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CASSAVA CULTIVATION AND STARCH PRODUCTION IN AN ANDEAN VILLAGE

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Introduction

This paper is based on "A socio-economic study of cassava and cassava starch production in an Andean village in Colombia", Mimeograph, CIAT, 1976. I carried out this study as a trainee of CIAT in the period September 1975-January 1976. At that time I was a B.Sc. student of the Department of Rural Sociology of the Tropics and Subtropics at the Agricultural University in Wageningen, The Netherlands. The purpose of this study was to describe the processes of cassava cultivation and starch production. Being a budding sociologist at that time, it certainly lacks analytical depth. Though my knowledge and ideas have developed over time, I nevertheless preferred not to include new views or comments, as this might introduce a bias into this paper.

Some social and economic characteristics of the Cuatro Esquinas area

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. It is one of the 33 sub-municipalities of the municipality of El Tambo. This village is located about 7 km north of Cuatro Esquinas. It is the only service centre in the municipality. Services granted by El Tambo are: the market, held twice a week; a little cattle market, held once a week; shopping services; municipal and judicial institutions; a secondary school; a church; festivals and agrarian institutions like the Agrarian Credit Bank and the Federation of Coffee Growers.

The village of Cuatro Esquinas consists of no more than 44 households; only

13 households possess land, the other 31 households earn their living mainly by trading and wage labour. Around the village, are found the farms, scattered in the mountains. Most farms are not very accessible. The most important means of transportation are horses and mules.

The area can be characterized by having a "minifundio" structure. The majority of the farmers are small landowners. Moreover, the number of landless labourers is very large, which means a cheap supply of labour. Daywages range between \$20 and \$25. ^{1/}

Not only regarding the location of the farms, but also from a social point of view the area is atomized. Individualism prevails. Everybody goes his own way without bothering other people. The negative consequence of this is that the farmers hardly discuss their mutual problems. This situation is doubly serious, as from the part of the Agrarian institutions in El Tambo the interest to help the farmers in this isolated area by means of extension is minima.

Cuatro Esquinas is located in a temperate zone. The altitude is about 1300 meters. Though variable, we may discern two rainy seasons: February through May and September through December.

The two most important cash crops are cassava and coffee. In addition, plantains, bananas, maize, beans and sugar-cane are cultivated.

Cassava in historical perspective

People started to grow cassava as a cash crop in the middle of the forties. Before that time coffee, and, especially, sugar-cane were the main cash

^{1/} One US dollar is about \$33 (Colombian pesos) January, 1976.

crops. The latter crop was used for the production of "panela" -pieces of raw, unrefined sugar- in small-scale sugarmills.

Those who started to cultivate cassava in big quantities were outsiders, mainly people from the Departments of Valle del Cauca and Nariño. They also introduced the use of oxen for the preparation of the land, which was formerly done by hand.

Initially only a small part of the native population adopted the cultivation of cassava as a cash crop. This cassava was transported by mule to El Tambo, sold to traders and put on fresh markets in Popayán and Cali. The majority continued to grow cassava mainly for family needs.

Between 1955 and 1965 however many farmers cut down their sugar-cane and started to cultivate cassava instead. Besides the small profitability of "panela" production, which may have been due to expanding cane production in Valle del Cauca two other factors explain this transition from sugar-cane to cassava. The most important reason has been the introduction of small-scale starch factories in the middle of the fifties. In the second place must be mentioned the construction of the road between El Tambo and Cuatro Esquinas in 1965. The latter consisted only of a widening of the muletrack, but nevertheless made the area accessible for jeeps, buses and trucks, thus allowing easier access to cassava and starch markets.

The small-scale starch factories

It has indeed been in the decade after the construction of the road that the majority of the 24 factories which now exist in the sub-municipality of Cuatro Esquinas have been built. Factories like these already existed in Palmira, located in the Department of Valle del Cauca and near Mondomo, a village located in the North of Cauca. When the capacity of the factories

exceeded cassava production in the zone, factory owners had to look for other markets to buy their cassava, among others the Cuatro Esquinas area. Others decided to move elsewhere and started to build factories in the latter area. When the economic profitability became clear some native people also took over their example.

The starch factories soon became a very important market for cassava. The constant demand for cassava considerably stimulated its production and the area planted with cassava was quickly expanded. Culturally the factories broadened the frame of reference of the farmers and caused a rapid transition from a mainly subsistence towards a market orientation of cassava cultivation. As we shall see this process did not involve a major change in agricultural practices. Cassava continued to be cultivated in a traditional way.

Regarding the technology used for the extraction of starch two different types of factories can be discerned although both are relatively small-scale operations. In the most simple type of factory the cassava is peeled, washed and rasped, and then strained by hand in a cloth that has been tightened at a wooden framework above a sedimentation tank. Water is continuously added. The maximum processing capacity of this manual type of factory is 600 kg of cassava per day.

In the mechanical type of factory the cassava is strained in a centrifuge-like machine, which slowly rotates on a horizontal axis. This machine is driven by a little petrol engine. In these factories a maximum of 1200 kg of cassava can be processed per day. However, because of shortage of cassava, in the research period even the mechanical factories did not process more than 600 to 750 kg of cassava per day.

In dry seasons the lack of a sufficient water supply may limit starch production in both types of factories.

The starch factories are not very labour intensive, though on a regional scale it is probably the most labour intensive form of starch production. The most labour intensive activity is the peeling of cassava. This is done manually, mostly by female family labour, in fewer cases by hired women and girls. It takes one person one and a half to two hours to peel a 75 kg sack of cassava. All the other production activities are carried out by one to two persons, in most cases a hired labourer. He is in charge of the washing, rasping, straining, sedimentation, cleaning, fermenting, drying, pulverizing and packing processes.

Starch production is regarded as the most profitable economic activity within the area. As 25% of the fresh cassava is converted into starch, a maximum of 150 kg of starch per day can be produced in the manual starch factories, whereas in mechanical factories this maximum is 300 kg of starch.^{1/} The greater production capacity of the latter is however largely negated by the scarcity of cassava. I estimated that during the research period the average amount of starch produced per day in both types of factories was about 100 kg. As net profits are \$274 per 37.5 kg of starch,^{2/} this relatively low production nevertheless means a daily income of about \$730 for the factory owner.

^{1/} In all 8 factories which were included in my study, they gave me exactly the same figure of 25%.

^{2/} See for a benefit-cost calculation of starch production my mimeograph "A socio-economic study of cassava and cassava starch production in an Andean village in Colombia", CIAT, 1976, p.72.

Assuming that on an average only 20 of the 24 factories are producing starch and that a factory is producing 500 kg weekly, I estimate that the total weekly production of these 24 factories will be about ten tons of starch. Respectively about 33% and 11% of the total week production is bought by two intermediate traders who live in the village. They buy the starch from the factory owners for \$240 per 12,5 kg and sell to trucker-buyers for 250 per 12,5 kg. The other 56% of the weekly production is bought directly from factory owners by these truckers-buyers for \$240 per 12,5 kg. Only six trucker-buyers are operating in the area. They come from Popayán (2) Monodomo, Cali (2) and Palmira and also sell the starch in Popayán, Cali, Palmira and even in Bogotá to wholesalers, retailers, grocer's shops and bakeries. Their profits are large: selling prices per 12.5 kg of starch are \$270 in Popayan, \$280 in Cali and Palmira, and \$310 in Bogotá. They often lend money, with or without interest to the factory owners in order to try to insure themselves of a sufficient amount of starch. Competition among them is strong. Sometimes the two largest trucker-buyers paid \$5 to \$10 more than the others to be able to buy a truck-load full of starch.

The cultivation of cassava

Cassava is mainly found on small plots, with most plots ranging between 0.5 and 2.0 hectares:

Regarding land tenancy it is striking that much cassava is cultivated by share croppers on a cost share lease basis.^{2/} This may result from the fact

^{2/} In my sample of 27 farmers, 16 farmers and landowners, 9 farmers are share-croppers and two farmers are tenants. Sharecropping seems to be a common characteristic of cassava production in Colombia. Rafael Orlando Díaz D. and Per Pinstруп-Andersen found that 29% of the 283 cassava farmers they visited were sharecroppers ("Descripción agro-económica del proceso de producción de yuca en Colombia", CIAT, 1977, p. B-13). This fact is not unimportant as it may not be unreasonable to hypothesize that sharecropping is negatively correlated with the adoption of new technology.

that cassava is the only annual cash crop in the area. For the many landless labourers sharecropping is one of the few possibilities to increase their income. Moreover, as land is scarce and larger landowners are not very willing to lease land, also for landowners sharecropping is one of the most feasible ways to expand their cassava production.^{3/}

After the fallow period brush and woodland are cut down with "machetes". According to the farmers the shortening of the fallow period has decreased soil quality considerably. Ten years ago farmers used to leave their lands as fallow for five to six years. At the moment the fallow period is no more than three years. They also say that this is one of the main reasons of the decrease in yields. Before yields were three to four times as large as at the moment. 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 fields. Hardly any farmers practice crop rotation. Some plough the soil with oxen for every crop, other plow only for the first crop. In the latter case they prepare the land manually for the second and third crop. Mechanical land preparation is not possible because of the inaccessibility of the fields, the often steep slopes and the usually rough surface of the fields. Formerly farmers used to plant in September. This habit was abandoned after the starch factories began to be the major market for cassava. These created a constant demand for cassava during the whole year. This meant that farmers had to spread the sowing dates of cassava in order to meet the daily cassava needs of the starch factories. Nevertheless much cassava is still planted in September, preferably with the new moon as this has according to the farmers

^{3/} Of our 9 sharecroppers 4 of them are landowners.

a positive influence on its growth.

Years ago farmers used to intercrop cassava much more than at present. The main reason for this is that as cassava became more and more important as a cash crop, especially during recent years when prices went up considerably, the intercrops started to seriously compete for income.^{4/} The most common intercropping systems are: cassava-plaintain; cassava-maize; cassava-beans and cassava-maize-beans. Most farmers weed three times during the growing cycle, at about two weeks and three and six months after the sowing date. The weeding is mostly performed by hired day labourers, in some cases by contract.

The use of chemical technology is limited to the application of insecticides, mainly against ants.

Because of several personal, and economic reasons herbicides are not used:

a) Present day wages of \$20 make a substitution of chemical for manual weed control highly unlikely; b) The farmers do not know if chemical weed control has an impact on yields; c) If they do believe that herbicide use increases production, they do not know in which measure it increases production; d) Some farmers think that the application of herbicides may decrease production instead of increasing it, as they believe that herbicides damage the quality of the soil; e) The farmers do not know how to apply herbicides properly.

Similar reasons also exist for the non-use of fertilizers: a) Traditionally neither their grandfathers nor their fathers used fertilizer; b) Lack of capital; c) Feelings of insecurity: farmers do not know how far the application

^{4/} Prices of a 150 kg load of cassava were: \$150 in 1973, \$280 in November 1974, \$325 in February 1975, \$400 in the period July 1975-January 1976.

of fertilizers increases yields; d) Farmers lack the knowledge how to apply fertilizers properly.

On the other hand some factors which are related to the production of starch appeared to be prohibitive for the application of fertilizers: a) Farmers, but especially the factory owners think that the application of fertilizers diminishes the amount of starch of the tuber; b) Also they think that the starch weighs less if fertilizers are used; c) Fertilizer use decreases the quality of the starch, as during the sedimentation process the starch does not separate well from the other elements of the tuber.

This negative attitude towards the use of fertilizers is based on experience with fertilized cassava that has been bought near El Tambo some years ago. Since that time the producers of starch do not buy fertilized cassava, as it decreases both the total amount of starch as well as the quality of the starch, and therefore their income.

In the Cuatro Esquinas area cassava has a growing cycle of one year. Only in case of an urgent cash need farmers sell their cassava a few month earlier when it is still on the field. The opposite, postponing the harvest, also happens sometimes, which has a saving function for the farmers.

Sometimes the cassava is harvested by hired labourers. However, after the starch factories began to be the major market for cassava selling the cassava to the factory owners when it is still on the field became the most common way of harvesting. Though farmers know that it may be more profitable to harvest the crop themselves, they nevertheless prefer to sell their cassava when it is still on the field. This saves the costs and time for harvesting,

packing and transportation, which can be used alternatively. Moreover the farmer does not have to worry whether or not the harvest is done carefully, as often harvesters leave tubers in the ground. The factory owner harvests each day only the amount needed for his factory. Only plots which are relatively small and located far away from the factory are harvested at one time. This contrasts with earlier years when more cassava was sold to traders and therefore harvested at one time.

Besides the small amount of cassava that is used for home consumption nearly all the cassava is sold to the starch factories. In earlier years when the local demand of the factories was less than at the moment, a substantial amount was sold to traders and put on markets elsewhere, mainly Popayán and Cali. Another portion was bought by starch factories from Mondomo and Palmira. Now that cassava is also scarce in the latter area, only very little reaches outside markets.

Credit facilities are limited. In my sample of 27 farmers only 4 of them received credit from the Agrarian Credit Bank. Others either do not need credit, are not credit worthy, or do not want an institutional loan. The Agrarian Credit Bank does not have a good reputation among farmers. Because of its red-tape it often takes two to three months before one gets his loan. Moreover farmers have to travel three times to El Tambo to arrange the loan, which means extra expenses and a loss of time. It is very difficult to get an exact idea of how many farmers receive credit from informal sources, as most people are not very willing to talk about this topic. Some farmers receive credit from friends or relatives, but did not say how much and for which purposes. Factory owners never lend money to cassava farmers. Strange

enough factory owners often borrow part of their working capital from the traders in starch.

Present problems in cassava cultivation

The major problem in the area is the growing scarcity of cassava. On the one hand the demand of the starch factories for cassava starts to exceed the supply of raw material. On the other hand this scarcity is due to a decrease in cassava yields. This is caused by two factors: the frog skin root disease and the deterioration of soil fertility.

Near Cuatro Esquinas the frog skin root disease is not yet a problem. But in a warmer zone called El Puente, located about a half hour's drive south from Cuatro Esquinas, this disease seriously affects yields. In this area some of our 24 starch factories are located. Another consequence of this disease is that farmers who found affected plants on their fields abstain from sowing these fields again with cassava. So the cassava area becomes less. Also non-affected plants coming from a field in which even a few diseased plants were found are not wanted as planting material. This results in a scarcity of planting material, which in its turn means that at the moment planting material for the first crop has to be bought, whereas formerly it was given by neighbours, relatives or friends.

An increase of production by an expansion of the cassava area seems not very likely. There is very little uncultivated land left, most farmers lack resources to buy land and opportunities to rent land are hardly existent.

On the other hand an increase of production per hectare seems also difficult

to achieve.

The adoption of fertilizer use is out of the question as long as starch producers refuse to buy fertilized cassava. But even if they accepted fertilized cassava, various constraints would hamper the adoption of fertilizer use and other agricultural productivity raising activities.

The major social constraint is a lack of capital of most farmers. Institutional constraints are the non-availability of institutional credit for most farmers and the complete absence of technical assistance.

As personal constraints of the farmers themselves must be mentioned their traditional outlook on agriculture, feelings of uncertainty regarding the profitability of the adoption of productivity raising agricultural practices, lack of knowledge and last but not least their distrust towards governmental or semi-governmental agrarian institutions.

So yields continue to decrease and the area impoverishes. Nevertheless most farmers view this reality as what will be, will be. Given the above mentioned constraints varieties with a high content of starch might certainly play an important role in improving the position of both farmer and starch producer. However, also probably cheap and simple agricultural productivity raising practices would have to be introduced to tackle the problems of soil fertility and decreasing yields. Or perhaps better said: These practices should introduce themselves as it might very well be that this technology in these types of areas should not count on the help of credit or extension services.