%**

STARCH ***The data given in this questionnaire are not very useful***

Respondent Number		AP5							
0 0	Position	Administrator							
0 1	Zone	South Vietnam							
0 2	Product	Modified Starch							
0 3	Product volume (in Ton)	100000			Conversion in %				25%
0 4	FreshRootEquivalent (in Ton)	400000			RawMaterialCosts in USD per Ton of produc				125 00
0 5	Average root price per Ton	350000							
0 6	CurrentProcessCosts per unit	56000			Processing Costs in USD per Ton				5 00
0 7	PotenProcCosts per unit	56000			Potential decrease				**0%**
0 8	Product unit equivalent	1000							
0 9	Average product price	2128000			Product price in USD per Ton				190 00
0 10	Potential product price	2520000			Potential increase				**18%**
0 11	Currency exchange rate	11200							
			PRODUCT	**COSTS**	**PRICE**				
ROOT QUALITY		**RANKING**	**VOLUME**	**DECREAS**	**INCREASE**		ProcCostsDecrease	ProductPriceIncrease	
1 3	High cyanogen	8	55	5	5		3%	3%	
1 4	Low dry matter content	10	55	n a	n a		0%	0%	
1 5	High perishability	10	55	n a	n a		0%	0%	
1 6	High fibre content	10	55	n a	n a		0%	0%	
1 7	Poor starch properties	10	55	n a	5		0%	3%	
1 8	Bad taste/texture/colour	10	55	n a	n a		0%	0%	
1 9	Unusual root size/shape	10	55	n a	n a		0%	0%	
1 10	Other						0%	0%	
1 11	Other						0%	0%	
							3%	**6%**	
PROCESSING TECHNOLOGY							ProcCostsDecrease	ProductPriceIncrease	
2 3	Poor handling of raw mater	10	100	n a	n a		0%	0%	
2 4	LowProductQual IndigenousP	10	100	n a	n a		0%	0%	
2 5	Low conversion rate	10	100	n a	n a		0%	0%	
2 6	Low capital efficiency	10	100	n a	n a		0%	0%	
2 7	Low labour efficiency	10	100	n a	n a		0%	0%	
2 8	Low water quality	10	100	n a	n a		0%	0%	
2 9	Excess water use	10	100	n a	n a		0%	0%	
2 10	Other						0%	0%	
2 11	Other						0%	0%	
2 12	Other						0%	0%	
							0%	**0%**	
PRODUCT MARKETING							ProcCostsDecrease	ProductPriceIncrease	
3 3	Poor product packaging	9	100	n a	n a		0%	0%	
3 4	Poor handling of product	9	100	n a	n a		0%	0%	
3 5	Bad physical infrastructure	8	100	n a	n a		0%	0%	
3 6	Many intermediaries	?	100	n a	?		0%	0%	
3 7	Severe price fluctuations	1	100	n a	?		0%	0%	
							0%	0%	
							0%	0%	
							0%	0%	
							0%	**0%**	