A SOCIO-ECONOMIC STUDY

OF CASSAVA AND CASSAVA STARCH PRODUCTION

IN AN ANDEAN VILLAGE

IN COLOMBIA

BY

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CONTENTS

INTRODUCTION

In June 1975, I finished my bachelor's as a student of the Department of Rural Sociology of the Tropics and Subtropics at the Agricultural University in Wageningen, The Netherlands. In July I left with Letty, my wife, for Colombia to do six months of fieldwork, which forms a part of our study. I was invited to do my practical work as a trainee of the Centro Internacional de Agricultura Tropical (CIAT) in Palmira, Colombia.

In August I spent three weeks at CIAT. As I did not know what the subject of my study would be when I left Holland, the main objective of my stay at CIAT was to choose a subject for my fieldwork and to write a proposal. The subject of my study came about after some talks I had with Piet Spijkers, rural sociologist at CIAT, and Rafael Orlando Díaz, agrarian economist at CIAT, who recently had completed a comprehensive study on cassava in five areas in Colombia.

The main reason to focus on cassava was that CIAT is the world center for production research on cassava, so carrying out a study on cassava, besides being good personal training, might also be of some use for CIAT. Next the decision has to be made where to carry out my fieldwork. After conferences with Piet Spijkers and Rafael Díaz I decided to go to the area south of El Tambo, a village located in the Departamento del Cauca, where much cassava is cultivated. Two factors influenced my decision. In the first place, the local area contains several small cassava factories in which starch is extracted from cassava. From a sociological point of view this seemes interesting, as they were started in an autonomous way by farmers, who in this way kept also the processing within their own control. In the second place, the distance between this area and Palmira would allow

me to be in contact with CIAT every now and then.

After the decisions were made I wrote my proposal, which can be summarized as follows:

- Give a short description and analysis, if possible, of the current agricultural system of small-scale cassava farmers in the area;
- examine the marketing and credit structure; and
- investigate how the processing of cassava on the local level affects the production of that crop.

As I did not know anything about the local situation, it was impossible for me to decide at that moment which methods of research I would use. After having written my proposal Letty and I left for El Tambo the 21st of August. The next day we found ourselves a little cottage in Cuatro Esquinas, a small village south of El Tambo, where much cassava is cultivated and eight small-scale cassava factories operate.

METHODS USED

The first five weeks of our stay in the village were mainly spent on improving my knowledge of the Spanish language and paying informal visits to farmers and factories in order to introduce myself and to explain the purpose of my stay. I met with very few problems during this introductory period. Some people, who had heard that a foreigner had come to live in the village, thought that I was an extension worker. Others wanted to know if I was working for the Dutch government or for a Colombian agrarian institution. But by telling them that my stay in a tropical country was only for my own benefit and formed a part of my studies with the main purpose of learning something about the agriculture and the way of life in this area, I very soon

built up a relation of mutual trust with the people.

After this initial month, in which I had already learned much about the cultivation and the processing of cassava, I set up my study more schematically. My sample consisted of 22 farmers, who I choose on the basis of the geographical dispersion of the farms. Some lived rather close to the village while others were located at a one-way walking distance of one hour from the village. My sample of factories consisted of eight factories located within walking distance from the village, the longer distance being one hour's walk. Five of the factory owners also cultivated cassava themselves, so I obtained information on the cultivation of cassava from a total of 27 persons.

Besides these two samples I also gathered information in informal talks with labourers and other inhabitants of the village.

I abandoned the idea of working with a questionnaire rather quickly, as I soon became convinced that my informants would tell less by talking to someone with a questionnaire in his hand, writing everything down. Therefore, I choose informal interviews, participation and observation as methods for gathering data.

There are a few farmers who I only visited once; most were visited two or three times. I interviewed most farmers on their lands, but sometimes I visited them at home. In the latter cases it often happened that after a while the farmer wanted to show me his crops in order to explain things to me. In the beginning I sometimes assisted the farmers by weeding or harvesting with them.

The duration of the interviews varied considerably, most were from one to three hours. During the interviews I wrote down some keywords in a notebook

in order not to forget. I elaborated these notes on my way home, or if the farmer did not live far away, at home.

Gathering data about the cassava factories was rather easy. I interviewed the factory owners, while peeling cassava. This worked out very positively, as I did not have to take the factory owner's time and it made me less a stranger. On an average these interviews were rather long, as frequently they wanted to know things about me, mainly related to life in Holland. This also happened often with farmers and other informants.

Although the focus of my study was the cultivation of cassava and the starch factories, about the end of November I decided to pay a little more attention than before to other aspects of the community. This provided the material for Chapter II in which I discuss the economic and social order, and the paragraph about the present agricultural situation, in which I deal briefly with the other crops grown in the area.

Reasons to broaden my scope were on the one hand that one cannot understand what is going on in the area without paying attention to the above mentioned aspects. Also, I considered my stay principally as a first confrontation with rural life in the tropics, a learning period, from which I wanted to take as many impressions as possible with me to Holland.

The peak periods in my data gathering were September, and especially October and November. In December, I was less mobile because of the often very bad weather circumstances and an injured knee, which prohibited me from walking long distances. In January, I spent much time on ordering the material I had gathered and on starting to write this report. At the end of January we left for CIAT to finish this report.

Though this study will certainly show that it is carried out by a budding sociologist, it was in every respect a very instructive learning period. Not only for me, but certainly also for Letty.

Peter Strobosch
CIAT, Palmira, Colombia
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This list would not be complete without my wife Letty who shared this experience with me and with whom I often discussed my fieldwork.

Last but not least I thank all those hearty people in Cuatro Esquinas who not only gave me information in the talks I had with them, but made our stay an unforgettable experience in every respect.

Peter Strobosch

CHAPTER I

A SHORT DESCRIPTION OF CUATRO ESQUINAS

THE INFRASTRUCTURE

The village of Cuatro Esquinas is located in the occidental mountain-range of the Andes, at a distance of about 35 Km. southwest from Popayán, the capital of the Department of Cauca (see Map I).

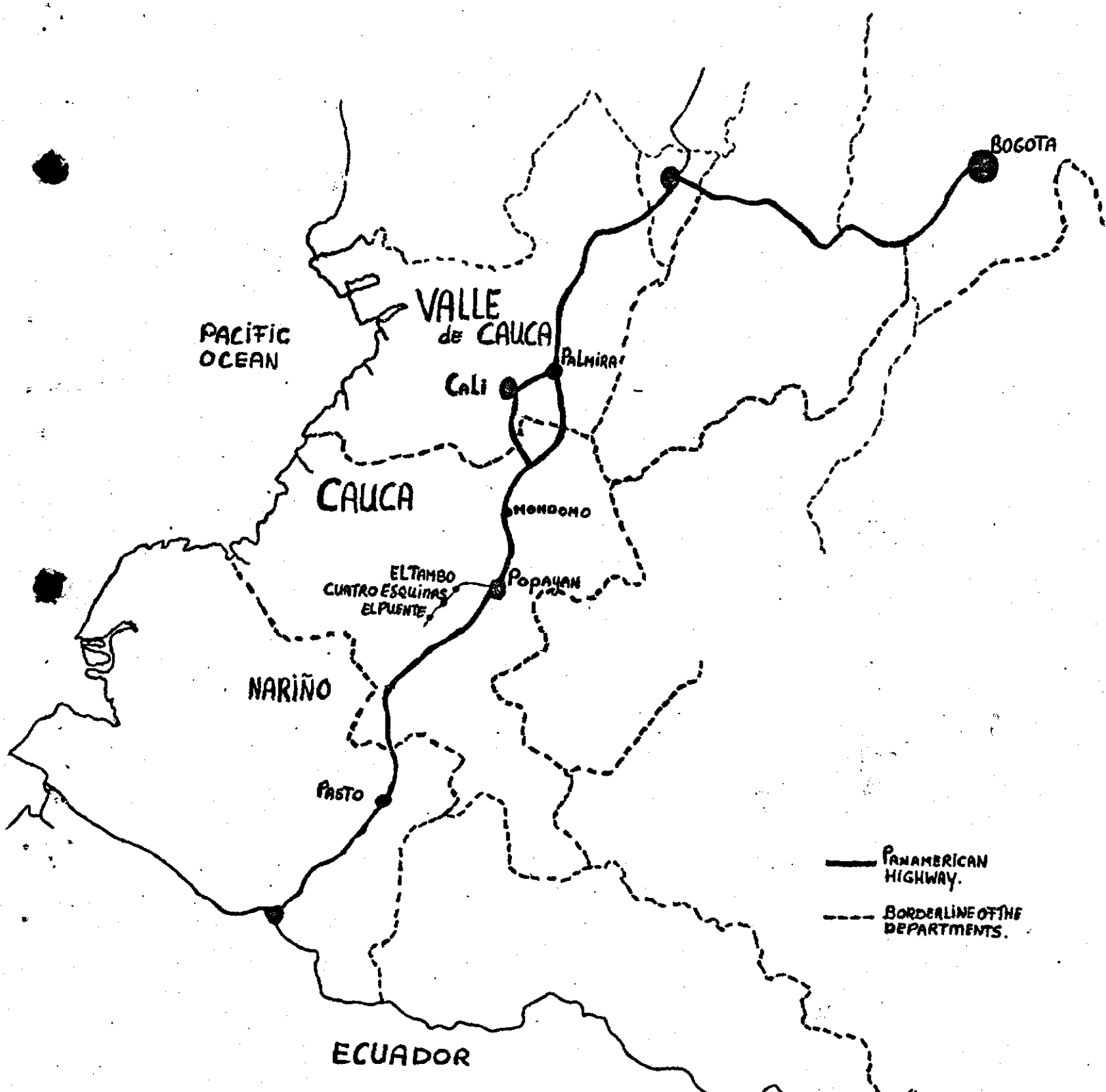
The altitude is about 1300 meters. The nearest big village is El Tambo, located about 7 Km. north of Cuatro Esquinas. It has about 500 inhabitants. El Tambo is one of the 41 municipalities of the Department of Cauca. Cuatro Esquinas, at its turn is one of the 33 sub-municipalities of the municipality of El Tambo. The local inspector and his secretary represent the municipal authorities of El Tambo.

One can only reach Cuatro Esquinas via the road Popayan - El Tambo - Cuatro Esquinas. From Cuatro Esquinas the road continues south into the mountains. Only a small part of the road between Popayan and El Tambo is asphalted. The remainder of the road surface consists of earth, sand and stones.

The road between El Tambo and Cuatro Esquinas is in a very bad condition. When it rains, transport becomes very difficult. The road south of Cuatro Esquinas is even worse.

Transport facilities between Popayan and El Tambo may be called satisfying. Frequently jeeps and buses are going. It is a one-hour trip by jeep, but nearly a two-hour trip by bus. Costs of transportation

MAP I. SOUTH-WEST COLOMBIA



are respectively $14 and $10[1].

It is not an exaggeration to say that transport facilities between El Tambo and Cuatro Esquinas leave much to be desired. People never know how long they will have to wait for transport, which often means a severe loss of time. Only on Friday and Saturday is transport rather frequent. These are market days in El Tambo and Cuatro Esquinas, respectively. It is a half-hour trip by jeep and a 45-minute trip by bus. Costs of transportation are respectively $7 and $6[1], which is considered by many people as expensive.

Transport facilities to the area south of Cuatro Esquinas are frankly very bad. Also the costs of transportation are relatively high. People there complain rightly of this situation. Transport is provided by the transport cooperative, which has existed in El Tambo for five years.

Three years ago water-works were constructed. I estimate that about 70% of the houses in the village are connected to the system. People pay $11 per month. The other 30% and the farms in the mountains receive their water either from wells or mountain brooks.

The village still does not have electricity. People say that lack of economic resources in the municipality is the main reason. Although people discuss it in the village council of communal action, they think that it will be at least two or three more years before electricity will reach the village.

Nearly all the houses of the village are located along the road. Geograpically the village can be divided into two parts:

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[1] One US dollar is about $33 (Columbian pesos: January 1976) In January 1976, prices went up 25% to 45%.

- The village centre

  This is the section where people started to build houses about 10 years ago. Before that time, one cannot speak of a village. Only three scattered houses existed in those days. From an economic as well as from a social point of view, it is by far the most important and active part of the village. The pub, the main shop, the school and the market-place are located in the centre. Furthermore, most of the traders operate there.

- La Laguna

  This part of the village begins about 150 meters from the centre, with only three houses in between. La Laguna is the youngest part of the village. It has been built during the last five years.

The houses of the village are usually constructed of local materials. According to the way of construction the houses can be divided into three categories:

1. Houses with walls and a floor of stone. The roof is either made of roofing tiles or of corrugated iron and most of them have open windows. Nearly all the bigger houses belong to this category.

2. Houses with walls consisting of a wooden framework, filled up with a mixture of earth, straw and water. These walls have been plastered with a mixture of manure, earth and water. The houses have earthen floors. The roofs are mostly made of corrugated iron and in some cases, of roofing tiles.

3. Houses with walls as described in category 2, but unplastered. They also have earthen floors. The roofs are either made of corrugated iron or leaves. Nearly all the smaller houses belong to this category.

The houses of categories 2 and 3 are often badly ventilated because of lack of windows.

Within the village, the three categories of houses are distributed as follows:

TABLE 1. DISTRIBUTION OF HOUSES IN CUATRO ESQUINAS

Location	Number of Houses		
	Category 1	Category 2	Category 3
The Centre	14	7	0
La Laguna	9	15	6
TOTAL	23	22	6

Three houses are uninhabited. The construction of two more houses is nearly finished. There is one household occupying two houses. One house is only used as a storage room by a woman who trades in coffee and plantains. The total number of households is 44.

THE POPULATION

It seems a rather fair estimation to say that the size of the average household is between six and eight persons. The total number of inhabitants in the village will be somewhere between 264 and 352.

The concentration of households in the centre expanded rather rapidly between 1965 and 1970. From 1970 on, people had to seek a place for living outside the centre because of lack of space, thus La Laguna originated.

Besides the natural population growth, the expansion of the village is for a large part due to the immigration factor. We can discern two immigration streams.

Internal immigration stream

In the last decade many households which already cultivated land in this area, moved from the countryside to the village. Main pull factors were:

a. The primary school, which was built ten years ago.
b. The marketing facilities. People who live far away in the mountains often have to lead their heavily loaded mules or horses to the village on small and, in rainy times, very slippery paths. This takes much time and is rather risky as the animals can easily be injured if they fall.
c. Family ties.
   The presence of relatives, already living in the village, attracted people, especially during the last five years.

Because of this internal immigration stream the distances between the houses and the work plots are often very long.

External immigration stream

Thirty years ago people from other parts migrated to this area and occupied land in the countryside. Some of them moved to the village later and thus formed a part of the internal immigration stream.

I shall return to this subject in Chapter III when I discuss the development of agriculture in this area.

One does not find many elderly people in the village of Cuatro Esquinas.

This may be due to the fact that most of the immigrants to the village have been young people.

Most of the household consist of the nuclear family. Sometimes they also include grandparents and/or the children of an unmarried daughter. The number of village people living in "union libre" (concubinage) is limited, whereas a fair number of people live in this manner in the countryside.

Most of the people claim to be Roman Catholic although it is difficult to get an idea how deeply people profess their religion in daily life. There is no church in Cuatro Esquinas. Every two months a priest says Mass in the school. This Mass is attended by many people. People don't go to church in El Tambo. The transportation costs may be an impediment.

Superstition seems to be rooted rather strongly, especially among the women. People attribute protecting, curing and luck bringing properties to various objects and plants.

THE PRIMARY SCHOOL

The primary school was built ten years ago. It's importance as a pull factor on migration has already been mentioned. The school offers five years of primary education and there are two first classes.

During September, October and November the school lacked two teachers. Since December all six courses have had a teacher. It is striking that all teachers hope to use their jobs as a stepping stone to the university, where they have not been able to go yet because of lack of economic resources. They all hope to be appointed someday as a teacher in Popayan in order to be able to combine their teaching with a study at the university.

The number of pupils in the school is 195. Many children come from outside the village. For them, the average one way walking distance is 3/4 of an hour.

The classrooms are small and there is a serious shortage of elementary materials. Eighty-one pupils (42%) do not have seats, 60 pupils (31%) lack desks. Lacking these materials, some children bring a seat or table to school. The only educational possessions of the school consist of a globe and some self-made maps and drawings of the human body. In case something is badly needed, either the teachers or some parents have to pay for it.

TABLE 2. SOME DATA FOR CUATRO ESQUINAS SCHOOL, 1975-76

Class	Number of pupils ♀	Number of pupils ♂	Average age	Youngest pupil	Oldest pupil	Minimum costs per year per pupil
1A + 1B	30	47	9,5	7	14	$150
2	22	21	10,3	8	16	$ 300
3	23	20	11,6	9	20	$ 350
4	8	10	14,6	10	22	$ 450
5	6	8	14	11	18	$ 500

The fact that a lot of pupils quit school after the first year is a normal tendency, according to the headmaster. Based on four years of teaching experience in Cuatro Esquinas, he gave the following explanations about progress and attendance at the school:

- After the first year the children are more or less able to read and write. Many parents are of the opinion that this minimum of education will do in the life of their children.

- Related to the above factor, many children have to help their parents after the first school year. At their age, this help consists of light work like bringing food to their fathers in the fields, the leading of horses and mules or the gathering of wood.

- Lack of money is a major reason that children don't attend school.

- The parents of children are no longer motivated to continue school for whatever reasons.

- After the first Holy Communion, which often takes place during the first school year, many parents take their children from school.

Another tendency in the area is for pupils to quite school after the third year. The main reason is that at this age the children are considered to be able to do heavier works like giving a hand in the households and helping their fathers on the fields.

The costs mentioned in Table 2 refer only to the buying of books, pencils and exercise books. However for those children who come from far away, costs are considerably increased as they have to take meals in the village and this costs $7 to $10 a day.

On an average, only 20% continues school up to the fifth course inclusive. Of this 20%, only 25% go on to secondary school.

EL TAMBO

El Tambo is the most important centre for a rather vast area. Only a few people can afford to travel to Popayan regularly. On the one hand the travelling expenses and the price level in Popayan are severe impediments. On the other hand, one can say that nearly all the important services for the agrarian population are available in El Tambo. Thus most of the time, there is no urgent need of going to Popayan. Usually the local shop keepers go to Popayan weekly in order to buy their merchandise.

The main economic and social services granted by El Tambo are:

- The Marketplace

  For the people of Cuatro Esquinas the market in El Tambo, held twice a week, acts more as a place where one buys goods than as a place where one sells his wares. In my opinion the main reason is that the three important cash crops cassava, coffee and plantains are not sold on the market in El Tambo. Hardly any cassava reaches outside markets at the moment. The coffee is either sold to traders in Cuatro Esquinas, or to the Federation of Coffee growers in El Tambo. Plantains are sold in Cuatro Esquinas and transported elsewhere. So only very little amounts of these three main crops are put on the market in El Tambo. Rather, people buy on the market those goods which are never, or hardly ever, available in Cuatro Esquinas. Examples are open-grown vegetables, meat, domestic articles, textiles, drugs, etc.

The market days, Wednesday and Saturday, have in addition to their economic functions, also their social functions. Friends and relatives, who during the week do not see each others often exchange novelties. A lot of drinking and chatting take place and in some pubs people can dance.

- The little cattle market held once a week

The only farrier in El Tambo lives next to the cattle market.

- Other shopping services

As the shopkeepers in Cuatro Esquinas sell only a few primary goods, most other needs are purchased in El Tambo. Also available in El Tambo are barbershops, workshops and 15 similar services.

- Municipal and Judicial Institutions

- The secondary school

- The church, of which the relevancy for the inhabitants of Cuatro Esquinas seems to be little.

- Agrarian Institutions. Important agrarian institutions include the Agrarian Credit Bank and the Federation of Coffee Growers.

- Festivals. Several times a year there are festivals in El Tambo, including bullfights, cock-fights and a lot of drinking and dancing.

CHAPTER II

THE ECONOMIC AND SOCIAL ORDER

ECONOMIC ACTIVITIES

In the area we can distinguish the following activities:

Agriculture:

Most households receive the main part of their income from agricultural activities. The area can be characterized by having a "minifundio" structure. The majority of the farmers are small landowners. However, the amount of landless laborers is also very big.

Industry:

The industrial activities in the area consist of the extraction of starch from cassava in small factories and the extraction of raw sugar from the sugarcane the latter. Most of the households that receive their income mainly from the cassava starch production live in the countryside.

Trade:

Though the trading sector is an important sector, a rather large part of it is in hands of people from outside the village. In Chapters III, IV and V I will discuss something about marketing of crops and the cassava starch.

In the village are six shops in which only primary goods are sold. Two of the shops are the main sources of income for their keepers. Though their shops form an important additional income, the other four receive their income mainly from agriculture .

Cattle breeding:

Cattle bredding is an important source of income for only about seven households. Cattle breeding takes place on a very low scale and very extensively. I estimate that the total number of cows in the area near Cuatro Esquinas will be no more than about hundred. Some big haciendas are located deeper into the mountains, about a two hour's drive south of Cuatro Esquinas. Most of these are owned by absentee owners living in Popayán. At the haciendas a lot of people work as "peones". These haciendas do not have any influence on the political or socio-economic life in Cuatro Esquinas.

Some eight families near Cuatro Esquinas own a team of oxen. Ploughing, mostly done by contract, is a nice additional income for them.

In the area some people also fatten one or more pigs. Almost all these people have some relation to the production of cassava starch (see Chapter V). The amount of people as well as the number of pigs is limited.

Other activities:

Among the other activities of the area may be mentioned the administrative jobs, the selling of meals, fruits and vegetables, carpentry, sewing , washing clothes, matplaiting and other plaiting. The school offers employment to six teachers. None of the six teachers is head of a household in Cuatro Esquinas.

Nearly all the households keep some poultry. However, not in big quantities and mainly for domestic use. The same can be said of the guinea pigs, which are considered to be a delicacy.

Finally, I could mention that some families train cocks for the cocks fights. However, owning a cock is, in my opinion, more a means of obtaining social status than of obtaining an economic gain, acquired from bets.

Whereas in the countryside nearly all the incomes are related to agriculture or to cassava starch production, a fair number of people in the village primarily earn a living practicing non-agricultural and non-industrial activities.

For 19 of the 44 households, which is 43%, activities outside the agricultural or industrial sector are the main source of income. For the other 25 households, which receive their income mainly from agricultural activities, the land is distributed as shown in Table III.

LOCATION	0 ha	0 - 2 ha	2 - 4 ha	4 - 10 ha	More than 10 ha
CENTRE	2	2	2	2	2
LAGUNA	10	2	1	2	0
TOTAL	12	4	3	4	2

The day laborers:

The twelve persons in the category with no land are all day laborers employed in agriculture. Nine of them only receive their day wage. Of the other three, one is at the same time the local herb doctor, in whom people seem to have rather much confidence. However, for serious things, one has to see a doctor in El Tambo or Popayan. The second one is also

the local dentist, who only extracts teeth. The third one receives additional income from his three daughters, who work as house maids in Popayán.

Besides these three girls I only know two other people who have employment outside Cuatro Esquinas. One of them is working as a house maid in Cali, the other one is a schoolteacher, working in a nearby village.

With a day wage of $25, or even less, the incomes of the day laborers cannot be but very low. As they say: "a day wage is of no use for us, it barely keeps our families alive". A fair amount of day laborers do not have employment every day. Moreover, the bad weather conditions in the rainy months often prohibit any activity on the land.

Even for those who are able to save a little money and want to increase their income, opportunities are scarce. Those who do manage to save some money have, according to my opinion, four possibilities to improve their life conditions:

1) Sharecropping

They can try to find a partner who owns some land, but who is not able, for example because of lack of resources, to work his land or does not feel like working his land. If they find such a willing landowner, they may work on a cost-share lease basis with him. They both pay 50% of the variable costs. Each receives half of the profit. This is by far the most feasable and usual way of obtaining a higher income level.

The most suitable crop in this area for working on a cost-share lease basis, is cassava, being an annual crop. The other type of share-cropping, the output-share lease, which means that the share-cropper pays all the variable costs, does not exist in the area.

2) Renting land

In case they have at their disposal some more money than in case 1, they can try to rent a piece of land. However, renting land in this area is rather difficult because:

- the land is already scarce
- the landowners who have enough land to be able to lease a piece of land, refuse to do so. Why is difficult for me to say, but one reason may be that the landowner can insure a constant, cheap labor supply for himself. That is the reason why some of the bigger landowners, who only cultivate a part of their land, are very unpopular among those who are seeking land. Like they say: "the rich do not want the poor to have."

3) Buying land

It is hardly possible for a day laborer to save enough money to be able to buy a piece of land. Land prices vary considerably but at least $9000 per hectarea will be needed. Moreover, he cannot get credit. In case he has the required amount of money, the land scarcity is a severe obstacle for buying land.

4) Trading

After possibility 1, this seems to be the most feasible possibility, however, some people who wanted to start trading in little quantities,

told me that the already operating traders keep the trading sector closed for outsiders as much as possible. The most popular crop for starting to trade in, is plantain. Compared with crops like coffee or cassava, plantains require less money.

Migrating to the city is often considered as another alternative. As migration falls beyond the scope of this study, I shall not attempt to discuss.

After having briefly viewed the possibilities, it may be clear that is nearly impossible for a landless laborer to improve his life conditions. Therefore, I presume that in the future more and more landless people will be forced to migrate. I shall touch on this subject in the last chapter.

Although I do not know the exact percentage of landless day laborers in the countryside, from many talks I had with day laborers, I have concluded that also in the countryside a fair amount of people are landless laborers.

In the category 2 - 4 ha., one person is a sharecropper, a second one is partly landowner, partly sharecropper. In the category 4 - 10 ha., one person is partly landowner, partly sharecropper.

Some small farmers work on the land of other farmers in times that they cannot do any work on their own lands. Others regard this additional income too small and prefer to do some repairs for themselves or to do nothing.

Let us now have a short look at the sources of income of the 19 households which receive their income mainly from non-agricultural activities.

Households in the Centre:

1) The large intermediate trader in cassava starch, who also owns a cassava factory. A few months ago he bought 40 ha of land, which will enable him to enhance his future income.

2) The main shopkeeper. He owns by far the biggest shop in the village. He sells more than the other shopkeepers, due to his relatively great variety of wares. In addition, he has rented a 2-ha plot on which he grows cassava. The cultivation of the cassava is done by a sharecropper on a cost-share lease basis. He also intends to start growing onions this year although they are not yet cultivated in this area. When I asked him the reason why, referring to the risk involved, he replied: "I like to invest my money in something new." In a few years, after having saved enough money, this family hopes to be able to start a living in Popayán.

3) The local pub owner. Having formerly been a farmer, he started the pub three years ago. When I asked him which he preferred, farming or having a pub, he answered the same way the shopkeepers did, namely that the pub (or the shop) supplies income every day and all year around, whereas agriculture provides revenues only in certain periods of the year. Besides, his wife sells meals on Fridays and Saturdays. He also lets a little house.

   This family too is hoarding money in order to be able to leave for Popayán in a couple of years.

4) The small intermediate trader in cassava starch. He is also the only trader in coffee who lives in the village. He also lends money every now and then and owns 3.5 ha of land.

5) The son of the small intermediate trader. He recently started trading in coffee as well.

6) The local policeman. To obtain additional income his wife sells vegetables and fruits. Moreover, he owns 2 ha of land.

7) The local inspector. He is living on his own and receives his monthly salary.

8) The jack-of-all trades. He is a landless laborer. He builts houses, paints, makes repairs, etc.

9) A widow who earns very little money by trading in plantains on a very low scale.

Households in La Laguna:

10) An owner of a cassava factory. He also owns a shop in which his wife is working and he owns a bus of the transport cooperative in El Tambo and some land.

11) A trader in plantains. He also rents 3 ha of land and his wife sells meals on Fridays and Saturdays.

12) The local carpenter. His wife owns 0.5 ha, planted with coffee.

13) A policeman without additional income.

14) A household of two friends, who are the local tailors.

15) The secretary of the inspector. He also receives his monthly salary.

16) A road worker earning his monthly salary.

17) A widow who washes clothes.

18) A widow who makes mats, brooms and string bags.

19) A housepainter who was unemployed during the five months of my stay in the village. His wife washes clothes in order to be able to feed the family. They also lease a room.

I am aware that I have referred only to the sources of income of the heads of the household. In a few cases children's work increases the familys' incomes; however their contribution is relatively small. Therefore, I consider the above mentioned sources of income as representative for the income position of the household.

From this list we can see that of the nineteen households only few better-off people were and are able to differentiate their economic activities in order to obtain additional income (households 1, 2, 3, 4, 6, 10, 11). In some cases the desire to leave for the city might have been an impulse to differentiate the economic activities.

A short remark may be made on the division of labor between men and women in the village.

As most farmers have their lands outside the village and as there is hardly any tillable land in the village itself - for instance behind the houses - most households lack subsistence plots, in contrast with the farms in the countryside. So there is hardly no talk of working on the subsistence plot, mostly the woman's job. In general, one may say that the majority of the women fill their days with cooking, washing clothes, and looking after the children. They also take care of the poultry. Those cases in which the woman has other activities to do have

already been mentioned in the list of the 19 households with mainly non-agricultural incomes. The spare time of the women is mostly filled with visiting other women and chatting.

After this short outline of the various economic activities, I summarize them as follows:

- Although agriculture is the main economic activity for most people (57% of the households) the number of people who receive their income mainly from other activities is also considerable (43% of the households).

- Big landownership is limited. Besides a group of small and medium size landowners, nearly 50% of the heads of households with an income from agriculture are mainly day laborers.

- After agriculture, trading is the most important sector.

- The industrial sector - the cassava starch production - is focused in the countryside. Only for very few inhabitants of the village is this industrial sector very important.

- Cattle breeding is a relatively unimportant sector.

- Economic differentiation within the household is limited to a few families.

- For the majority of the people, the possibilities for creating other ways of earning an additional income are scarce.

One may already have noticed some obvious differences between the inhabitants of the centre and those of La Laguna. I shall deal with these differences in the next section.

THE SOCIAL STRUCTURE

Although during my field work I did not go very deeply into the social structure of the village, a few words can be said on it. Let us successively have a short look at the village and the differences between the centre and La Laguna.

The Village

Because of a lack of data I cannot stratify the village on the basis of income levels. However, a look at the occupational structure may teach us something. The only category of people of which I can say with certainty that they have low incomes, is the category consisting of the 12 landless laborers plus the households 7, 8, 9, 15, 17, 18 and 19. This 45% of the households earn an income between $400 and $800 per month. The other households form a rather heterogeneous category with a wide range of economic activities. Although of some it can be said with certainty that they belong to the better-off group of people, I do not have enough information to generalize.

On first sight the village seemed to me a quiet, peaceful place in which people live in harmony but I had to alter this view as I stayed longer in the village. Personal observations which changed my mind include the following facts:

- Some people do not go to the pub or a festival when they know that people they dislike are there.
- Expressions of displeasure of people trying to rent a piece of land towards people who refuse to lease a part of their uncultivated land are common.

- People with low incomes refer to others as "the rich"

- Among the women much rivalry and jealously exists. They gossip a lot, mostly focusing on the going off on the sly of married men.

People do not express these feelings of dislike in public. They only told me about their feelings in personal talks.

In short, I can say that interaction takes place most frequently between people with more or less the same economic position, relatives and people who need each other economically (e. g. the landowner and his sharecropper).

Interactions between those unequal economically are less. For those with low incomes the lack of economic resources is an impediment on such matters as drinking, eating, dancing, sporting, travelling to El Tambo and Popayán, etc.

The centre versus La Laguna

The first impression one gets, when one walks through the village for the first time is an outstanding difference in material things between the centre and La Laguna.

In the first place, the houses in La Laguna make a much more shabby impression than those in the centre. I verified this impression by counting the different types of houses, which resulted in Table I.

In the second place there are the differences in furniture and the way people are dressed, especially the children. These differences will, for a large part, be due to differences in economic position. Of the

low income group, five households are living at the centre, whereas 15 households are living in La Laguna.

When we look at the 19 households with mainly non-agricultural incomes, we can also see that the scales are tipped in favour of households in the centre. Explaining these differences is nearly impossible for me. The relative poorness of La Laguna may be related to the fact that La Laguna has been built during the last five years and is therefore the youngest part of the village.

It may be that people who formerly lived in the countryside decided to migrate to the village because of the push factors of the countryside (e.g. isolation and things related to that) and the pull-factors of the village (e.g. family living in the village, the school, shops, transport and trade facilities), even though they lacked sufficient resources to do so.

In analogy to the often disastrous effects of imigration to the cities, I view La Laguna as the "slum" of Cuatro Esquinas.

In accordance to what I said earlier, the large number of low income families in La Laguna manifests itself also in the way of interacting. I have the very strong impression that the inhabitants of La Laguna interact more with each other than with people of the centre.

CHAPTER III

THE AGRICULTURE IN CUATRO ESQUINAS

A HISTORICAL SKETCH

Until 30 years ago the main cash crop in the area was sugar cane. This sugar cane was used for the production of "panela" in the "trapiches".[1] Not only was panela the main source of cash income, it also formed a very important part in the daily diet of the people. Nearly everybody cultivated sugarcane and owned or leased a trapiche. The surplus of panela was transported by mules and horses to El Tambo. In El Tambo the panela was either sold on the local market or to traders from Popayán. Coffee was also cultivated, partly as a subsistence crop, partly as a cash crop, although in much lower quantities than at present. People cultivated plantains, bananas, maize, cassava and some fruits as subsistence crops.

About three decades ago people began to grow cassava as a cash crop. According to a very old farmer, this new way of cultivating cassava started in 1946. The first two men who started the cultivation of cassava in big quantities were from Pasto, the capital of the Department of Nariño. In Nariño cassava already played an important role in the existing agricultural system. One of these "Pastusos" not only introduced the cassava as a cash crop, but also introduced the use of oxen for ploughing. Formerly, the preparation of the soil was done by hand. Those who began to cultivate cassava in big quantities were mainly people from the Department of the Valle del Cauca and from Nariño.

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1 Panela is a form of unrefined sugar; a trapiche is a sugarmill.

As an old farmer said: "From the people of Nariño and the Valle del Cauca we learned how to cultivate and to eat cassava." Formerly, people grew some cassava plants between their other crops only for use in the household. Also, cassava became an important ingredient of "sancocho", the soup eaten daily in many homes.

After the initial steps were taken by the Pastusos people from other parts of the Department of Cauca followed their example. Those wo started to grow cassava as a cash crop were relatively wealthy people, probably because only these people could afford the risk and uncertainty that are involved in starting something new. During these first years only a small part of the native population adopted the cultivation of cassava as a cash crop. The majority of the people continued to grow their cassava as before. This meant in small quantities and only for family needs. However, the basis for a new imported cash crop had been laid.

As years passed by, more and more people started to see the profits of the cassava cultivation and changed from sugarcane to cassava, some in a small way, others in a large measure. I asked some older inhabitants of the region why they had changed to cassava. The main reason was that the benefits of the panela hardly compensated the time and costs of cultivating sugarcane and producing panela. On the contrary, the cultivation of cassava was much more lucrative. Besides this economic aspect, people were a bit tired of growing sugarcane. As they say, the cultivation of sugarcane is "trabajo duro" (hard work), whereas the cultivation of cassava is considered as "trabajo ligero" (light work).

The surplus cassava, which was still small in those early years, was

transported to El Tambo by mules and horses, a six hour's trip to and from. In El Tambo the cassava was either sold on the local market or to buyers from Popayan and even Cali. Although this was the beginning of an expansion of the cultivation of cassava, it would nevertheless be many years until the cassava would become as important as it is today.

In addition to the reasons already mentioned, the cultivation of cassava has been stimulated mainly by the following factors:

1) The introduction of the small cassava factories, in which the cassava is processed to starch.

2) The construction of the road between El Tambo and Cuatro Esquinas.

3) The increase of the population.

Ad 1). About 20 years ago,[1] a man from Palmira[2] built the first cassava factory very close to what is now the village of Cuatro Esquinas. According to many people, Palmira is the birthplace of these small cassava factories. The cassava factories soon began to be a very important market for cassava. The constant demand for cassava considerably stimulated its production. People also did not have to go all the way to El Tambo to sell their cassava. Moreover, selling to the cassava factories was much more profitable for the farmers, compared to selling in El Tambo.[3]

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1 People don't remember the exact date, but a safe margin seems to be between 1954 and 1956.

2 Palmira is located at a distance of 25 km northwest of Cali, capital of the Department of Valle del Cauca.

3 See the paragraph on marketing in Chapter IV

It has been during the decade after the introduction of the cassava factories -- more or less between 1955 and 1965 -- that the majority of the farmers cut down their sugarcane and started to cultivate cassava instead.

Ad 2). The construction of the road between El Tambo and Cuatro Esquinas --ten years ago -- consisted of widening the muletrack and a little improvement of the road surface. The road is still unpaved and turns into a brook when it rains.

However, it enhanced the accessibility of the isolated area. On one hand, it became possible for the people to travel and to transport their products to El Tambo by bus or jeep and it also became easier for them to make use of the services found in El Tambo.

On the other hand, it meant that the buyers of products -- namely cassava, coffee and plantains -- could penetrate into the area itself. Related to the cassava factories, the construction of the road meant a considerable improvement of the investment climate. Most cassava factories have been built during the last decade.

Ad 3). As a third important factor, we can mention the population increase, which meant a considerable expansion of the cultivated area, mainly with cassava.

THE PRESENT AGRICULTURAL SITUATION

Cuatro Esquinas is located in a temperate zone. Because of differences in altitude, the area near El Tambo is a cold zone, the area south of Cuatro Esquinas (near the village of El Puente) is a warm zone.

People do not divide the year into different seasons. When the weather is nice, they say it is summer; when it rains, they say it is winter. However, one can say that there are two rainy seasons: February through May and September through December.

As Chapter IV is dedicated to the cultivation of cassava, I shall present in the following section a short description of the other crops which are cultivated in this area.

Coffee

Besides cassava, coffee is the other most important cash crop. Although coffee has traditionally been more important than cassava, the economic relevance of the two crops may nowadays at least be called equal.

Only very few people select the seeds of the coffee. The majority of the farmers select the seedlings when they are about 50 cm high. No chemical technology is used in growing coffee. The weedings, in August and January, are done by hand. The fact that not all the laborers weed carefully often results in damage to the roots of the coffee tree. I met one farmer, who, because of this reason, cuts the weeds with a "machete" (chopping-knife) just above the surface of the soil.

Though this method is more labor intensive and requires more weedings, he said that since he has practiced this method his yields are considerably higher than before.

The most common shadow trees are plantains, bananas, "guamos" and "cachimbos". The plantains and bananas have the advantage of bringing in money, themselves, in contrast to the other two types of trees.

Years ago there was only one big coffee harvest, in March and April. During recent years, people have also harvested a big quantity in December. According to the growers, this shifting has been caused by changes in climatological conditions. They expect that in the future the harvest in December will yield more than the harvest in March and April. At this moment the two harvests yield about the same quantity.

Harvesting is mostly done by day laborers. Growers rarely pay per amount of harvested coffee because, in this case, harvesting is done carelessly. Because of the coffee harvest, March, April and December are peak periods in the demand for labour. In those periods many people from other parts come to this area. Even then, however, many farmers have a shortage of labour. Because of this scarcety some coffee farmers offer better food and pay a few pesos more than others in order to attract enough labourers. The average day wage for harvesting coffee is $20.

The harvest in this area is a time consuming job, because:

- rainfall is often heavy during harvest time, making the steep slopes very slippery;
- the trees are mostly pretty high; and
- if weedings have been poorly done, the tall weeds obstruct the work

For these reasons the amount harvested in one day by one person is usually very small, and therefore, the costs of harvesting are high. The shortage of labour, the frequent bad weather circumstances and the other factors mentioned result in very big losses sometimes. It is not uncommon that half of the harvest is lost because the coffee falls off before it can be harvested.

Another important problem is the worsening soil fertility. People told me that ten years ago the yields per hectarea were four to five times bigger than at the moment! The need for fertilizer is felt by many, but lack of capital is a severe impediment.

As far as I know, nobody receives credit from the Agrarian Credit Bank for buying fertilizer.

Marketing.

Although the Federation of Coffegrowers in El Tambo pays more for the coffee than the traders do, most people sell to traders for the following reasons:

- The Federation buys only coffee of very good quality, as this coffee is exported. Large part of the yield is often affected by the weather and therefore not accepted by the Federation.
- The Federation only accepts very well dried coffee. This helps to partly lower the price difference between the Federation and the traders, as more weight can be sold to traders, who accept coffee that is not well dried.
- Selling to the Federation means extra transportation costs.

The bulk of the coffee is sold to intermediate traders. Some traders work on their own account; others trade jointly with someon who supplies them with money. This way of trading is called the piquero system. A piquero is an intermediate coffee trader who buys with someone else's money, in most cases a wholesaler. The piquero buys coffee on the various local markets. He earns his money in two ways:

- He pays less for the coffee than the wholesaler pays to him
- He also receives a commission from the wholesaler

I was told by some farmers that some piqueros smuggle with weights of their balance.

The coffee market in Cuatro Esquinas is mainly in hands of three intermediate traders:

- A man living in Cuatro Esquinas[1]. At the same time he is the small intermediate trader in cassava starch (see the paragraph on the marketing of cassava starch).
- A woman from Popayán. She is also one of the two large buyers of plantains. She owns a house in the village, which she uses as a storage room and she also owns a truck.
- A woman from El Tambo. She transports the coffee by bus or jeep. Every now and then she lends money.

The trader in Cuatro Esquinas works partly as a piquero, partly on his own account. He does not condition the transaction between farmers and himself by giving credit. Instead, he sometimes has to borrow money from other people. From the coffee he buys on his own account, he sometimes selects and dries a certain amount in order to sell it to the Federation, but only when he considers the price offered by the Federation more lucrative than the price offered by others, who are mostly wholesalers. During my stay he paid an average of $320 per 12,5 kg, which he then sold for $340 - $350. Besides being a piquero, he obtained his commission of $4 per 12,5 kg from the wholesaler.

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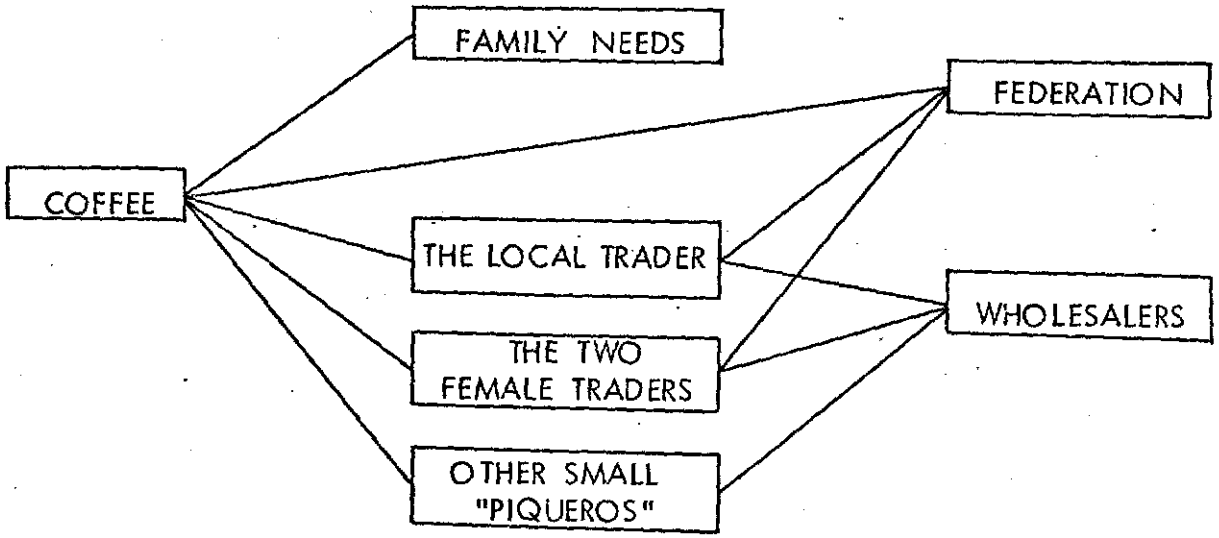
[1] I do not count his son, who only recently started to buy coffee.

I was also told that sometimes the other intermediate traders, select, dry and sell coffee to the Federation. That part of the coffee that is not used for family needs nor sold to the above mentioned traders or the Federation is sold to other small intermediate traders, mostly piqueros.

Schematically, we can represent the marketing of coffee in Cuatro Esquinas as follows:



Plantains.

Following after cassava and coffee, plantains are the most important crop. If plantains are the only cultivated crop, the plots are small. The majority of the plantains is found on the coffee fields, where they serve as shadowtrees. One also finds plantains on every subsistence plot, but even households that lack a subsistence plot have a few trees around the house most of the time.

Although from a purdy economic point of view cassava and coffee are far more important than plantains, the relevance of the latter for small farmers

should not be forgotten. They are important because of, as I call it, their "facility" by which I mean:

- plantains are an easy crop to cultivate;
- the trees produce for a few years; and
- plantains have a big advantage compared with cassava and coffee, for in contrast with those crops, which are harvested respectively once and twice a year, plantains can be harvested year around.

As large quantities are eaten daily in the household, its importance as a subsistence crop is clear. The fact that people can sell some plantains every now and then secures them of a small but regular income. Also, in case of a sudden cash need, people can sell some plantains. Especially for low income families, without any cash reserve, plantains are very important.

Marketing.

The greater part of the plantains is sold on Fridays on the local market. In fact, the selling and buying of plantains is the only important trade on the market in Cuatro Esquinas.

Most of the plantains are bought by two women from Popayán. One of them has already been mentioned as a trader in coffee. In addition to Friday, they also trade in this area two other days of the week.

Two more intermediate traders buy lesser amounts of plantains. One comes from El Tambo and trades in the area twice a week. The other one is living in La Laguna. Because of a lack of capital he does not buy as much as he previously did. Moreover, there are four small intermediate traders

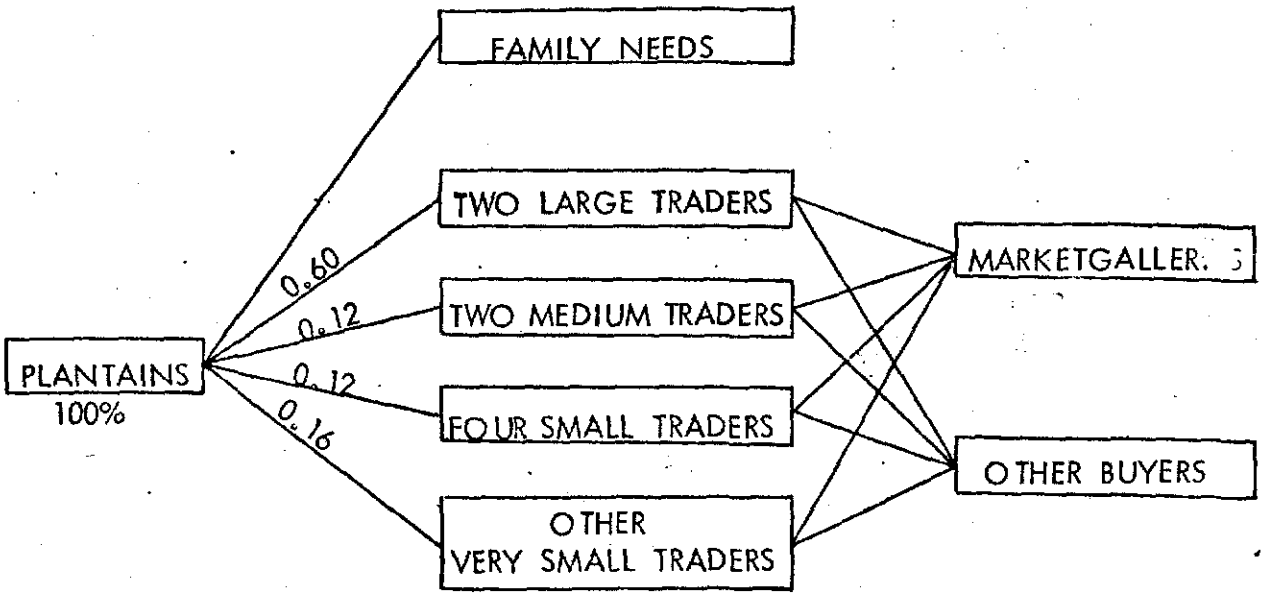
coming from elsewhere and finally, there are some very small intermediate traders, living in and near Cuatro Esquinas.

It is good to repeat that the trade in plantains is one of the best alternatives for raising incomes of people with little or no land.

The traders mainly sell the plantains to salesmen in one of the three market galleries in Popayán. The remainder is sold to buyers in Popayán who transport the plantains elsewhere, for instance to Cali.

The average selling price during my stay in Cuatro Esquinas was $220 per load of 125 kg. Plantains were resold in Popayán for $300 per load. Costs for the traders are $15 per load (transport, the porter and the admission to the market gallery). Profit per load is thus about $65. During the last summer the price was much lower, averaging $125 per load.

From my observations of the average amount of plantains bought by each trader per week, an approximate representation of the marketing of plantains is as follows:



As I do not know the total amount used within the family, I only mention the percentages as related to the marketed surplus.

Bananas.

The amount of bananas cultivated in the area is much less than of plantains. Plots with only bananas do not exit. While most of the time bananas are used as shadowtrees for coffee, sometimes one finds bananas on the subsistence plot.

People prefer to cultivate plantains because of their much higher use value, Compared to bananas, plantains offer far more alternatives for use in the household and therefore the demand for plantains is, in the countryside as well as in the cities, much bigger than the demand for bananas. As a cash crop bananas are also worth less, $60 per load of 125 kg. The marketing of bananas is in the same hands of those who control the plantains markets.

Maize.

Maize is almost always cultivated only as a subsistence crop. Only in case of an urgent cash need is some maize sold. There are two yields per year. The maize is sown at the beginning of the rainy months -- first time in September and a second time in February. There is only one weeding, about three weeks after the sowing date. Sometimes the maize is intercropped with either cassava or beans. No chemical technology is used. After about three months people being to harvest little quantities. People prepare the corns, which are still very soft then, in many ways. At this early stage, however, the maize deteriorates rather quickly and cannot be stored. Only after five months, when the corns are hard, is

the greater part of the maize harvested and stored. Maize is either used for human consumption or as feed for the poultry. People consider maize too expensive for feeding to the pigs. Byproducts of the cassava starch production are available as cheap alternatives to feed to pigs.

Beans.

Beans are also mainly cultivated as a subsistence crop. There are two yields. The first crop is sown at the end of September, weeded a month later and harvested in December. The second crop is sown in February, weeded a month later and harvested at the end of April. The beans are only grown as an intercrop, either with cassava or maize. No chemical technology is used.

Sugarcane.

Though sugarcane was formerly the most important crop in this area (see previous section), only a few people still cultivate it in little quantities. Raw sugar is extracted from the sugarcane in little mills and the greater part of this raw sugar is used for family needs. Sometimes, people feed cane to horses and oxen as a source of energy. Only a very small part of the crop reaches the market in El Tambo.

CHAPTER IV

THE CULTIVATION OF CASSAVA

A GENERAL INTRODUCTION ON CASSAVA

Cassava is one of the world's most important staple foods. In terms of calories per unit land area per unit time, cassava appears to be able to outproduce all other staple food crops. It has been estimated that cassava is the main food of approximately 200 million people (Cowsey and Haynes, 1970).

The tubers of the cassava plant are used extensively as a basic food crop by low-income families living in the humid tropics. The root is one of the cheapest sources of carbohydrates available to people although it contains very little protein.

The greater part of cassava cultivation is presently, and presumably will continue to be, under small-scale, traditional production conditions. It is mainly found on small plots and the bulk of the labour force , management and even the capital, are provided by the same household.

Output per farm is small. Frequently, a large part of the crop is utilized for individual family needs. Production in excess of family needs is sold or exchanged at local markets, or sold to intermediate traders.

Where cassava is produced commercially, the products of the plant are utilized in local industry and are also exported to foreign markets. It is utilized as a grain substitute in human and animal diets, primarily in the form of flour and dried chips.

There is still very little known about the agricultural system and the decision-making process of cassava farmers in different areas. Great deal of socio-economic research will have to be carried out on the farm level. There are three important reasons why more research is necessary.

- All over the world many attempts to improve the life conditions of a small farmer, for instance by means of better credit facilities or the introduction of technical innovations, have not been successful because of a failure to pay attention to differences in the agricultural system and the decision-making process among these farmers.

- There will be a growing demand for cassava in the future, it it maintains its relative position in the increasing demand for food. Colombia is identified as an area of potential cassava shortage. If a cassava shortage is to be avoided (if no alternative sources of carbohydrates become available) then cassava production should be stimulated.

- As cassava production is expanded and prices decrease, new markets for cassava are likely to be economically feasible (e.g. the development of the European and Japanese market for cassava can be affected by price changes).

Cassava occupies a considerable area in Colombia (Figures I and II). Yields are low, and little improvement has been noted in the last ten years (Figure II). Production increases have resulted almost exclusively from expanded areas. A linear trend for area planted to cassava shows an annual increase of 3,760 ha (Figure II).

LAND TENURE

Cassava is mainly found on small plots, with most plots ranging between 0.5 ha and 2 ha. Only few plots are bigger. Thus, most of the small sized and bigger cassava farmers cultivate more than one plot.

Concerning the relation to the land, in my sample of 27 farmers, 16 farmers are landowners, 9 farmers are sharecroppers and 2 farmers rent land.

Of the nine sharecroppers, four also own land cultivated with cassava.

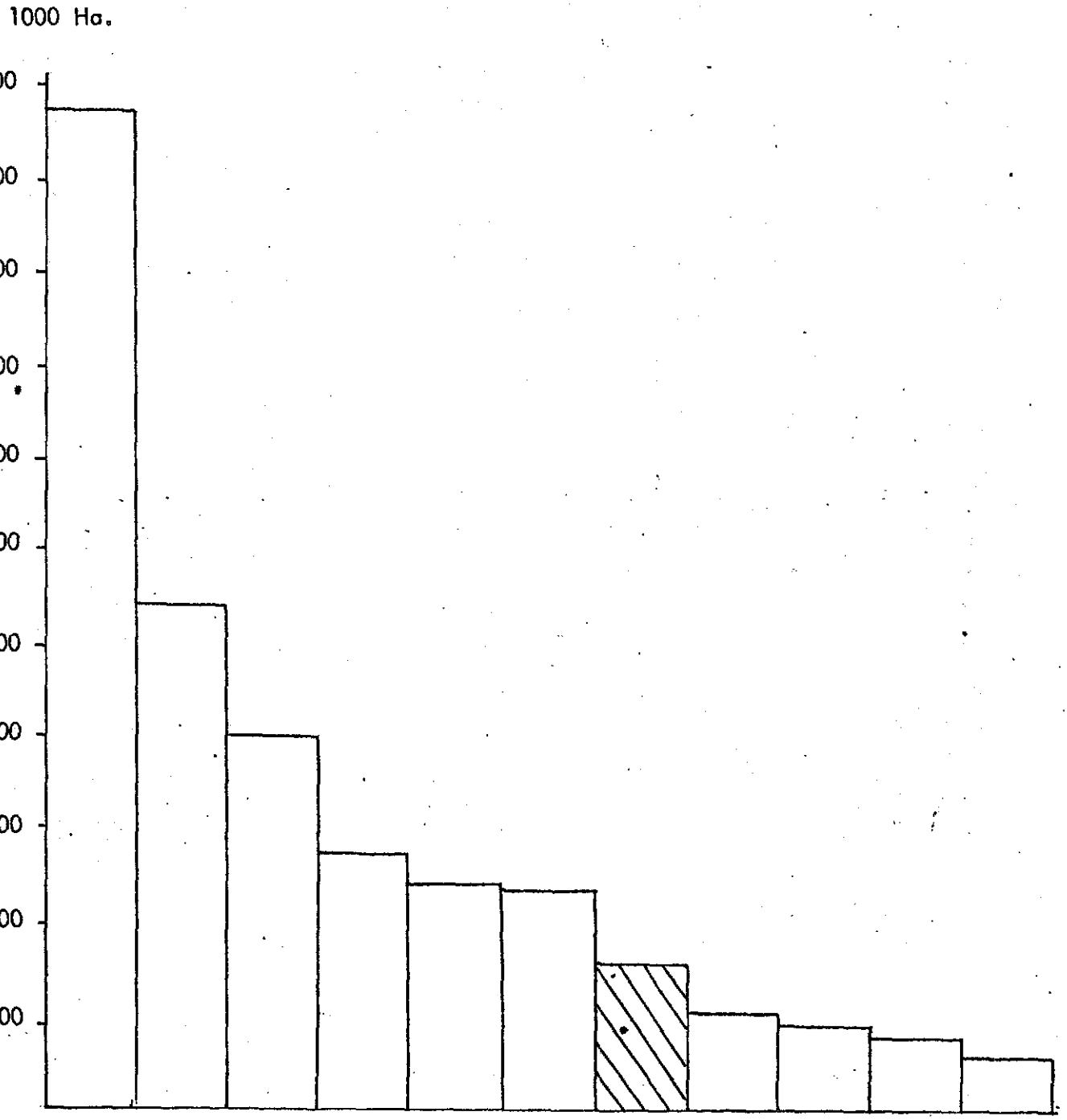
The fact that sharecropping is a rather common use, may result from the following:

- cassava is the only annual cash crop in the area
- for day laborers it is a possible way of reaching a higher income level (see Chapter II).
- given the scarcity of land and the difficulty of renting land, it is a possibility for landowners to expand. Examples are the four cassava farmers, who are partly landowners, partly sharecroppers. In addition to the nine sharecroppers, two other farmers already owned land planted with other crops (mainly coffee) and started to grow cassava on a cost-share lease basis.

PREPARATION OF THE SOIL

In the last decade the length of the fallow period has shortened considerably. Where it was common ten years ago to keep land as woods for five to six years, now the average duration of the fallow period is three years, and

FIGURE 1. *Area grown with 11 major crops in Colombia, 1972*



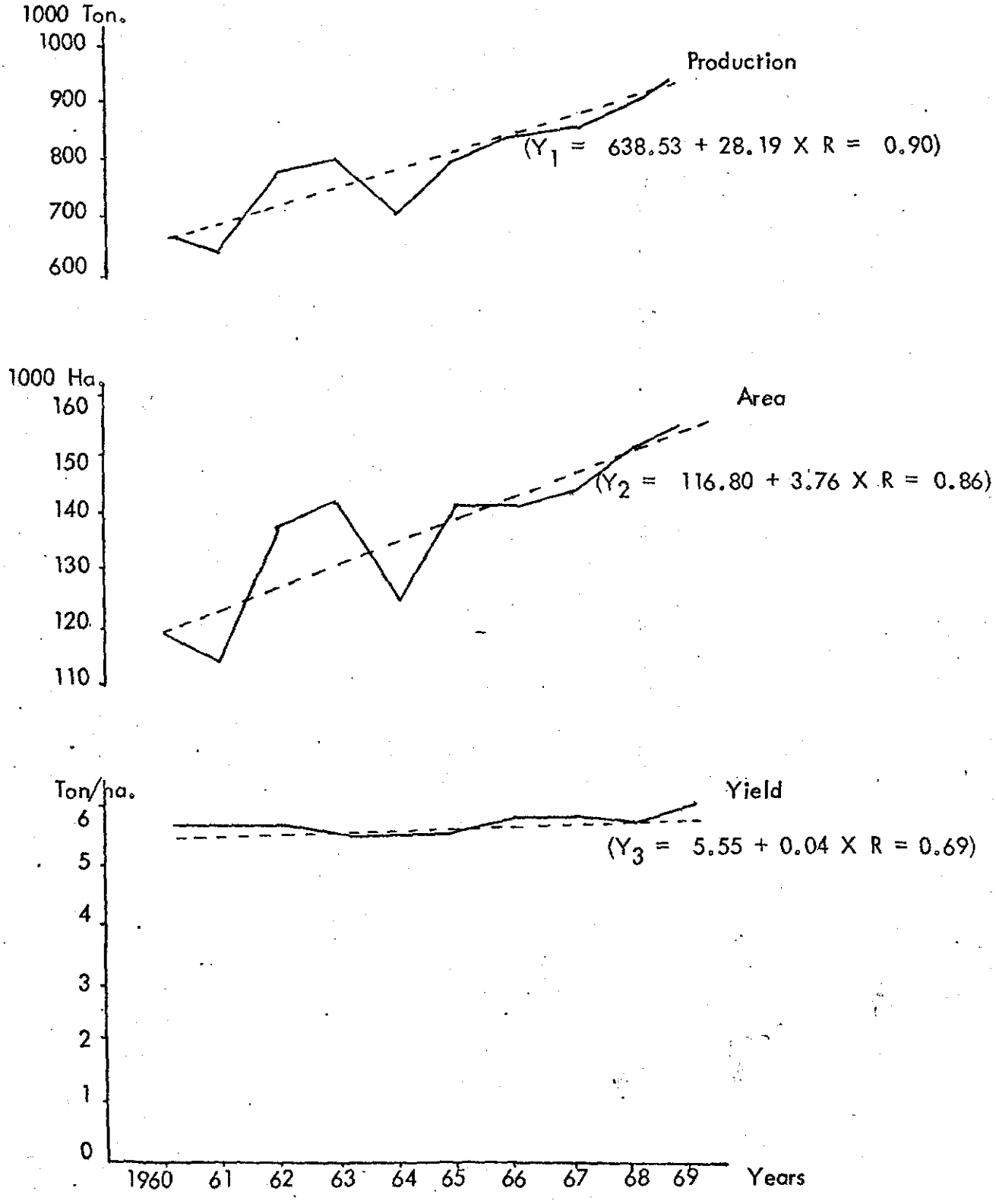
1/ Data from 1970

2/ Data from 1970

3/ Data from second semester of 1971 and first semester of 1972.

Source: Programas Agrícolas del Ministerio de Agricultura. Oficina de Planeamiento del Sector Agropecuario, Bogotá, Colombia. January and December, 1972.

FIGURE II. The trend in Production, Area and Yields of Cassava 1960 - 1969.



Sources: Programas Agrícolas del Ministerio de Agricultura. Oficina de Planeamiento del Sector Agropecuario, Bogotá Colombia, December 1972. p:204

L. Jay Atkinson, Changes in Agricultural Production and Technology in Colombia. U.S. Department of Agriculture, Economic Research Service in Cooperation with the Ministry of Agriculture and the Central Planning

sometimes even less. Worsening of soil fertility is the result of this change.

The first step after the fallow period is to cut down brush and woodland with machetes. The woody material is either burned or piled at the edge of the field, where it rots. The smaller weeds are left on the field as they are good manure. They are mixed with the soil during ploughing. After this initial manual land clearing, the soil is ploughed with oxen.

The majority of the farmers grow three consecutive crops of cassava in the same field. Hardly any farmers practice crop rotation. Some plough the soil with oxen for every crop,others plow only for the first crop after the fallow period. In the latter case they prepare the land manually for the second and third crop.

Mechanical land preparation seems out of the question because of the bad accessibility of the fields, the often steep slopes and the usually rough surface of the fields[1]. Because of the great difference in physical conditions of the fields, the time and costs needed for ploughing 1 ha vary considerably. On an average, I found that the ploughing of 1 ha takes eight days and costs $1.500. The $1.500 includes the rent payment for the oxen and paying of the two labourers, one leading the oxen, the other one steering the plough.

There are about eight families that possess osen in this area. For them ploughing, which is mostly done by contract, is a nice additional income. The average costs seem to me to be rather high. Therefore, aside from the physical impediments, mechanical land preparation may well be economically feasible.

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1 I only know one farmer in the area who used a tractor for preparing a 2-ha plot.
This plot is located along the road and the surface is rather even.

Formerly the farmers preferred to prepare the soil in July and August. In these dry hot months the cut weeds and brush wither quickly and are easily absorbed by the soil when the first rain starts to fall in September. Moreover, preparing the land in July and August means that the crop can be sowed in September. The first rainfall stimulates a rapid growth of the young seedlings. This habit was abandoned when the cassava factories were built. They created a constant demand for cassava during the whole year so farmers have to spread the sowing dates of cassava in order to meet the daily needs of the cassava factories. Nevertheless, July and August are still the most popular months for land preparation and September and October for sowing.

SOWING

Although they prefer to sow in September and October, farmers say that "the cassava can be sown in every month of the year." The cassava is sown with the new moon, which according to the farmer, has a positive influence on the growth.

The fact that cassava can be sown in every month of the year has the advantage that if necessary, the farmer can turn the sowing date of cassava to his other crops. Some other crops, like coffee, corn and beans, must be sown in certain periods of the year. Thus, he can spread his labour input, which may save him money. If the farmer practices intercropping, he can adjust his cassava practices to the requirements of his intercrops.

Planting material is obtained from the previous crop. The stem is cut into stakes of 10 - 15 cm, which are planted in little holes. The cassava

is never planted on ridges. The planting distance is about 1 x 1 m which provides a plant population of about 10.000 plants/ha. If the first seedlings do not grow well, some farmers consider it worthwhile to replant. Using a bigger or smaller planting distance depends on:

- The farmer's perception of soil fertility. As most farmers are aware of the rapid worsening of soil fertility - not only at long notice - one could expect that the planting distance of the second and third crop increases. However, this does not seem to happen.
- The accuracy of sowing
- The practicing of intercropping

Nowadays people have to buy their planting material for the first crop after the fallow period. Good planting material is already scarce in the warmer zone around El Puente, south of Cuatro Esquinas, because many cassava plants are affected by a disease called "Cuero de Sapo" (frog skin root disease). People expect that this disease will also affect cassava in their area in the future. At the moment, the amount of affected plants is still limited in the area. Nevertheless, people are scared to buy planting material from a field in which some affected plants were found, especially because they do not know whether it is a disease of the plant or the soil. The result is a rise in prices of planting material.

The old farmers especially complain of the "capitalizing of human conduct". In former days, planting material was given to neighbors, relatives and friends. Farmers now think that especially at this time when people do not know if the planting material is infected or not, they should help

each other even more. Some farmers consider it a shame that in particular the richer and the younger farmers take advantage of the situation by raising the price of planting material.

WEEDING

Weed control in cassava is done by hand. Most farmers weed thre times during the growing cycle, at about two weeks and three and six months after the sowing date.

Cassava's relatively high resistance to weeds makes it possible if necessary, for a farmer to postpone a weeding. Thus he is able to spread the required labour input during the growing cycle. Most times the weedings are performed by hired day labourers but in some cases it is done by contract. Weeding is heavy work, especially during the rainy months when the weeds grow fast and the soil is wet.

THE USE OF CHEMICAL TECHNOLOGY

Like the use of mechanical technology the application of chemical technology is very limited.

Insecticides.

The application of insecticides is the only chemical input in the area. Prices of insecticides are low. One applies the insecticides with a back-pack sprayer.

Herbicides.

No one uses herbicides for cassava for the following reasons:

- It is not at all certain that a change from manual weed

control methods to chemical control would have a significant impact on yields[1].

- Assuming an average labor use for manual weed control of 45 man-days/ha, substitution of chemical control for manual weed control, would reduce labor requirement to about 42 man-days/ha. Figure III shows the relation between the use of herbicides and labor saving[1].

- With a present daily wage for weeding of $20 in the area, a substitution of chemical for manual weed control seems very unlikely. However, an increase in the wage-herbicide price ratio could result in an increase of herbicide use.

Apart from these rather objective reasons, more subjective reasons are:

- The farmers do not know if the use of herbicides increases production or not.

- If they do believe that herbicide use increases production, they do not know in which measure it increases.

- Some farmers think that the application of herbicides may decrease production instead of increasing it, because they believe that herbicides damage the quality of the soil.

- They do not know how to apply herbicides properly.

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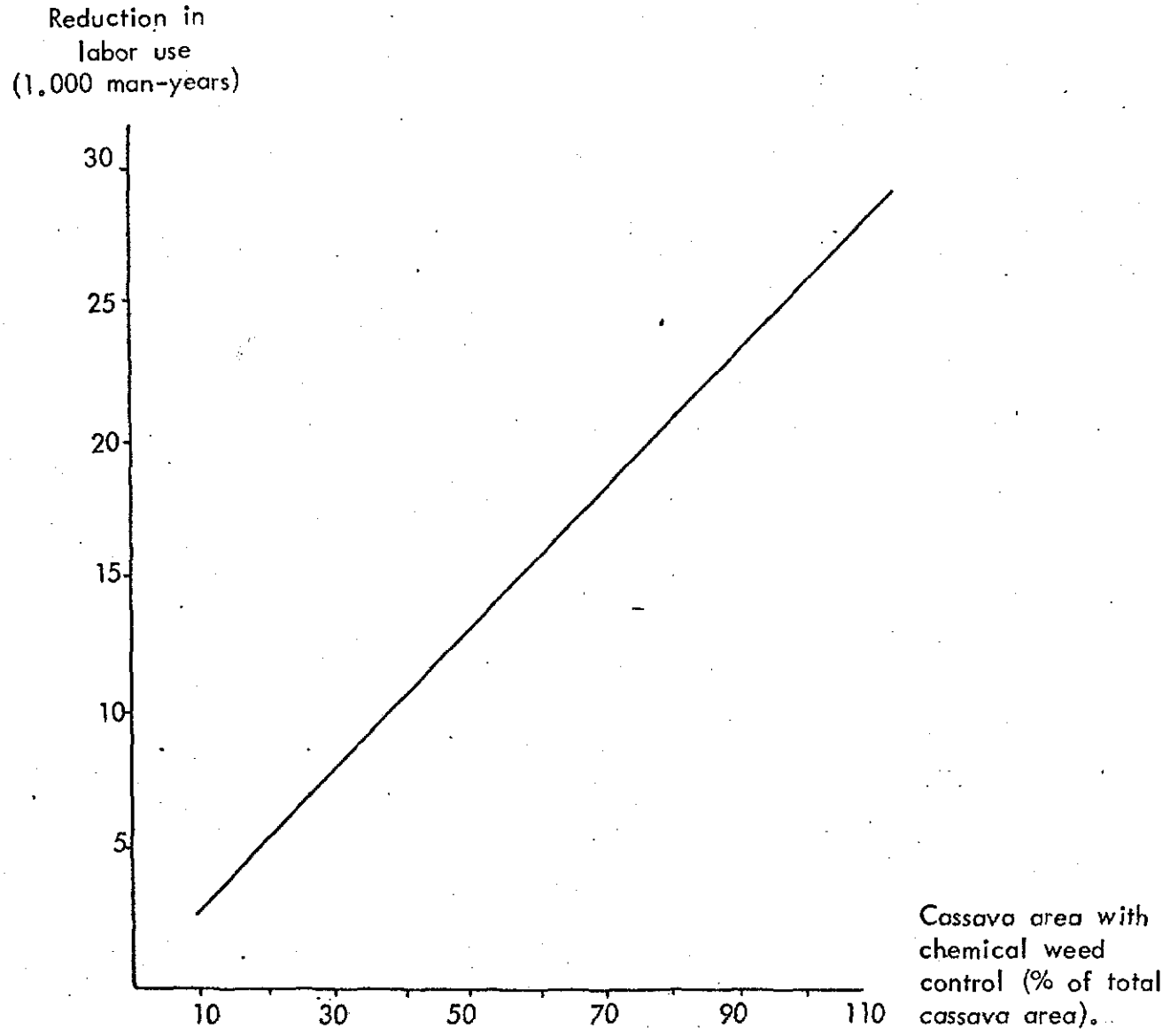
1 "Present and potential labor use in cassava production in Colombia", by Per Pinstrup-Andersen and Rafael O. Díaz, 1973.

FIGURE III. The effect of chemical weed control on labour use in cassava production in Colombia.



Source: Present and potential labour use in cassava production i Colombia, by Per Pinstrup-Andersen and Rafael O Díaz, Cali, Colombia, 1973.

Fertilizers.

As I already knew that fertilizers are not used in this area, an analysis of the differences between adopters and non-adopters (e.g. differences in ecological conditions, in economic positions of the farmers, in qualities and views of the farmers) was out of the question.

Because the introduction of fertilizers is often regarded as one of the measures for increasing production, it seemed interesting to me to analyze which factors preclude the use of fertilizers at this moment and under which conditions the farmers would be willing and able to adopt the use of fertilizers.

Regarding the precluding factors, I found in various literature the common factors such as:

- My father and grandfather did not use fertilizers either.
- Lack of capital.
- Feelings of insecurity. People do not know how far the use of fertilizers increases the production[1].
- The lack of knowledge about applying fertilizers.
- The belief that on steep slopes the fertilizers will be carried away by the rain.

To create favorable conditions for the introduction of fertilizers it may be necessary to create better credit facilities for the farmer, provide simple technical assistance, lay out a demonstration field, etc.

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[1] Some years ago one of the bigger farmers used fertilizers on a 2 ha plot. For one reason or another his production decreased. This event had a negative demonstration effect and intensified the feelings of insecurity of many people.

On the other hand, I also found factors which appear to be prohibitive for the use of fertilizers. These factors are related to the production of cassava starch in the small cassava factories:

- In case fertilizers are used, the cassava contains relatively more water and less starch (dry matter).
- The starch weighs less if fertilizers are used.
- The "mancha" does not separate well from the starch during the sedimentation process (see Chapter V) if fertilizers are used. This consequently affects the quality of the starch.

Though I do not know if these effects from the use of fertilizers are scientifically proven, they are at least considered to be true by the farmers and particularly by some factory owners, based on their experience with fertilized cassava of the zone of El Tambo some years ago. Consequently, the factory owners do not buy fertilized cassava as it decreases the amount of starch as well as the quality of the starch and therefore decreases their income.

In my opinion, a further analysis, at least in this geographic area, of the conditions under which the farmers would be willing and be able to adopt the use of fertilizers is questionable.

HARVESTING

In this area cassava has a growing cycle of one year. Only in case of an urgent need of cash do people sell their cassava a few months earlier when it is still on the field. This action leads to not only a lower price, but also often loss of the planting material. The opposite ,

postponing the harvest, also happens sometimes. Cassava can be left in the ground for a long period. People sometimes postpone their harvest if they do not need the money at that moment. This has a saving function for it raises the price of the cassava as the tubers grow bigger. Farmers who cultivate more than one plot take advantage of this by sowing their plots at different times. Thus, they receive income several times per year, and they also minimize the risk of a bad harvest at any one time.

The farmers harvest their cassava in the following ways:

1) By hiring labour

2) by contract

3) by selling the cassava when it is still on the field

In the first case, the farmer supervises the harvest. According to the farmers, labourers do not work hard if they receive their day wage anyway. Also, sometimes harverters leave tubers in the ground. Harvesting is done by pulling the stem out of the ground and bringing out the attached tubers. If this is not done carefully, the tubers can break off the stem. Without supervision people do not dig out these tubers.

The second case of the farmer offering a contract for harvesting, is rare in this area.

The third harvesting method, selling the cassava when it is still on the field, became very common after the introduction of the cassava factories. Nearly always, the owners of the cassava factories buy the cassava when it is still on the field, instead of buying already harvested loads of

cassava. The factory owners are then responsible for the harvest. Buying the cassava implies a risk for the farmer as well as for the factory owner, as the agreed price may be either too much higher or lower than the price corresponding to the amount of cassava in the ground.

Although it is more profitable for the farmer to harvest the crop himself, because he almost always received a lower price for the cassava by selling when it is still on the field, he prefers the latter situation for at least the following reasons:

- It saves the costs of labour. This money saved can be used alternatively.
- It saves time, which can also be used alternatively.
- It saves the costs of transportation.
- He does not have to worry whether or not the harvest is done carefully.
- His wife does not have to prepare meals for the labourers, which saves time and money.

When factory owners buy the cassava that is still on the field, they usually have to hire labourers by contract for the harvest and the transportation of the cassava. Hardly ever is the cassava harvested at one time; each day the amount of cassava needed for the factory is taken from the field. This contrasts with earlier years when more cassava was sold to traders and therefore harvested at one go.

If in the future the Frog Skin Root disease (see Chapter VI) affects

more cassava, it is very likely that the risk involved in buying unharvested cassava might cause factory owners to buy only harvested cassava, the quality of which they can see at the time of buying.

CASSAVA AND INTERCROPS

Years ago farmers used to intercrop cassava more than at present. The main reason for this is that as cassava became more and more important economically, especially during recent years when prices went up considerably the intercrops started to seriously compete for income.

The most common cropping systems are: cassava - plantain ; cassava - maize; cassava - beans; and cassava - maize - beans.

Only in very few cases is cassava intercropped with coffee and sugarcane. In the cropping systems cassava - plantain and cassava - maize - beans, the planting distance increases.

As I mentioned earlier, the easy cultivation properties of the cassava plant enable people to adjust labour requirements of cassava to the labour requirements of intercrops.

MARKETING

Home consumption:

It is very hard to estimate the percentage of the cassava which is used for family needs, as every now and then people harvest some plants.

The local people do not evaluate cassava very highly as food. Plantains, potatoes and rice are generally preferred. Most people cultivate plantains but rice and potatoes have to be bought. I am told that in former days rice and potatoes were mainly eaten by those families who could afford to buy them while cassava was eaten more by the very low income families. This situation changed, especially in the last three years, because of the increase in the price of cassava as shown here.

	Price per 150 kg of cassava
1973	$ 150
November 1974	250
February 1975	325
July 1975—January 1976	400

The high price of cassava at the moment means first, if cassava is not given to them by relatives or friends who cultivate it, families who do not cultivate cassava themselves hardly can afford to buy it. Secondly, it means that the cassava farmers eat less cassava than before in order to be able to sell more. With this extra income they buy higher evaluated foodstuffs, for instance rice and potatoes.

The biggest portion of the cassava eaten in the household is used as an ingredient of sancocho,the daily soup, and less frequently it is eaten in boiled or fried forms. As a result of the above factors, I can say that at the moment the amount of cassava used for home consumption is small.

The marketable surplus:

I am told that in earlier years, when the supply of cassava was much bigger

than at the moment, a substantial amount of it was sold to traders and put on markets elsewhere, mainly Popayán and Cali. Another portion was bought by owners of cassava factories from Mondomo and Palmira. As the cassava became more and more scarce in those areas, it became worthwhile to buy it around Cuatro Esquinas. Now that cassava is also scarce in the latter area and hence expensive, only very little reaches outside markets.

Besides this scarcity factor, there are two other important factors why the farmers prefer to sell to cassava factories instead of to traders, even though the latter frequently pay a little more.

- The first factor is the possibility for farmers to sell their cassava when it is still on the fields;

- The second is the very important fact that traders only want to buy the big tubers, whereas factory owners buy everything According to the factory owners, little tubers contain relatively more starch than big tubers.

When one realizes that a considerable part of the harvest often consists of little tubers, it is obvious that farmers profit more when they sell to factory owners. Moreover they save time and costs when they sell to factory owners as they do not have to select the tubers. Thus, the bulk of cassava is sold to factory owners.

CREDIT

Only four farmers in my sample receive credit from the Agrarian Credit Bank.

The Agrarian Credit Bank lends $3,000 for cassava per hectare per year at an interest rate of 12% per year. If one thinks he will not be able to repay the loan after one year, the Agrarian Credit Bank may grant an extension of payment. This only occurs if the inspector of the bank, who comes to have a look at the fields, agrees with the reason the farmer gives for seeking the extension of payment (e.g. because of bad weather circumstances the tubers are too small at that time). During the installment of this payment extension the farmer cannot apply for another loan for another crop. The result is that sometimes the farmer is forced to do less than he wants to do. In order to avoid this situation it sometimes occurs that he borrows money from a friend or relative in order to be able to repay the loan of the bank. Right after repayment to the Bank he applies for another loan. With this money he often repays part of the debt to the friend or relative. This means that he can only spend part of his loan to the cultivation of his crop. This shortage of working capital often results in having to sell the cassava a few months before harvest.

People are not very content with the Agrarian Credit Bank. Among the complaints heard frequently are:

- The Bank refuses to lend money for buying land, though this is supposed to be one of its services. The reaction of the Bank to this criticism is: "The Bank does not have sufficient resources at its disposal to meet all requests. But whereas you were not able to buy your own land, others could. So be patient, the Bank does not forget you." [1]

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[1] Source: Almanaque Creditario 1975: Caja de Credito Agrario

- Because of its red-tape it takes a long time before one gets his loan. One has to go three times to El Tambo to arrange the loan. Because the time-lag between the first and third visit is often two to three months, it means extra expenses of at least $60 per visit (transportation, a meal in El Tambo, loss of time).

- It is almost impossible that a person will co-sign for another person as no one wants to take the risk of having his property seized.

It is very hard to get an exact idea of how many farmers receive credit from other informal sources, as most people are not very willing to talk about this topic. Some farmers told me that they received credit from friends and/or relatives. Others only talked about it in very vague terms. I know one money lender, a wealthy coffee grower, who lends money to at least seven persons at high interest, 8% or even more per month.

LABOUR INPUT, COSTS AND BENEFITS

Labour input:

As I do not have exact dates for the input of labour for cassava cultivation, the dates derived from the project "Descripción Agroeconómica del Proceso de Cultivar Yuca en Colombia" carried out by Rafael Orlando Díaz A. This investigation was conducted during 1974 and 1975 in five different zones in Colombia. Dates are given for the zone Cauca. In this Department his sample consisted of 62 farmers, of which 30 are living in the area south of El Tambo.

Table IV. Estimated labour use in the production of cassava per hectare. Average by farm size in zone Cauca.

Activity	Small 0 - 1.99 ha		Medium 2 - 9.99 ha		Large 10 or more ha		Total Weighted	
	Average	%	Average	%	Average	%	Average	%
Land clearing	2.3	2	0.5	1	2.9	3	1.4	1
Land preparation	47.3	34	25.6	29	28.5	28	33.1	32
Plotting	4.8	4	0.8	1	3.2	3	2.5	2
Planting	7.6	6	8.0	9	5.7	6	7.5	7
Hilling	0.0	0	0.0	0	0.5	0	0.1	0
Re-planting	1.0	1	1.3	1	2.5	2	1.4	1
Irrigation	0.0	0	0.0	0	0.0	0	0.0	0
Drainages	0.7	1	0.0	0	0.0	0	0.2	0
Fertilizers	1.0	1	1.6	2	0.8	1	1.3	1
Insecticides	5.9	4	4.6	5	6.7	7	5.3	5
Fungicides	0.0	0	0.0	0	0.0	0	0.0	0
Herbicides	0.0	0	0.0	0	0.0	0	0.0	0
Weeding	56.1	40	40.9	47	42.0	42	46.1	45
Pruning	0.0	0	0.0	0	0.0	0	0.0	0
Harvesting	10.1	7	4.4	5	8.0	8	6.8	6
Total	136.8	100	87.7	100	100.8	100	105.8	100

Costs:

Also from Rafael O. Díaz I have taken the following data. I have averaged the farm sizes 0 - 1.99 ha and 2 - 9.99 ha, which results in the following table.

Table V. Estimated variable production costs per hectare of cassava in Zone Cauca.

Activity	Costs (Col. $)
Land clearing	36.5
Land preparation	951.3
Plotting	73.1
Planting	203.6
Re-planting	29.5
Hilling	0.0
Irrigation	0.0
Drainages	9.2
Application of fertilizers	33.9
Application of insecticides	137.0
Application of fungicides	0.0
Application of herbicides	0.0
Weedings	1,265.9
Draining	0.0
Harvesting	189.2
Inputs	
Seed	122.1
Fertilizers	64.5
Insecticides	113.0
Fungicides	0.0
Herbicides	0.0
Transportation	106.2
Storage	0.0
Packing	20.4
Technical assistance	8.1
Total variable costs	3,363.5
If land is rented	1,050.9
If money is borrowed: interest on working capital	360.0
Total variable costs	$ 4,774.4

Benefits:

The average yield per hectare of the farmsizes 0 - 1.99 ha and 2 - 9.99 ha in zone Cauca is 4.245 tons. During my stay the average price of cassava per ton was $ 2.670. Gross income per ha is: 4.245 x $ 2.670 = $11.334. Net income per ha would be: $ 11.334 - $ 3.363 = $7.971. Net income per ha, if land is rented and money is borrowed would be: $ 11.334 - $4.774 = $6.560.

CHAPTER V

THE PRODUCTION OF CASSAVA STARCH IN SMALL FACTORIES

CASSAVA FACTORIES WITHIN THE EXISTING ORDER

The area near Cuatro Esquinas is the third area in south-west Colombia where small cassava factories exist. Factories originated in Palmira, where in the Thirties people started to extract starch from cassava on a small scale. When the cassava became scarce in that area, from constant demand for cassava by the factories and the worsening of soil fertility, owners had to look for other markets to buy their cassava. Other owners moved to the area near Mondomo, where they started to build factories. When the problem of scarcity became serious around Mondomo, there was a second shift to the area near Cuatro Esquinas[1].

More than half of the factory owners in the latter area are people from the Valle del Cauca. They were the first to start a factory, but when the economic profitability became clear some local people, that were in most cases wealthier farmers, took over their example.

In general, I believe that these people from the Valle del Cauca socially are not considered as outsiders. They mixed strongly with the native population by marrying women of this area.

Although in some cases the influence of the cassava factories has already been mentioned, it may be useful to summarize this influence

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[1] See Chapter III for other information regarding their history.

First, the factories meant a rapid transition from a subsistence orientation towards a market orientation for the cassava farmers. Related to this, in addition to the construction of the road between El Tambo and Cuatro Esquinas and the increase of the population[1], the area planted with cassava was quickly expanded.

They also caused a differentiation of economic activities. Though it seems incorrect to speak of a distinct class of entrepreneurs, they economically form a relatively well-off group.

The farmers have had to spread their sowing dates in order to meet the daily cassava needs of the factories.

The farmers can now, more than before, sell their cassava when it is still on the fields.

The farmers can also sell the little tubers, which are not accepted by traders for the commercial markets.

The factories among other things created a scarcity of cassava. This caused competition among factory owners and also among traders in cassava starch. This, in turn, meant a rise in price of cassava and cassava starch. By the big demand for cassava of the factories the amount of cassava sold to traders and transported to elsewhere became less.

The direct contribution of factories to employment is little. Mostly the members of the house are employed in the factory. Nearly always the "colador" is a hired labourer. Sometimes women are hired to peel the cassava. They have also not created any important forward and/or backward

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[1] Se also Chapter III

Linkages. The employment found in the harvesting and transportation are not specifically due to the existence of these factories. The trade is in hands of a small group of people from outside the area, meaning that a fair amount of the money surplus leaves the community.

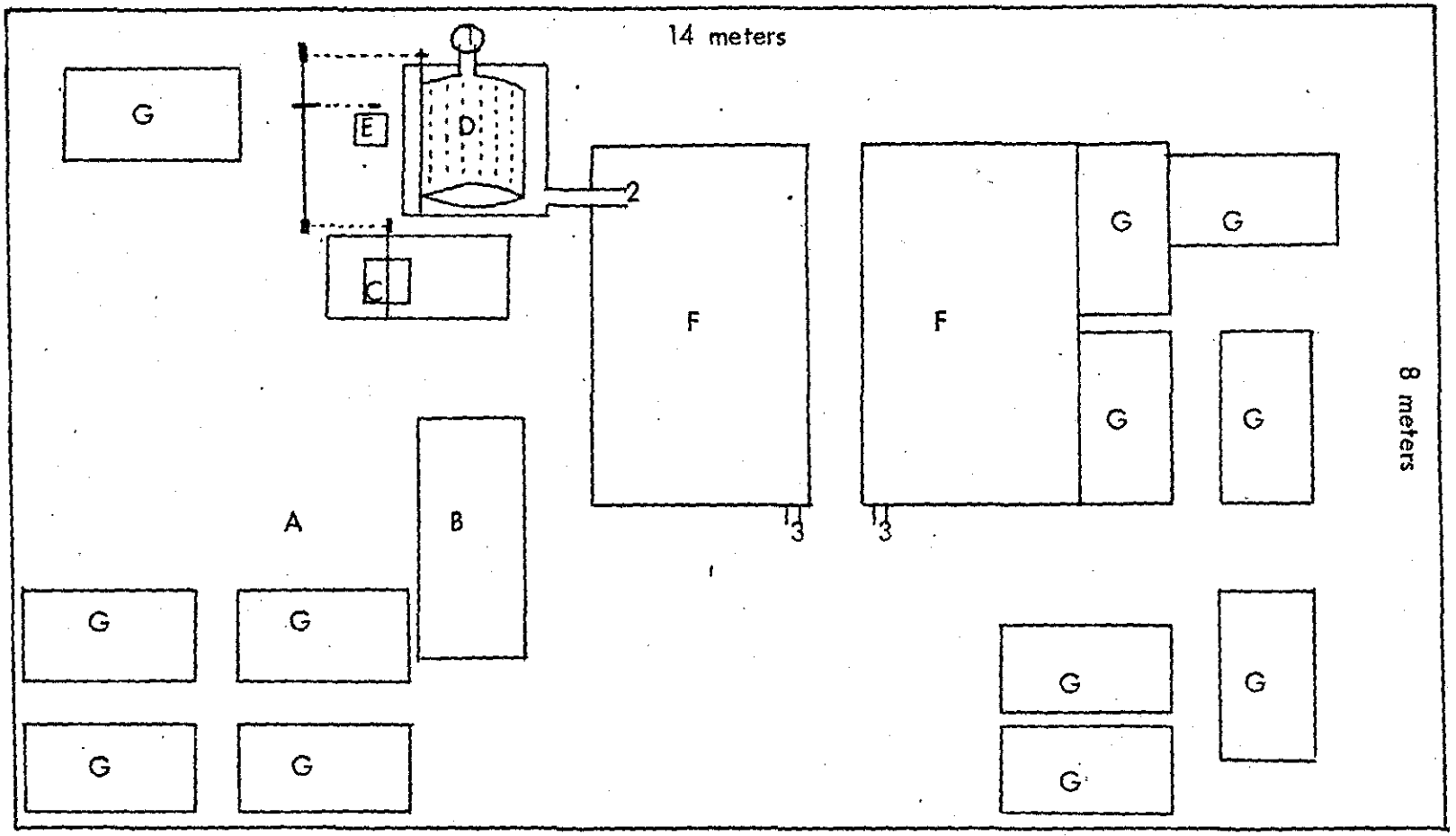
Extracting starch from cassava and even more the trade in cassava starch are viewed as the best commerce. As such they broadened the frame of reference of the inhabitants of the area. I met several young farmers, most of them very well acquainted with one or more factory owners, who would start a factory also, if they had get the chance.

THE PROCESS OF CASSAVA STARCH PRODUCTION IN SMALL FACTORIES

In the process of cassava starch production we find the following stages:

1) Peeling
2) Washing
3) Rasping
4) Straining
5) Sedimentation
6) Cleaning
7) Fermenting
8) Drying
9) Pulverizing
10) Packing
11) Stocking

MAP II. Ground-plan of a cassava factory



A. Place where the cassava is peeled
B. Washing-bank
C. Rasping-machine
D. Straining-machine
E. Petrol engine
F. Sedimentation-tank
G. Fermentation-tank
1) Barrel to put in "afrecho"
2) Wooden pipeline
3) Waste-pipe

1) Peeling

The peeling of the cassava tubers is done by hand. Nearly always the cassava is peeled by members of the household, and if the supply of family labour is not sufficient, would labour be hired. The peeling is mostly done by women and girls. The peelings contain the main part of the "mancha" -- an oily-like substance of the tuber which contains, among other things, most of the protein of cassava. According to local beliefs, this mancha is dangerous to human health, if it is eaten in considerable quantities. On the contrary it does not harm animals.

The factory owners either use the peels as manure, especially for coffee and plantains, or as fodder for mules and horses. The peelings are never sold. Thus, apart from the two aforementioned purposes, the peels do not have any direct economic value.

It takes one person one and a half to two hours to peel a 75-kg sack of cassava. The people who peel are paid $5 or $6 per sack. In the peeling operation the cassava looses one-sixth of its original weight.

2) Washing

The peeled cassava is washed by the "colador" (litterally, strainer). The colador is the one who washes, rasps and strains the cassava. If he has any time left he helps with the peeling. He is mostly a hired labourer. He washes the cassava by stirring it with a wooden stick in a stone tank. From time to time the water in the tank is changed. The washing operation consumes very little time. The peeling and washing of the cassava seems to influence the quality of the starch. Proper peeling minimizes the amount of mancha. Also, remains of the peelings can dirty the starch and

A girl peeling cassava. A man washing the peeled cassava.

consequently affect the ultimate quality of the starch. (Good washing also minimizes the dirtying of the starch).

In two factories I was told that workers peel and wash the cassava better than in other factories. Apart from the fact that I could observe this with my own eyes, it is also reflected in the price of the starch. They receive $80 more per 100 kg of starch (about 4%) than the other factory owners.

3) Rasping

After washing, the cassava is rasped in a rasping machine. This machine is driven by a little petrol engine. This operation also consumes little time.

4) Straining

The straining is the process in which the starch is actually extracted from the cassava. Straining may be done in either of two ways.

a) Straining by hand. The colador strains the rasped cassava in a cloth that has been tightened at a wooden framework above the sedimentation tank. Water is continously added. The water that falls into the sedimentation tank has a white color, because of the starch. The colador continues straining a batch until the water has a bright color, which means that all the starch has been extracted from the cassava.

Two to three buckets of rasped cassava (about 25 kg) are strained in the clot at the same time. This takes about 20 to 30 minutes. Then the cloth is refilled with more rasped cassava. The pulpy residue of the strained cassava is called afrecho.

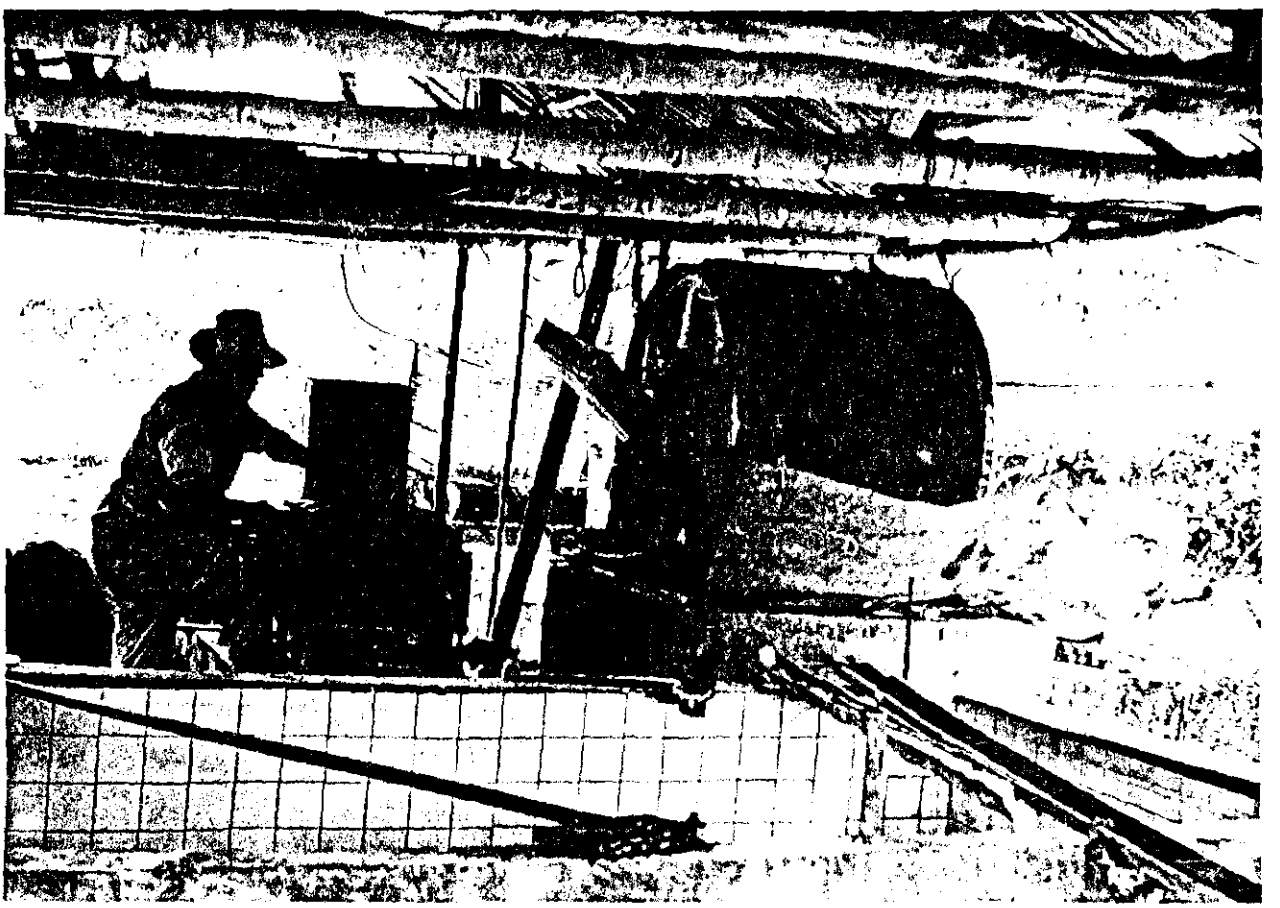
Straining by hand.

The maximum amount that can be strained by hand is four loads of cassava (600 kg original weight) per day. In times of sufficient supply of cassava, the hand straining process is the most limiting factor in the cassava starch production.

b) Straining by machine. The straining machine can be compared with a centrifuge, which slowly rotates around a horizontal axis. The rasped cassava is put into this machine and water is continously added. The water, mixed with the starch, falls into a little tank under the machine, from where it is conducted via a wooden pipeline to the sedimentation tank. What remains in the machine is the afrecho.

In most cases the straining machine is driven by the same petrol engine which drives the rasping machine. In those cases where each machine is driven by a separate engine, the location of the rasping and straining machines, with regard to each other, is unsuitable for only one petrol engine. With a straining machine a maximum of eight loads of cassava (1,200 kg original weight) can be strained per day, or about twice as much as by hand. During my stay in Cuatro Esquinas, however, hardly anyone strained more than four to five loads a day. This was primarily because of the shortage of cassava and secondly, because the price of cassava was considered too high by some factory owners. Regarding the amount of starch that can be extracted from the cassava, there is no difference between straining by hand and straining by machine.

After straining one load of cassava, the amount of afrecho is about 12,5 kg after it has been dried. That is about 8% of the



Man working with the rasping machine. At the right the straining-machine and the wooden waste pipe, by which the water with the starch drains away into the sedimentation tank.

original weight of one load of cassava. The afrecho is used as fodder for chickens, mules, horses and pigs, and every factory owner possesses some of those animals. Factory owners keep one or more pigs especially for making a good use of this by-product. As was mentioned earlier, it is because of the availability of the afrecho and the mancha (see 5) that hardly any maize is fed to pigs.

In this way the afrecho has an indirect economic value. In a few cases the afrecho is dried, then packed and sold. I know one trucker-buyer of cassava starch who also buys large quantities of afrecho. He fattens 105 pigs with it.

The price is $25 per 12,5 kg of dry afrecho. Whatever the use of afrecho is, from an economic point of view, it is considered of minor importance by the factory owners.

5) Sedimentation

After the sedimentation tank has been filled, it is left for three to four hours. This is the time needed for a good sedimentation. Every factory has two sedimentation tanks, so that during the sedimentation process in the first tank, workers can begin to fill the second one. After three to four hours of sedimentation we have the following situation:

At the bottom of the tank is a humid, white stratum of starch. In this stage the starch feels like rubber. Above the starch we find a thin stratum of liquid, yellow mancha. This is the minor part of mancha that if left in the cassava tubers after the peeling. The biggest part of the tank is filled with the water from which the starch and mancha has settled out.

6) Cleaning

After the sedimentation process the water is drained through a plug in the sedimentation tank. Next, the mancha is either discarded or collected in a bowl or other container. The mancha is, according to the people, even better than afrecho for fattening pigs, probably because of its protein content.

The mancha is, however, never sold. In most cases the factory owners fatten their own pigs with it. The small intermediate trader in starch who works in the area gets the mancha free. For him this is a cheap way of fattening his five pigs.

When only the starch is left at the bottom of the sedimentation tank, the surface of the starch stratum is washed with water from a hose. Next, the sedimentation tank is either filled another time or the starch is taken out. Sometimes, people fill the same tank three to four times before removing the starch. After the damp starch is taken out of the tank, it is put into fermentation tanks.

7) Fermenting

The starch is left in fermentation tanks for about two weeks. During this fermentation process the starch acquires a certain acidity. The ultimate quality of the starch depends in a large measure upon the acidity attained.

8) Drying

After two weeks of fermentation the workers empty the fermentation tanks and put the damp and clotted starch on wooden trays. The starch is allowed to dry in the sun for about two to three days.

9) Pulverizing

When the starch is dry the clods of starch are pulverized by hand. Even after having been pulverized, the starch may still contain a few small clods.

10) Packing

Next the starch is packed in sacks, each one containing about 75 kg. Workers at the factory do not select the starch for quality.

11) Stocking

The starch is never stored in the factories for a long time. About once a week the starch is either directly sold to a trucker-buyer or is transported to the village where it is sold to one of the intermediate traders or to the only trucker-buyer with storage facilities (see Marketing).

A man pulverizing the starch, which is drying in the sun.

Schematically, we can summarize the production of cassava starch, based upon an input of 150 kg of cassava, as follows:

Input: 150 kg of cassava

peeling — by-product: ± 25 kg of peelings (16,5%)[1]

125 kg of peeled cassava

washing

125 kg of peeled, washed cassava

rasping

125 kg of rasped cassava

straining — by-product: ± 12,5 kg of "afrecho" (8,3%)[1]

mixture of starch, "mancha" and water

sedimentation

three strata of starch, "mancha" and water

cleaning — by-product: ± 25 kg of "mancha" (16,5%)[1]

a stratum of damp starch

fermenting

damp, acid starch

drying

dry clotted starch

pulverizing

Output: 37.5 kg of pulverized starch (25%)[1]

packing

stocking

selling

1/ Percentage of the original weight

It must be said that the figures given for the by-products should be considered more as rough indications than as exact data.

As for the final quantity of starch produced, all the factory owners gave me about the same figure. Of course this figure varies a little because of differences in the quality of the cassava. Also little tubers seem to contain relatively more starch than big tubers.

In spite of these little differences it is fairly accurate to say that an input of 150 kg of cassava gives an output of 37,5 kg of starch, which means a conversion factor of .25.

A BENEFIT-COST CALCULATION

Based upon the extraction of 37,5 kg of starch from 150 kg of cassava, I have developed the following benefit-cost calculation:

Costs		Benefits	
150 kg of cassava	$ 400	37,5 kg of starch	$ 750
transportation	30		
peeling	10		
loan of the "colador"	6		
packing material	9		
rent on working capital	15		
depreciation	6		
Total costs	$ 476	Total benefits	$ 750

Net profit: $ 274

Regarding the costs, I have assumed that:

- There is no price difference between the buying of a load of cassava and the buying of an equal amount of cassava when it is still on the field plus its harvesting costs.
- The mule or horse for transportation has to be hired.
- All labour is hired
- The depreciation costs of the factory are $ 3,000 per year and the total annual production of starch is 18.750 kg.
- 50% of the working capital has to be borrowed.

Regarding the benefits I assume that:

- The by-products do not produce any additional income
- The price of starch is $250 per 12,5 kg. During my stay the price of starch fluctuated between $ 240 and $ 250 per 12,5 kg.

From my observations, the amount of starch produced not only differed widely between the various factories but also within the same factory from week to week. The main reason for this was the shortage of cassava, which caused a discontinuous supply. The result of such shortages is competition among the factory owners for the purchase of cassava. Important decisive factors in cassava purchasing are, on the one hand, being able to pay a little more than another factory owner, and on the other hand, having friends or relatives among cassava farmers.

In a five-day work week a maximum of 750 kg of starch can be produced in

a factory where starch straining is done by hand. In a factory with a straining machine the maximum output is 1500 kg. However, this difference in production capacity is largele negated by the shortage of cassava. I estimate that during the time I stayed in the area the average amount of starch produced per week in both types of factories was about 500 kg. This relatively low production nevertheless means a net weekly income of about $ 3.680 for the factory owner.

MARKETING AND CREDIT

As mentioned earlier, the starch is seldom stored in the factory for more than a week. Because starch is sold about once a week, storage facilities are not a problem. As most of the cassava factories are located along the road, trucks can reach the factories. It may be due to this fact that the greater part of-the starch is directly sold to trucker-buyers without the intervention of intermediate traders.

There are 24 cassava factories in the sub-municipality of Cuatro Esquinas. Twenty are located along the road, four are located far back in the mountains. The starch which is produced in these four factories is first transported by mule or horse to the village and there sold to one of the two intermediate traders or to the trucker-buyer who has storage facilities at his disposal. Transportation costs are paid by the producers.

The Intermediate traders.

Two intermediate traders live in Cuatro Esquinas. As one of them buys and sells about three times as much as the other, we shall call them respectively "the large intermediate trader" and "the small intermediate trader"

Both only buy from the eight factories which are located near the village. The 16 factories located half an hour's drive south of Cuatro Esquinas, in the warmer zone near El Puente, sell directly to trucker-buyers. Some people say that the intermediate traders earn a living "by doing nothing".

The large intermediate trader works on a share-lease basis with one of the richest farmers in the area.[1] The house in which the trader lives and in which the starch is stored belongs to this farmer. The trader works partly on hiw own account, partly with money of this farmer. They share the profits on a 50-50 basis.

The trader buys and sells about 45 sacks of starch every week, which is about 3.375 kgs. Assuming that on an average only 20 of the 24 factories are producing starch, due to the shortage of cassava, and a factory is producing 500 kg. weekly,[2] I estimate that the total weekly production of these 24 factories will be about ten tons[3]. According to this estimation, about 33% of the total week production is bought by this trader.

Very often this intermediate trader provides credit to the producers of starch although not always to the same producers who sell to him. When he does not ask an interest charge, the producers to whom he lends money are usually good friends. In this case he would give credit only on the condition that they sell their starch to him. To most people, however, he also asks -- besides this obligation of delivery -- an interest charge.

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1 Actually this farmer is one of those two people from Nariño who started growing cassava as cash crop. His lands are located south of the sub-municipality of Cuatro Esquinas.

2 See the paragraph on a benefit-cost calculation.

3 By the great variations in the production of starch per factory and between factories this cannot be but a rough estimation.

When an interest charge is included, this means that owners have to sell the starch to him for $5 or $10 less per 12,5 kg. If we consider the time that is needed from the harvesting of the cassava until the sale of the starch, we can say that the time between the lending of the money (for the greater part needed for the purchase of cassava) and the delivery of the starch is about a month. Since the average price of starch during my stay was $240 per 12,5 kg and trader pays $5 or $10 less per 12,5 kg, then the factory owner pays an interest rate of, respectively, 2% or 4% per month.

In some cases this trader renders the starch producers another service -- at any rate this is how the producers see it -- by telling them where they can buy a field of cassava. It may very well be that this is more a question of conditioning the relation between producer and trader than a rendering a service.

After buying a quantity of starch the trader sells it to trucker-buyers. It varies as to how much and to whom he sells, although every trucker-buyer buys from him at some time. The amount depends on the supply the trader has and the demand from the trucker-buyer. The two will bargain about the price but the trader is in a stronger bargaining position. Because of the shortage of cassava the starch supply is limited, whereas the demand is strong. A second factor for the trader being in a strong bargaining position is his sufficient amount of working capital. He never has to ask the trucker-buyer for credit.

On an average, the trader sells for $10 per 12,5 kg more than his purchasing price of $240 per 12,5 kg. Thus, his gross income per week from selling 3.375 kg of starch will be about $2.700. He pays 50% to the farmer with

whom he works on a share-lease basis, so his net income from trading in starch will be about $1.350 per week.

It is impossible to estimate his profits from lending money, as I do not know how often he lends money or how much each time. For two years he has operated his own cassava factory. A few months ago he bought .40 ha of land, which enables him to increase his income in the future.

The small intermediate trader, besides trading in starch, also trades in coffee[1]. He buys and sells about 45 sacks of starch (3.375 kg) every tree weeks. Therefore, I estimate that he buys about 11% of the total week-production of the 24 factories.

This trader buys his starch from three factories, two of which are located in the mountains, inaccessible for trucks. So in contrast with the large intermediate trader he always buys starch from the same producers. The trader supplies these three producers with credit. He pays $5 less per 12,5 kg. to them, which corresponds to a calculated interest rate of 2% per month.

The interest rates asked by the two intermediate traders are considered reasonable by the producers. Judging from these indeed rather low interests, one may say that the obligation of delivery is more important to the traders than the income derived from the lending of money. If I assume that these three producers sell the same percentage of their production to this trader, they then sell about 70% (1,125 kg every three weeks) of their total production to him.

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1 See the marketing of coffee

The trader sells the starch to a wholesaler from Cali[1]. His trading profits are also $10 per 12,5 kg. About every three weeks the trader calls the wholesaler in Cali to tell that he has a truckload (about 3.5 tons) of starch in stock. The wholesaler hires a truck and comes to Cuatro Esquinas to get the starch. At times the wholesaler lends money equal to half of the freight to the trader. According to the trader, he does not pay any interest. By lending money in this way the wholesaler is assured that every three weeks a truckload of starch is waiting for him. The trader uses the loan to purchase starch and to give credit in turn to the producers. The trader's profits from money lending are hard to estimate.

His profits from trading in starch are $2.700 every three weeks. As he does not have any additional costs, his net income from the starch trade is about $900 per week. Besides, in certain periods of the year, he receives an additional income from his coffee trade. The price at which trucker-buyers sell starch to wholesalers in Cali is $280 per 12,5 kg. If we assume that the wholesaler from Cali sells his purchased starch for $280 per 12,5 kg, which is probably a low estimation, then we can say that from his one trip to Cuatro Esquinas every three weeks he earns a gross profit of $8.100. His costs for hiring the truck are $1.500. Assuming that his additional costs (e.g. labour, storage) are at most $600, then his net earnings from one trip to Cuatro Esquinas are at least $6000.

The trucker-buyers

If about 44% of the total starch produced in the sub-municipality of Cuatro Esquinas is sold to the two intermediate traders, then about 56%

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1 Just before I left the village he started looking for other possible buyers, but had not yet arranged to sell to any others.

is sold directly to trucker-buyers. Some of these trucker-buyers also purchase starch from 15 cassava factories located west and outside the sub-municipality of Cuatro Esquinas. Besides, there are a few trucker-buyers who only buy from these other 15 factories. As I do not have any data on these other factories and trucker-buyers they are not considered here; the following discussion involves only the local area and its 24 factories. In this area two trucker-buyers operate with eight-ton trucks. The first one, from Palmira, buys a truckload of starch[1] about weekly. We can call him the "large trucker-buyer weekly". The second one, from Popayán, buys a truckload about every two weeks. We shall call him the "large trucker-buyer fortnightly". This second trucker-buyer also owns a cassava factory. He is the only trucker-buyer with storage facilities in the village, namely at his mother's house. Occassionally starch from the four factories in the mountains is transported by mule or horse to the village and stored in his mother's house.

Besides these two trucker-buyers, three other buyers with 3.5-ton trucks operate in the area. Two of them, from Cali and Mondomo, each buy a truckload every week. The third one, from Popayán, buys a truckload every two weeks[2]. Very often transactions between a trucker-buyer and starch producer are conditioned by the provision of credit. This implies that the producers have to sell their starch for $5 or $10 less per 12,5 kg, which is not considered a high interest.

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1 A truckload is 100 sacks = ± 7.500 kg

2 A truckload is 45 sacks = ± 3.375 kg.

However, the main motive for lending money seems not to be the interest. As with the larger trucker-buyers mentioned earlier, money lending with interest seems to be one of the methods by which all trucker-buyers try to insure themselves a sufficient supply of starch. Although the trucker-buyers present themselves to the outside world as a homogeneous group of friends with the same interests, their common interests actually lead to substantial competition among them. This is especially true when the demand for starch is bigger than the supply.

Apart from money lending with interest, this competition manifests itself in the following ways:

- Extending credit without interest, but only with the obligation of delivery.

- Offering a better price than others.

In particular the two large trucker-buyers use this method to secure sufficient amount of starch. They sometimes offer $5 to $10 per 12,5 kg, more than the others.

Competition seems to be also the main reason why trucker-buyers are very willing to buy from the large intermediate trader[1], even though he asks $10 per 12,5 kg more than the producers. In addition, buying from him also means that they can buy a considerable amount of starch each time, and therefore, they do not have to drive to the factories, which lowers their costs of transportation.

The starch is mainly sold in Popayán, Cali and Palmira, (see Map I). The large trucker-buyer fortnightly is the only one who transports the starch all the way to Bogotá. The small trucker-buyer from Mondomo buys not only

[1] The small intermediate trader is not considered because he always sells to the wholesaler from Cali.

starch but also the afrecho. As his relation to the producers is often a dependent one because of the credit he provides, he only pays a trifle for the afrecho. He is thus able to fatten his 105 pigs very cheaply.

Summarizing, we can say that the price received by the starch producer from all buyers is $240 to $250 per 12,5 kg of starch.

The selling prices per 12,5 kg are:

		Distance from Cuatro Esquinas
In Popayan	$ 270	35 kms
In Cali and Palmira	$ 280	200 kms
In Bogotá	$ 310	800 kms

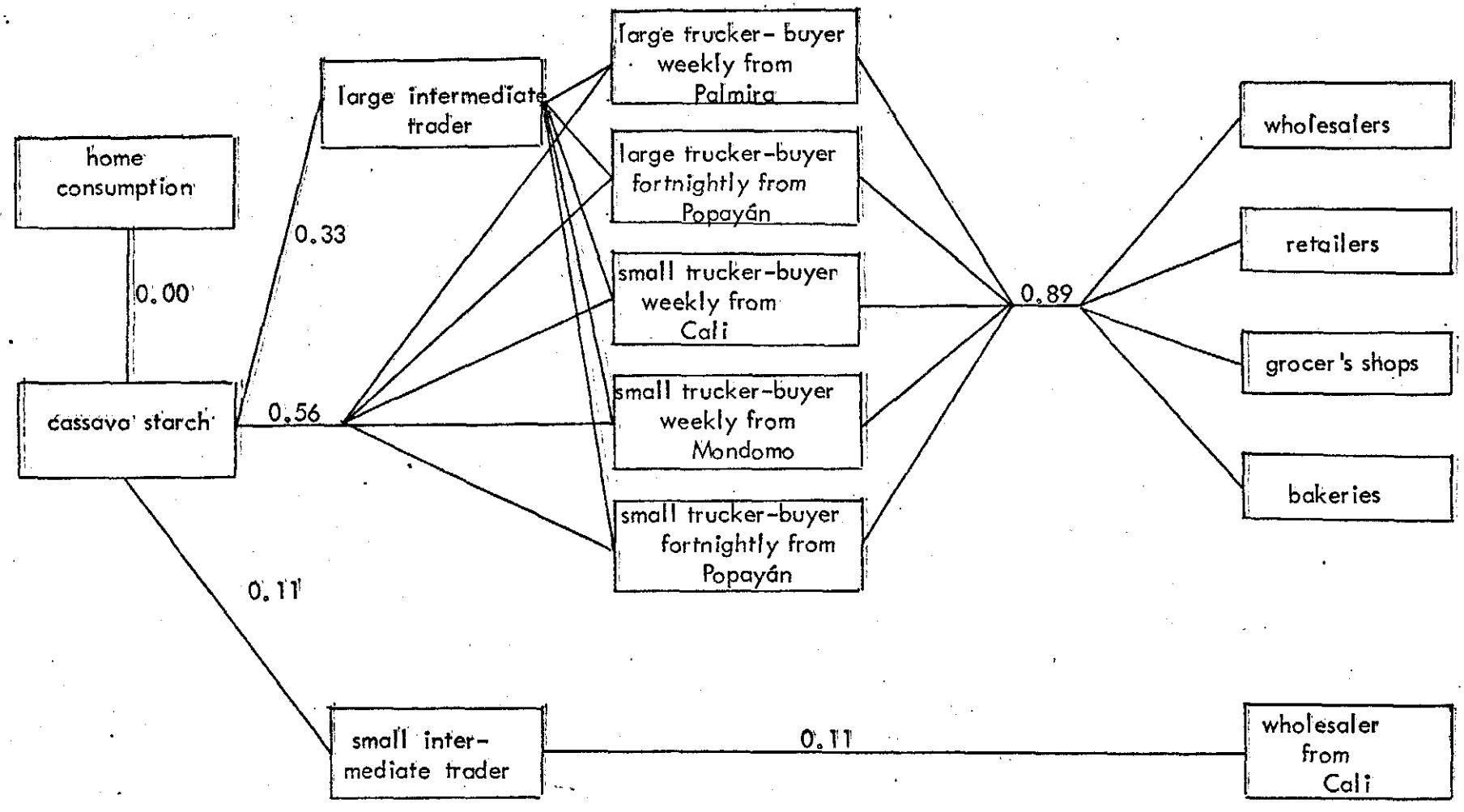
The prices of the starch reflect the prices of the cassava. Different prices during recent years give the following comparisons:

	Price per 150 kg of cassava	Price per 12,5 kg of starch
1973	$ 150	$ 90
November 1974	$ 280	$140
February 1975	$ 325	$160
July 1975	$ 400	$240

To give an example of the profits:

The large trucker-buyer fornightly transports 100 sacks of starch (= 100 x 6 x 12,5 kg) to Bogotá. To Bogotá and the return is a four day's trip.

FIGURE IV. The marketing of cassava starch



He sells for 100 x 6 x $310 =	$ 186.000
He purchases for 100 x 6 x $250 =	$ 150.000
His gross earnings	$ 36.000
His costs of transportation	$ 4.000
His net earnings	$ 32.000

If we compare his net earnings with an income of $25 for a day labourer, we can see that every two weeks this trucker-buyer earns as much as a day labourer earns in 1,280 days of employment! This trucker-buyer started trading in starch six years ago with $250. Now his working capital is $2.000.000.

The starch is sold in the cities to wholesalers, retailers, grocers' shops and bakeries. The trucker-buyers obviously prefer to sell to wholesalers, as they buy the entire truckload. On the contrary, retailers and especially grocers and bakers buy only a few sacks at a time.

Schematically, we can represent the marketing of cassava starch shown in Figure IV.

Sources of credit.

Regarding the sources of credit we can say that the trucker-buyers are almost the only source of credit for the producers of starch. I know of only one case in which a farmer lends money to a factory owner. Apart from the farmer, this factory owner also receives credit from the trucker-buyers. Institutional credit (e.g. the Agrarina Credit Bank and commercial banks) is not available to owners for the production of cassava starch in small factories.

If one cannot get credit from a trucker-buyer or another person and is near to halting production, he has a last possibility, namely looking for a person who is willing to help him produce a certain amount of starch on a cost-share lease basis with the factory owner. This person is always a farmer. He supplies the cassava, and the account between the two is settled after the starch has been sold. The starch producers need the credit mainly for the purchase of cassava, secondly, for the payment of labour and sometimes for consumptive ends.

The use of cassava starch[1].

Cassava starch is, among other things, used:

- as flow to make bread
- as a kind of maizena
- as an ingredient of artificial leather
- for chemical and pharmaceutical preparations
- for some explosives
- for pastes
- for insecticides
- for perfumes, soaps and toilet powders
- for dyeing silk
- in the production of malt and glucose

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1 Derived from "Industrialización de la Yuca" by Rafael O. Díaz.

CHAPTER VI

A FUTURE VIEW

Economic progress came to Cuatro Esquinas, brought by a new crop and, later, by local facilities for processing it into a product very much in demand. This has contributed to a rapid population increase, a change in food habits and broadened views by the inhabitants. These changes are due, in large part, to direct contacts with regional and national markets.

It is especially interesting that both innovations, the new crop and its processing which brought wealth and change in the community, were initiated by outsiders.

On the other hand one sees that these developments lead to an increasing difference in economic positions. Some people have incomes 20 times as high as the landless laborers.

One may hypothezise that the recent tendency of cassava starch factory owners to integrate cassava production with their processing enterprise is an answer to their deteriorating raw material supply situation. It is interesting that another potential income source for them, e.g. entering the trading business, is not preferred. Efforts like these might run counter to the social power network, established by the traders.

PRESENT PROBLEMS

Although the problems which the agrarian population has to face are caused by numerous interrelated factors, in my opinion there are three main problems, which have to be dealt with: the decrease in production, land scarcity and unemployment.

While the decrease in production also certainly applies to the second cash crop, coffee, I shall concentrate on cassava.

Before eight or ten years ago, yields of cassava, according to the farmers, were three to four times as great as they are now. As far as I can see, this rapid decrease in production is principally due to two factors:

1) The shortening of the fallow period, which resulted in a rapid deterioration of soil fertility, and

2) The frog skin root disease.

This disease of cassava has been observed recently to induce severe losses up to 90% in a wide area of the Department of Cauca. The disease results in abnormal root growth and thickening; sometimes the whole root system may be affected, but commonly only some of the roots show symptoms while others continue to grow and thicken normally. The disease appears to affect the deposition and storage of carbohydrates in the roots so that diseased plants produce fewer swollen roots, which are frequently distorted and show uneven thickening[1].

The disease is already a big problem in the warmer zone near El Puente. One of the consequences is that farmers who found affected plants on their fields are afraid to sow these fields another time. Also, the farmers do not want to use the non-affected plants as seed if they come from a field in which even a few diseased plants were found. This results in a scarcity of seed plants. Even though the amount of affected plants in the area near Cuatro Esquinas is less than in El Puente, probably because of its colder climate, the consequences of the disease are already felt.

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[1] Source: Annual Report, CIAT, 1974

Researchers at CIAT are working on identifying this disease.

In addition to the above mentioned factors, the cassava scarcity is indirectly increased by the constant demand from the cassava factories.

MY THOUGHTS ABOUT THE FUTURE

If the farmers of the area continue to grow cassava and do not start to grow another crop instead, then the production will have to be increased, both for the benefit of the farmers themselves and also for the cassava factory owners. Also given the fact that it is very difficult to find off-farm activities to raise incomes seems to make increased cassava production even more important.

Theoretically, an increase in production may result from either expanding the cultivated area or intensifying production on the area available. now. The first possibility seems to me to be a poor solution in the long term because:

- the land is scarce
- the price of the land that is still available, $9000 or more per hectare, is an impediment for many farmers to buy land. Besides credit for buying land is not available.
- most farmers who do not cultivate all their land refuse to lease this land.
- the most feasible way for expanding one's area is sharecropping.

It would be interesting to see if in the future more landowners will be willing to work with a sharecropper, if the yields continue to decrease.

The second possibility also seems difficult to achieve, as long as the factory owners refuse to buy fertilized cassava. Regarding their negative attitude on buying fertilized cassava, two things can happen: either they will continue to refuse it in the future or will change their minds and begin to accept it. The first case may be the death of many factories. On the other hand some factory owners may change their opinions, if their production falls below a certain level. When and how they make this decision may be a subject of future research.

If factory owners are going to accept fertilized cassava, this will create a need for technical knowledge that will have to come from outside the community and credit facilities for buying fertilizer will have to be created. However, the most important factor regarding the introduction of this technology seems to me the human factor. It seems to me that many farmers do not consider fertilizer use as a possible way to increase their production, though a few do. Even though most farmers can define their situation quite clearly and are fully aware of the deteriorating soil fertility, they nevertheless view this reality as: what will be, will be. They think more of migrating elsewhere than of tackling the problem itself.

Many people also exhibit a distrust towards governmental institutions , which may be caused by bad experiences with the Agrarian Credit Bank. One farmer expressed this as follows: "If a technical assistant of one of the agrarian institutions would come to this area to talk with us about our problem, it is very likely that five of every ten farmers would not listen to him." So the problem of how to introduce new technology will have to be more thoroughly investigated, if plans for it are going to be a fact.

Another area for investigation would be how far the introduction of new varieties of the transition to the cultivation of other crops, or another cropping patterns, might contribute to the development of this area.

Another item that may be the subject of future research is how far a cooperative movement can be regarded as a possible solution. As I did not study this, I can only express my impression, namely that I did not find any indication for future cooperation. One could think on the one hand of cooperation between farmers in processing their cassava cooperatively, and in another case, of cooperation between factory owners in selling their starch.

The area is rather atomized; individualism seems to prevail. Everybody goes his own way without bothering other people. The problems which they have in common are hardly discussed. Neither farmers not factory owners ever mentioned discussions of their mutual problems when I was talking with them. I was told that in the Spring of 1975 there was a meeting for comunal action in the village council, initiated by two people of an agrarian institution. Afterwards, nobody could tell me who those people were, what they discussed and what the results of the meeting were. Thereafter, this subject had been dropped quickly and those two people never came back.

If nothing is done about the problems, then it may be likely that the area will become more and more impoverished. Those people with enough resources may be able to sustain a living. Others may migrate; the first signs of this are already visible. I am told that in recent years people have already left the area. Their motives may differ. Some, who were landless labourers, left to seek jobs elsewhere, often in the city.

Others left because of the attractiveness of the city.

In some cases it happened that the head of the household first went away to find employment with the intention that his family would follow later, if he found a job. Occasionally it happens that the man does not return. This may be because he found another woman or because he failed to find employment. Women and children are left behind without any income. This seems to happen relatively more with people who have been living in concubinage than with married people.

It is hard to tell what will happen to the cassava factories if the present trend of decreasing production continues. Some may survive , others may not. It may be that some factory owners will consider it worthwhile to move and build a factory elsewhere. Those factory owners with enough resources may persevere because they are more able to control the market of cassava than those with fewer resources. I met several factory owners who recently have started to cultivate cassava or have expanded their cultivated area to secure more cassava.

There are already some cassava farmers who have moved to the area west of El Puente where there is still uncultivated land. An interesting subject of investigation would be to find if it is likely that more farmers who decide to move, but do not want to go to the city, will settle in that area. If this happens and people start to cultivate cassava in big quantities, which at the moment is not yet the case, then it may be very interesting to see if this also causes a new shift in the location of the cassava factories.