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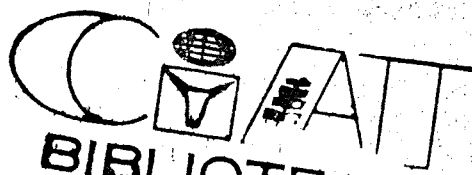
Centro Internacional de Agricultural Tropical

REPORT ON A FIELD VISIT TO CACAOTAL
January 22-30, 1974

by

Stillman Bradfield

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SMALL FARM SYSTEMS PROGRAM


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Introduction:

The purposes of the trip reported on here were:

1. - To gain some initial impression of the agricultural system in Cacaotal;
2. - To update some of the descriptive material found in A STUDY AND PROGRAM FOR SWINE PRODUCTION ON SMALL FARMS ON THE NORTH COAST OF COLOMBIA, By George D. Wesoloski (Ph. D. Dissertation, University of Illinois, 1973);
3. - To explore the present state of development of agriculture from the point of view of The Campesino, including his perception of the factors limiting production;
4. - To generate some ideas as to possible future activities of the Small Farm Systems team.

Given the time limitations on this first visit, attention was focussed on the following tasks:

1. - Adjusting the Wesoloski map of Cacaotal to date, including new houses and changes in residence. Village leaders also cooperated in providing land use data, occupational data, and estimates on ownership of cattle for all households. No attempt was made to census either the human population or that of smaller animals. These data are summarized in the Appendix. The household number corresponds to the number of the map (Figure 1 below).
2. - Discussion with leaders and a few other villagers as to the agricultural problems faced by the village in recent years. Documents on these were collected and the problems are discussed below in the text.
3. - Systematic data was gathered from eight informants on costs of production for three interplanted crops, based on their recollections of the year.
4. - Two instruments using paired comparison choices were applied to the same eight individuals to gain some impression as to their perception of their needs. These same instruments were applied to four senior staff scientists of CIAT for a comparative perception of the problems and possibilities of Cacaotal.

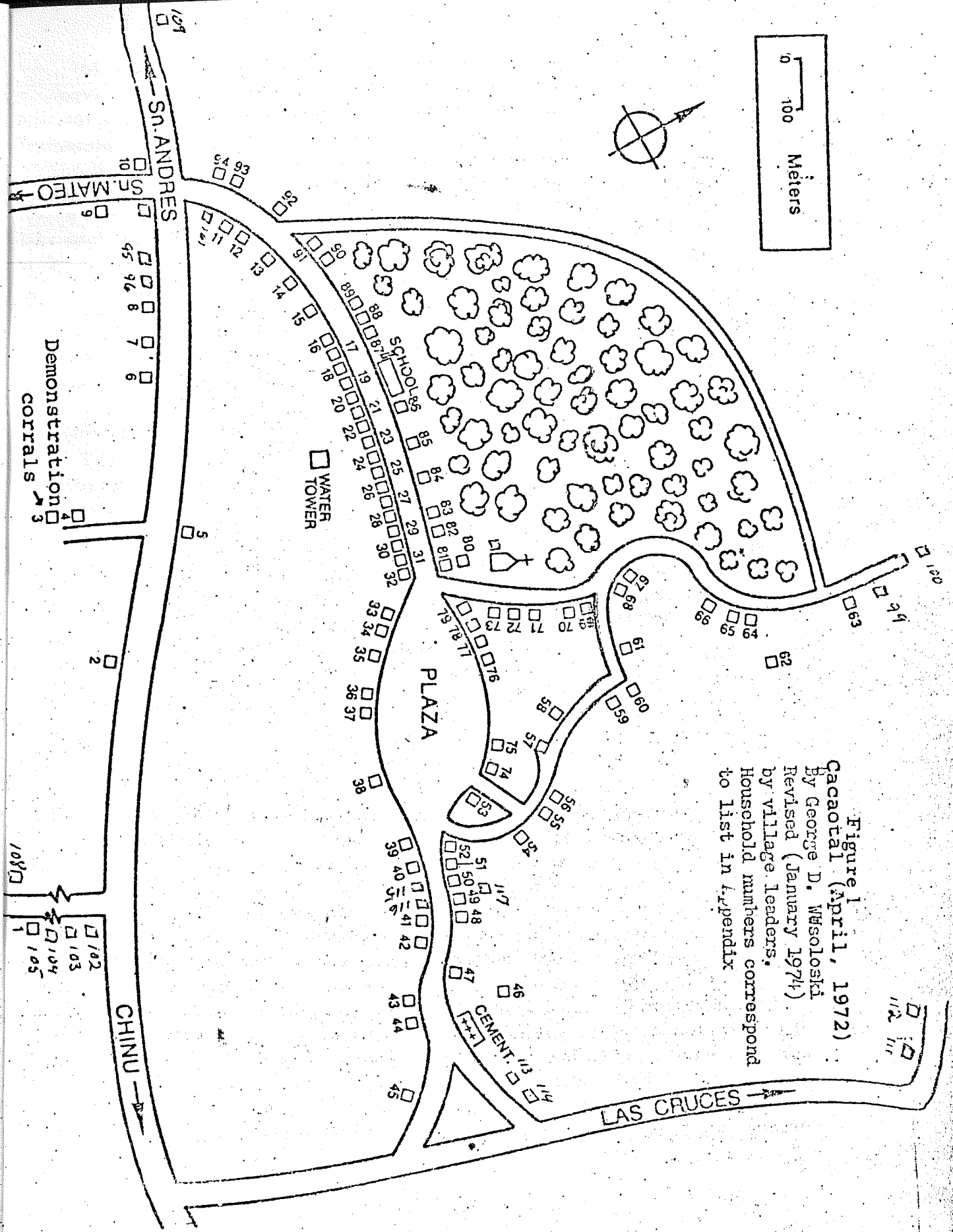
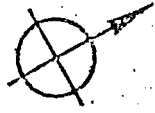
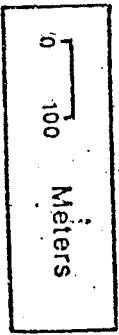


Figure 1
 Cacooral (April, 1972)
 By George D. Wasolowski
 Revised (January 1974)
 by village leaders.
 Household numbers correspond
 to list in Appendix

CIAI

The data presented in the Appendix are approximate at best, but they do yield some impressions of the ways of life of the families in the village. Over half of the families in Cacaotal do not own any land other than their house lot. However, most of these are either working on land belonging to their families, or they rent some land, or have taken possession of land in Las Cruces. Title to the land in Las Cruces is still in dispute. Only twelve heads of households were reported to be exclusively employed as farm workers, and a like number of heads of households were either retired, widows or too sick to work. This latter group receives help from their children or neighbors.

Fully one third of the heads of households earned at least part of their income from activities other than the production of crops and animals, and almost half of this group worked full time outside of agriculture. The full and part-time occupations outside agricultural production are:

Mason	3	Sawyer	1	Barber	1
Carpenter	2	Butcher	1	Well Driller	1
Tailor	2	Construction	1	Snake-bite curer	1
Raises fighting cocks	1	Baker	2	Vendors of local agricultural products	12
Taxi driver	8	Laundry	1		
Taxi owner	9	Bar-cafe	3		
Stores	7	Dentist (tooth puller)	1		

One of the major sources of statistical error for estimating wealth in Cacaotal derives from the wide variation in estimates on the number of cattle owned. According to informants, there is only one really large cattle rancher there; and if we exclude his cattle, we get a total of approximately 725 for all others in the village, or an average of about 6 head per household. The large owner was estimated to have 2,000, 3,000, 3,500 or 4,000 head. Generally speaking, the largest herds within the village belonged to the owners of the largest farms. Most of these families fall outside the sphere of interest of the Small Farm Systems team. Therefore, attention was focussed mainly on the crop production activities of small farmers. It should be kept in mind, however, that most small farmers kept a cow or two, pigs, chickens and a few had ducks and goats. The beast of burden in this system of agriculture is the burro, since virtually all cultivation activities are carried out with the chuzo (pointed stick) and the machete.

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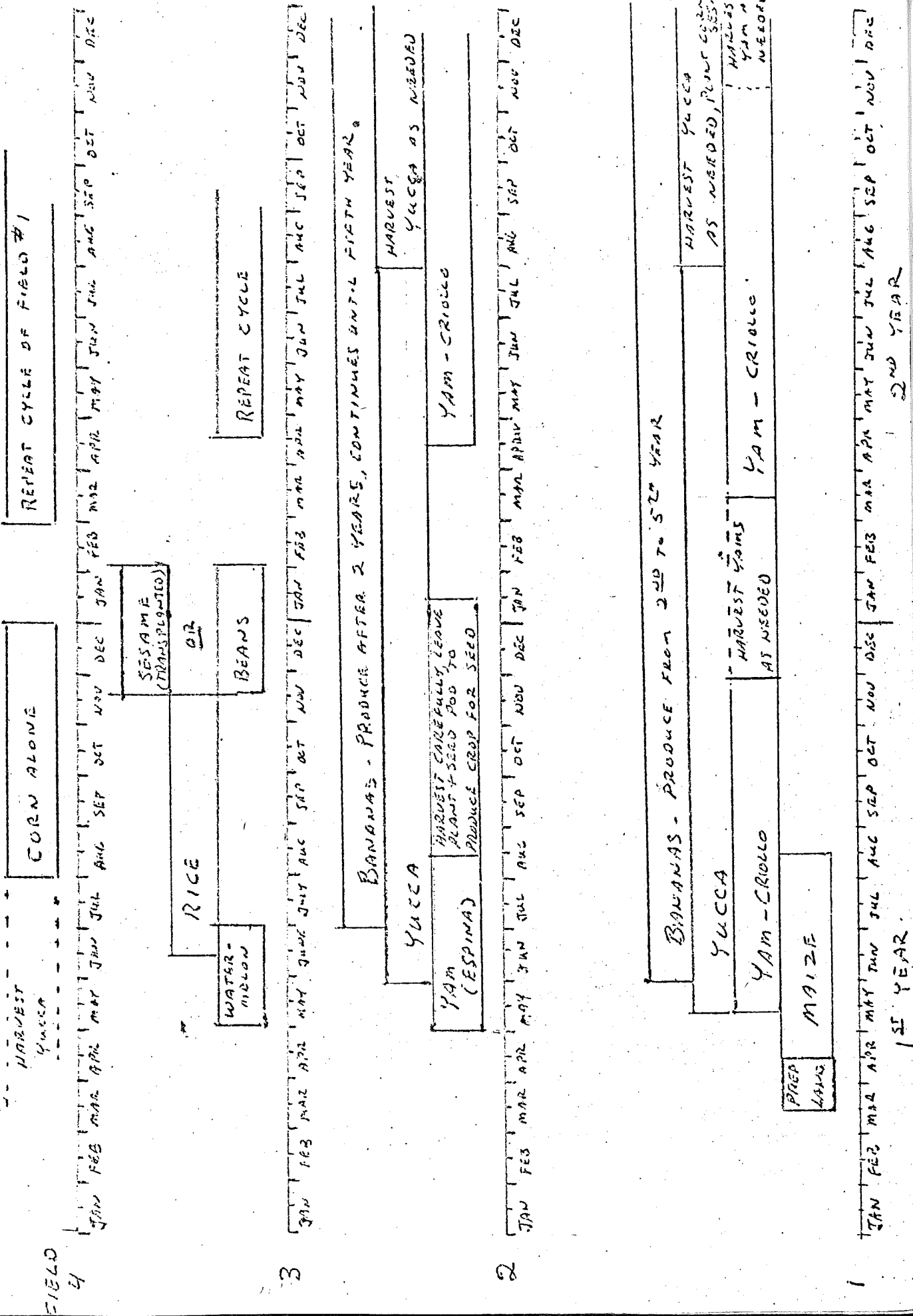
The Cropping Sequence. -

The agricultural system of Cacaotal is extremely complicated and variable. In addition to the variation from farm to farm which results from the decision of different individuals, there is wide variation at any given time of year as a result of weather, availability of credit, etc. Interplanting crops, which require anywhere from sixty days to five years to complete one cycle, makes it difficult to clearly identify any seasonal round of activities. Men with sufficient land tend to cultivate a parcel for about 26 months, leaving the bananas, and let that piece "rest" for three or four years before cultivating again. Those who can maintain this rotation, find that soil fertility is satisfactory without the addition of chemical fertilizer. The Las Cruces land, however, has been under continuous cultivation for about six years, and fertility has declined to the point where farmers recognize the need for fertilizer to restore fertility.

The three principal crops of the region are yams, yucca and maize; and another five of some importance. These are: bananas, rice, beans, sesame and watermelon. A typical cropping sequence of these crops on a piece of land divided into four fields is presented below in Figure 2.

The activities scheduled assume that the rains really do begin in April when they should, and that credit is available in the right amounts and at the right time. In fact, planting sometimes has to be postponed to May or June due to the lack of rain, and parts of the sequence are frequently lost for lack of credit. Bananas are not normally planted throughout a field, but rather in a corner, or in the house plot.

CROPPING SEQUENCE IN CACAOVAL, COLOMBIA FOR EIGHT CROPS



No attempt was made to cover a full five-year cycle of activities. The major round of activity is associated with the eighteen-month cycle of corn, yams and yucca. Eight farmers were asked to estimate their costs of production for one hectare plot of these three crops. The results are summarized below in Table I.

TABLE I

PRODUCTION COST ESTIMATES PER HECTARE FOR MAIZE, YAM, AND YUCCA - ASSOCIATION OVER 18 MONTHS PERIOD

ITEM	Range	Average of 8 informants*	
		Pesos	(man-days)
Seed - Maize	Pesos 50-300	189	
Yams	1,200-3,000	2,014	
Yucca	20-200	114	
Preparation (in man-days)	8-40		20.6
Planting Maize (in man-days)	3-12		5.5
Planting Yams (in man-days)	7-24		15.1
Planting Yucca (in man-days)	5-14		9.8
First Weeding (in man-days)	18-40		31.0
Second Weeding (in man-days)	18-35		29.1
Third Weeding (in man-days)	15-40		26.0
Fourth Weeding (in man-days)	12-30		20.8
Fifth Weeding (in man-days)	0-30		16.5
Harvest corn (in man-days)	5-20		11.5
Harvest Yams (in man-days)	15-50		29.1
Harvest Yucca (in man-days)	10-40		24.3
Transportation (in Pesos)	0-625	281	
		<u>2,598</u>	<u>239.3</u>

Production	Fanegas Range	Fanegas Average	Price Range	Average Price (Pesos)	Range or Total Value	Average Total Value (Pesos)
Maize	7-18	11.0	200 - 260	207.50	1,400 - 3,600	2,312
Yams	15-25	21.2	500 - 600	575.00	9,000 - 15,000	12,188
Yucca	12-62	26.1	200 - 280	215.00	1,920 - 15,000	5,965
Total		58.3				\$20,465

*The individuals responding in Tables I, II and III are 3, 10, 20, 56, 62, 78, 92, and 118 in the household list. They are located by the same number on the map.

1st YEAR: JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
 2nd YEAR: JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

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If we convert the average labor requirements to pesos @ 25 per man-day, we can estimate costs as follows:

\$ 2,598	cost of seed and transportation
5,975	value of labor
<u>600</u>	rent for 1 hectare - 18 months
9,173	costs of production
20,465	average total value of production
<u>-9,173</u>	costs of production
\$ 11,292	net income per hectare in 18 months

A number of cautions should be kept in mind. The data in the table are the estimates of eight individuals who keep no records whatsoever. Moreover, conditions vary from farm to farm. Similarly, some farmers give more importance to weeding than others. The variation in estimates is therefore not surprising. The figures which are surprising are those for the rental and sale of land. There was widespread agreement that the average sale price of ordinary land for cultivation was \$3,000 per hectare (as compared with 20-40,000 per hectare for the Cauca Valley). The rental price for land for cultivation was only \$600 per hectare for 18 months, or \$400 per hectare per year. On the other hand, land rents for pasture is \$30 per head per month. With two cows per hectare as a normal carrying capacity, this comes to \$720 per hectare per year, as opposed to \$400 per hectare per year for cultivation. The rental and sales prices seem absurdly low in relation to production. Moreover, cultivating without fertilizer takes more out of the land than does pasture, yet it is cheaper to rent for cultivation than for pasture. The situation is economically even more irrational when we recall that land under cultivation yields a great deal more in value of production than does grazingland. They estimate that each cow will produce \$150 milk per month for eight months, plus a calf. The value of the milk is only \$2,400 per year. The only explanation for the relative rental prices of land which comes to mind is that owners rent to cultivators for less in order to get the land cleared.

Inasmuch as the figures consider only a one hectare plot with three crops, they should understate average real farm income. Moreover, labor costs may be exaggerated since no one really pays \$25 per day for hired labor. The maximum is \$20, plus a meal served in the field. More and better economic information will clearly be a first order priority for the Systems Program. Although the simple interview guide used does not yield very precise economic data, similar approaches can be used to measure values and attitudes as they relate to farm family priorities.

Some Opinions of Peasants and Agricultural Scientists

To get some idea of the place of production goals in the overall scheme of the well-being of the farm family in Cacaotal, a paired comparison chart was prepared and administered to the same eight informants who gave economic data. Each item was paired with each of the remaining fourteen and the person was forced to choose one objective as more important to him than the others. Four CIAT experts were asked to choose one alternative on the basis of what was best for Cacaotal. The answers of both groups are presented below in Table II.

TABLE II

In terms of improving your way of life, which of the following two factors do you think are more important?

CIAT Rank Order	CACAOTAL Rank Order	I T E M	Ave. No. CACAOTAL Votes	Ave. No. CIAT Votes
1	1	To Improve family health	10.7	11.8
2	2	Education for the children	10.6	10.2
6	3	Credit to buy land	9.5	8.5
10	4	Secure title to more land	7.6	7.5
11	5	Credit on a longer term basis	7.5	6.5
3	6	Better price for products sold	7.4	9.5
5	7	Produce more yam, yucca and maize	7.1	9.0
12	8	Win the lottery	7.0	3.8
8	9	Produce more pork, beef, milk and eggs	6.5	8.0
4	10	Credit at lower interest rates	6.4	9.2
9	11	Rent land for cropping	6.2	7.8
14	12	Remodel the house	6.0	2.0
7	13	Birth control - family planning	5.7	8.2
15	14	Buy better equipment and furniture for the house	4.5	1.8
13	15	Find work outside agriculture	1.4	3.0

The most striking results of the comparisons are that both groups agree on the overriding importance of health and education, and the relatively low priority of the other "non-economic" variables. The only exception to this observation is that the CIAT experts gave greater importance to family planning than the peasants. A number of the informants were either past child bearing age, or were receiving birth control help from the Posta Medica in Chinú--hence the lower interest in family planning than one might expect.

While in the field, I was constantly reminded of the preoccupation with land. Getting credit to buy land, or getting secure title to land already in use is of the utmost importance to them. Their interest in renting land is much less intense.

CIAT experts and Cacaotal farmers came down on opposite sides of the fence on the credit question, with the farmers strongly favoring more long-term credit over credit at lower interest rates. The reasons for this choice were apparent. Almost all of the farmers were receiving credit from the Caja at one per cent per month when they used to have to pay five per cent per month to the local money-lender. So they had already achieved the goal of lower interest rates. On the other hand, the Caja system of credit is not adapted to the intercropping system of agriculture on the north coast. There is almost no money at all to buy land, and what there is goes into crop loans with a six month limit for corn and twelve months for yucca and yams. Since they all plant corn at the same time, their loans fall due at the same time, with a depressing effect on corn prices as they all have to sell at the same time. The yam and yucca loan periods are too short for the crops--particularly for yucca which is not normally harvested for eighteen months after planting. A system of revolving credit, or a permanent line of credit would be more compatible with the farmer's needs under his system of cultivation.

Five of the eight men in Cacaotal gave winning the lottery from 9 to 14 of their votes. They were the regular ticket buyers who spent one or two thousand pesos a year on this "investment!" Poor people, rural and urban alike, spend more of their incomes on lotteries, number rackets, and the like, than do people in the middle classes. The reason for this is that lotteries for the poor are like the stock market for the better off. If a man has 30 pesos in his pocket, he can buy six lottery tickets or a pair of sandals for his child. If he spends it on sandals, it is gone; an expense with no hope of return beyond a short period of use. With the lottery, he has put himself in a luck-maximizing position with six chances to really hit it big, buy a car, cattle or whatever, and in one jump, become "rich" overnight. Most of the other needs on the list can be effectively dealt with if one wins the lottery.

Getting work outside of agriculture is of particularly low value for this group of informants since they were all full-time farmers who had no other occupation.

A second paired comparison test was devised to focus strictly on the factors of production. The results are summarized in Table III below.

TABLE III

In order to improve the production of the farm, which of the following two factors would be more important?

<u>CIAT RANK ORDER</u>	<u>CACAOTAL RANK ORDER</u>	<u>I T E M</u>	<u>Ave. No. CACAOTAL VOTES</u>	<u>Ave. No. CIAT VOTES</u>
1	1	Water for irrigation	9.6	11.0
6	2	More land for rent	8.6	6.5
12	3	More land for sale	7.8	4.2
3	4	Seeds which will produce more	7.5	8.8
13	5	Small machinery	7.1	3.0
5	6	Seeds which will grow faster (Short-season varieties)	7.0	6.8
8	7	Better pasture for the animals	6.7	5.5
10	8	Herbicides for weeds	5.7	4.8
7	9	Better feed supplements for animals	5.6	6.0
11	10	Medicines for the animals	5.5	4.5
4	11	Insecticides	5.2	7.8
2	12	New varieties of fruits and vegetables	5.1	9.0
9	13	More manual labor available	4.5	5.2
4	14	Chemical fertilizers	3.5	7.8

As in the earlier table, there is strong agreement between farmers and experts on the most desirable item--water for irrigation. Unfortunately, gravity-feed tank systems of irrigation are not feasible in this area. However, wells within range of the electric service of the village can employ an electric pump plus hose to irrigate some of the area.

The land priority again stands out as one of the most desirable of the various factors of production, as far as the local farmers are concerned.

There are several important areas of differences in opinion. The farmers want machinery to eliminate some of the present labor requirements. However, the CIAT staff view this environment as one in which minimum tillage is appropriate. On the other hand, farmers are not much interested in fertilizers, insecticides or new varieties of fruits and vegetables, whereas CIAT experts see great potential benefits from these three items.

The implications of these tables are discussed below when we consider some possibilities for future work.

Some Limitations of the Present Study. -

The visit to Cacaotal lasted only nine days, and although I was resident in the village for the entire period and had a chance to visit with people in the evenings, the time period did not permit a penetration in depth in any of the areas under investigation. The purpose was simply exploratory, and the hope was to develop some ideas as to which areas of the small family farm need future work. We should note, however, that I did enjoy a number of advantages in this work which are not normally present in the work of an anthropologist. The fact that the Swine team had worked there for a number of years and had done much to help the villagers made my work immeasurably easier. Association with the CIAT effort allowed me to get started immediately with the leaders of the village in gathering data. Present personnel of the Swine team, Dale Fisher and Luz Elena Betancourt de Argel, were most helpful in providing information, insights, and introductions to the village officials.

The eight people selected for the various schedules were selected with certain criteria in mind which make them a bit unrepresentative of the village as a whole. Four of them were elected officials of the village, the other four were simply small operators. Two of the latter four were selected because of their known opposition to the present leadership. Only one of the informants owned more than the average number of cattle for the area, so presumably the data reflect a bias against cattle raising as opposed to crop production. None of the large land owners were included in the group, and this too biases the results in favor of the small cultivator, rather than the rancher.

The decision to work through the existing leadership was made for the conventional reasons; but in addition, the leadership of this village is unusually active in pressing elected officials of the government for solutions to their problems. I collected letters from them to high government officials all the way to the President of the Republic. Their concerns were focussed on three main issues--getting land titles to lands already occupied, getting help in organizing a cooperative for purchasing supplies and marketing their products, and getting the government to investigate and break a monopsonistic group, composed of some of the people of Cacaotal and a yam exporter in Cartagena. They charged that the exporter would only buy from this organized group and that he was paying \$888 per fanega for yams which they were buying in the village for \$450-500 per fanega. Transportation costs were estimated at \$70 per fanega, and village leaders considered the resulting profit as excessive.

Although I have no systematic data on the subject, I suspect that the prestige hierarchy of occupations runs from the cattle ranchers at the top, to people with cattle and other businesses, down to the full-time cultivators, with the day laborers at the bottom. I chose to concentrate my efforts on the full-time cultivators, rather than to select a few from each of the above categories, on the grounds that this group was more likely to be the focus of future activity of the Systems team.

The instruments used are to be regarded as only pretests of improved instruments to be employed in the future. Not only are many of the categories inappropriate, but the questions themselves are subject to change. For example, we might choose to put together categories of equal value in Pesos; such as, one cow, x number of pigs, x number of sacks of fertilizer, etc., and ask the question: "If you were in sudden need of cash, which of the following pairs of commodities would you prefer to sell first?" Similarly, we will need to study preferences on land usage, getting their preferences for various crops and the trade-off of crop land for pasture.

Work in Progress.-

The Swine Program plans to remain actively in charge of the work in Cacaotal through 1974. They are continuing their programs and have coordinated a series of new field tests with members of the Maize and Systems teams. Two hectares of land in Las Cruces have been rented for the tests listed below.

CACAOTAL PROJECT (1974)
SWINE, MAIZE, SYSTEMS

1. - Test of weed killers:

Control and two or three treatments
Area: 5,000 M²

Objective: To eliminate the first two weedings. This will bring down the costs of weeding by 50 per cent.

The weed killer must be compatible with maize, yucca and yam.

2. - Tests with varieties of yam:

The seeds would be brought from Carmen de Bolívar.

Objective: To watch the reaction of the maize and yucca association.

Area: 600 M²

3. - Test of population and fertilization of yam, yucca and maize.

Two (2) populations (control) 9,200 plants/Hectare distance: 1,20 m x 0,9
15,000 plants/Hectare distance: 0,9 x 0,75

Levels of fertilization: Two levels of fertilization would be tested; half in nitrogen, low in phosphorous and high in potassium.

Manner of application:

1. - At planting: 12 cms. below surface
2. - 1/2 at planting - 1/2 three months later
3. - 1/3 at planting - 1/3 three months later and 1/3 six months later

Total number of plots: two levels of fertilizer

three ways of application

two populations

four replications

Total: 48 plots of 50 M² each

Area: 2,500 M²

4. - Maize test. Comparison on creole and braquitico in relation to maize, yams and yucca.

Objective To watch reaction of braquitico in relation to yams. There will be four populations of maize.

- | | |
|---------------|----------------|
| 1) 1.20 x 0.9 | 3) 0.9 x 0.75 |
| 2) 0.9 x 0.6 | 4) 0.9 x 0.375 |

Total plots: 2 varieties

4 populations

4 replications

32 plots of 60 mts² each

Total area: 2,200 mts²

5. - Plot for observation of Xanthosomas: Distance 0,9 x 1.20 mts²

Lateral tubercles are harvested between 9 to 10. months

Area: 50 mts²

6. - Test of maize and caupi: Area 2,000 mts²

7. - Yucca test: Three creole varieties plus the llanera and tolimense would be taken as control:

Total plots:

5 varieties

4 replications

20 plots of 60 mts² each

Area 1,200 mts²

8. - Grain legume plot (Dr. Miguel Muñoz P. ICA)

• Area: 3,000 mts²

In addition to the trials listed above, there is some discussion going on as to the advisability of beginning projects on ducks and goats. Both of these animals offer the potential advantages of being able to produce well on rougher diets. The idea is that a reasonably well-cared-for goat will produce about as much milk as the average cow in the areas, and will do it at much less costs. If there is a market for the milk, cheese and cajeta which can be produced, this seems a project worth some thought. Some people have expressed reservations on the duck project on the grounds that they do not in fact produce as many eggs as chickens and the lower acceptability of the eggs.

Similarly, there is some interest in the possibility of doing a small project on irrigation. Loyd Johnson says that this is perfectly feasible near the village where electric current is available to run the pump. Hose is quite cheap, so if the well is located at the corner of several properties, we should be able to run trials on several properties from one well. The data already in hand indicate that water for irrigation is the number one desire of the villagers. On the other hand, they ranked fertilizers and new varieties of fruit and vegetables very low on the list. Since the CIAT experts rated these last two items of great potential benefit to the area, we could combine the irrigation project with intensive use of fertilizer and new varieties of fruits and vegetables. No doubt this will produce a more dramatic response to fertilizers than the unirrigated plots in Las Cruces. Making it at least in part a fruit and vegetable garden near the houses would make these projects more acceptable, as the theft problem would be reduced.

The economists of the Swine Team are currently carrying out a small study aimed at getting some information on the total capital available to farmers, labor availability, and data on land ownership and utilization.

Future Plans of the Small Farms Systems Team. -

We will need to plan our future activities in the Cacaotal region in the light of what has already been done there, what is currently scheduled to be done this year, and the collaboration with the ICA people in the area.

Certainly, we will need much more complete and precise data on the socio-economic realities of the people, as well as some more detailed assessment of their perception of their needs and possibilities. However, I do not think that we should accept their opinions and priorities at the present time as necessarily limiting and guiding our activities. For example, assuming that a successful irrigation trial with fertilizers and new varieties is carried out, I would expect to see a sharp change of opinion on the relative importance of these items. Similarly, our plans need not take into account their interest in such things as machinery, if we are convinced that it is not appropriate.

The Systems Program has another potentially fascinating possibility for study in the region. A large irrigation-drainage district is being formed around Turipaná. Loyd Johnson informs me that there is a group of small rice farmers on the lands adjacent to the station who have already been contacted by CIAT and ICA staff. Some data already exist on this group, and further work is now being planned. They will have water for year-around cultivation, and we felt that they would be interested in our collaboration. I think we should follow-up on this during our visit to the area later this month to see if we want to get involved in any way.

One of the major decisions that we will have to make is the degree to which we engage in research on variables which we know are important, but not subject to direct manipulation by CIAT. Yet, we cannot realistically deal with the small farm as a system without serious attention to factors which are exogenous to the farm unit itself. Land reform, credit to buy land, crop credit, the availability of all of the necessary inputs--seeds, fertilizers, herbicides, insecticides, and the like; and the conditions under which they are available are of vital importance to any analysis of the problems of small farmers, and will have to be dealt with by the team. Study on these problems will necessarily involve us in a study of such national institutions as the Caja Agraria, INCORA, etc., not only to discover what their policies are at the present time, but the limitations which they face in terms of the resources available to them to carry out their charters. Normally, institutions such as these have heroic charters and insufficient resources to carry them out. We will need to estimate the place that development of agriculture on small farms has in the national system of priorities.

In addition to the economic survey presently under way, we will have to investigate the peaks and troughs of the cycle of labor demand, and the whole question of the availability and prices of land. The figures cited earlier indicate that there is something abnormal in this area which we need to understand. Economists will also, no doubt, be interested in investigating the marketing system.

Given the high labor inputs of the present system, and the likelihood that not much can be done in the way of mechanization, it seems likely that we will emerge from all of the various studies and experiments with systems for small farmers which are scale-specific to them. In order for these to remain viable alternatives for the long-run, they will have to be sufficiently productive to enable the small farmer to survive along side of the larger operators, each performing specialized functions in that environment. Otherwise, we could expect the larger farmers with more resources to be able to continue the normal processes of land consolidation into larger units, leaving the small farmers without a livelihood, and more migration to the already over-crowded cities.

It is my feeling that we should begin on several fronts at once. We have already mentioned the field trials to be carried out, and the possibility of the irrigation project. We need to establish realistic parameters with respect to the national institutions which affect small farmers as soon as possible. Meanwhile, there is much to do at the village level. Here we can investigate the trade-offs in the decision-making possibilities which are presently within the power of the individual farmer. On such topic, mentioned earlier, is a study of the possibilities of altering the land use patterns on the finca, with a major component being the trade-off between using land for grazing or cultivation.

In the long run, close collaboration with ICA and the Caja will pay off when it is felt that we have the technological package ready for testing. ICA and the Caja already have developed the policies and the administrative machinery to use a system of supervised credit. At the present time, it is restricted in application to farmers with ten hectares or more, but no doubt, this restriction can be removed. Moreover, this collaboration includes other government agencies such as IDEMA and INCORA.

Government agencies in Colombia have already advanced well beyond the old extension techniques based on trying to reach all farmers with new information and trying to convince them that they should change their practices. This approach has proven costly and ineffective in dealing with the vast numbers of small farmers, given the shortage of extension personnel in all countries. The machinery already exists for applying the assumptions of the behavioral psychology model of human behavior, rather than the psychodynamic model, which is based on trying to alter the internal states of the individual. With the behavioral model, change is directed at the structure of advantage facing all small farmers, rather than at trying to convince the individual. With this approach, we simply assume that the farmer is responding to a perceived structure of rewards and punishments in such a way as to maximize his net welfare. I call this the Godfather Approach to Development, since it is based on the principle that behavioral change results when the combined institutional structure "makes an offer they can't refuse!" With this approach, we look at the behavior of the individual farmer from the point of view of maximizing his own welfare, and the effects of his decisions with respect to national goals of increasing food production. If his behavior does not contribute to both goals, then we conclude that there is something wrong with the present structure of advantage.

Farmers in Cacaotal are heavily dependent on the Caja Agraria for credit at one per cent per month. Their only alternatives are either no credit at all or paying five per cent per month to the private money lender. Thus, the Caja is in a key position vis a vis the structure of advantage facing the small farmer. When the ICA-CIAT technical personnel believe that they have a good technological package to test in a given region, and that they are

confident of the availability of all of the inputs at the right time, then a tie-in with the Caja could offer dramatic results. The farmer would then be confronted with the choice of getting credit under reasonable conditions, provided that he implements the entire technological package, or the present alternatives of no credit or expensive credit from the money-lender.

This approach offers strong positive incentives to adopt new technology, and, at the same time, selects the first group of adopters in the most economical manner. Extension agents do not have to spend their time trying to convince people to try new technology, but spend their time helping the adopters to apply the new technology. It seems to me that the final objective of the Systems team should be the implementation of our findings by the national agencies to raise national food production within the institutional framework they have already established for the task. To accomplish this end, we will need to work closely with these agencies in order to understand both their possibilities and their limitations.

APPENDIX

LISTA DE JEFES DE CASA EN CACAOTAL

No. Nombre

- 1 José Tomás Salcedo - No es propietario (trabaja en la finca de su mamá) 3 hectáreas - 15 reses.

- 2 Urbano Sarmiento - No es propietario (trabaja la finca de su suegra y mamá) - 1 1/2 hectárea - comercia con ñame.

- 3 Manuel Reyes Barrios - Propietario - 30 hectáreas en total; cultiva 15 y las otras 15 son pasto - 25 reses (a medias con otro).

- 4 Elario Alvarez - Padre de 4 y propietario - 10 reses.
 Manuel Alvarez - Hijo (trabaja en la finca de su papá) - 15 hectáreas.
 Gallero (cría de gallos finos para pelea). También trabaja finca del suegro - menos de media hectárea.

- 5 Adalberto Torres - Propietario - 1 1/2 hectárea (la alquila a cualquiera que necesita pasto) - 3 reses. Chofer (compró jeep).

- 6 Iván Sierra - No es propietario (trabaja en la finca del suegro) - no cultiva. Vive del comercio de ganado. Yerno de Antonio Rivero (11).

- 7 Eduardo Alvarez - Propietario de 10 hectáreas en Pasto (herencia de su mamá) - En Cacaotal trabaja en la finca de un familiar - 1 hectárea 10 reses.

- 8 Faustino Colón - Propietario de una casa de 600 metros cuadrados - Aparcerero de Las Cruces - 1 1/2 hectárea - Jornalero 5% del tiempo.

- No. Nombre
- 9 Juan Viviano - Tiene 5 hectáreas en Pasto - 2 vacas - En Cacaotal cultiva una hectárea de la finca de su papá.
- 10 Marco A. Vásquez - Propietario de un solar y de tienda-bar - cultiva 11 hectáreas en Las Cruces - la señora tiene 6 vacas y alquila pasto.
- 11 Antonio Rivero - Padre de tres hijos: Alfredo, Jorge (101), y Arturo (100) - Tiene 90 hectáreas - cultiva 1 1/2 hectárea. Sus hijos trabajan en la finca lo mismo que su yerno Iván Sierra y Ezequiel Martínez pasto - 60 reses en total.
- 12 José Angel Alvarez - Propietario de 10 hectáreas - Administra 20 hectáreas que son propiedad de la tía, Carmen Rivero, hermana de (11) - Cultiva 1/2 hectárea - pasto - 25 reses.
- 13 Miguel Simón Rivas - Propietario de 50 hectáreas - cultiva media hectárea - pasto - 25 reses. (anciano)
- 14 Carlos Alvarez - Vive en la casa de Alberto Torres - Profesión: chofer - Rafael Marugo Alvarez vive en su casa y es también de profesión chofer (carro propio).
- 15 José Domingo Salgado - Vive en la finca de Rosa Zavala (tiene casa y 3 hectáreas) - 1 hectárea es de él y también tiene 1 hectárea en Pasto (herencia) - 5 reses - Ganó \$40,000 en lotería.
- 16 Zoraida Pastorizo - Tiene una tienda, pero no terreno - Convive con Manuel Pedrozo de profesión albañil.

- No. Nombre
- 17 Gilma Díaz - No es propietaria - Lava ropa, plancha, pone inyecciones - Edad 40 años - tiene hijas y no tiene esposo.
- 18 Ramón González - No es propietario - De profesión jornalero agricultura.
- 19 Víctor Díaz - Propietario de casa, no de terreno - Las Cruces 1 1/2 hectáreas.
- 20 Rafael Noriega - Parcelero de un terreno en las Cruces - 2 hectáreas - 2 reses - alquila pasto.
- 21 María Hernández - Propietaria de una casa - vive sola - su hijo vive en Venezuela y le manda cheque.
- 22 Josefa Rivas - Ya no vive en ésta casa - Julia Eba e Hilda Díaz (Sra. de Colón) viven en la casa en la actualidad - Miguel Díaz da pensión (servicio social de Díaz) - Miguel Colón no es propietario - únicamente es jornalero.
- 23 Carmen Naranjo - Ya no vive en ésta casa - Luis Miguel Díaz vive en la actualidad - dentista, sastre, cantina - cultiva 1 hectárea (propiedad de la mamá) - 2 reses.
- 24 Rafael Alvarez - Vendió la casa a Januario Alvarez de profesión chofer (carro propio) - tiene 4 hectáreas de su propiedad en Pasto arrienda el pasto a otras personas.

- | <u>No.</u> | <u>Nombre</u> |
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| 25 | <u>Armando Díaz</u> - Propietario de una casa - profesión: peluquero - trabaja en cantina. |
| 26 | <u>Luis Torres</u> - Propietario de una casa - Compra ñame y yuca - la mujer compra y vende ropa. |
| 27 | <u>Luis Miguel Díaz</u> - Para mayores detalles ver (23) - la mamá vive en su casa y es mantenida por sus hijos - Juan Díaz de profesión sastre vive con ella - Su hija de nombre Simona es también sastre. |
| 28 | <u>Reinaldo Ojeda</u> - No es propietario de terreno - de profesión chofer y trabaja para Alfonso Bello (ambos tienen carro). |
| 29 | <u>María Betín</u> - Vendió su casa al Dr. Luis Pacheco, quien está construyendo casa para su mamá. |
| 30 | <u>Fernando Alvarez</u> - Propietario de una casa, pero no de terreno. Comercia con ganado - trabaja 1/2 hectárea (terreno cedido por un amigo) - 6 reses. |
| 31 | <u>Arturo Torres</u> - No es propietario de terreno - trabaja en la finca de su papá (33) - 10 vacas. |
| 32 | <u>José Miguel Alvarez</u> - No es propietario - de profesión chofer (no tiene carro o vehículo) - 4 vacas. |
| 33 | <u>Rafael Torres</u> - Propietario de 79 hectáreas - (31) trabaja con él lo mismo que Ricardo y Felix - 6 hectáreas bajo cultivo - pasto 30 vacas - Felix negocia con ñame. |

- | <u>No.</u> | <u>Nombre</u> | |
|------------|---|----------|
| 34 | <u>Pablo Salgado</u> - Propietario - Trabaja 5 hectáreas de Códines - 3 hectáreas en Brillante (las que son alquiladas) - propietario de dos carros - 40 reses - pasto alquilado - compra y vende ganado - compró 60 hectáreas recientemente. | 43
44 |
| 35 | <u>Estebán Salgado</u> - Es propietario - anciano y ciego - 8 hectáreas las que son trabajadas por su hijo. | 45 |
| 36 | <u>Pedro Salgado</u> - Hijo de <u>Estebán Salgado</u> trabaja los terrenos del papá - 1 hectárea - perforación de pozos. | 46 |
| 37 | <u>Rafael María Barrios</u> - Propietario de 1/4 de hectárea - trabaja 1 1/2 en Las Cruces. | 47 |
| 38 | <u>Jacinto Alvarez</u> - Arrienda cuando puede 1/2 a 1 hectárea - arregla corrales - carpintero rústico. | 48 |
| 39 | <u>Hernando Guevara</u> - No es propietario - Era albañil - paralítico y no puede trabajar - su mamá lo cuida . Edad: 35 años. | 49 |
| 40 | <u>Andrés Salgado</u> - No es propietario - trabaja 1 1/2 hectáreas en Las Cruces. | 50 |
| 41 | <u>Vicente Barrios</u> - Propietario de 40 hec.-paja, pasto.No cultiva nada. Tiene 10 reses - arrienda pasto a otros - cultiva una hectárea. | 51 |
| 42 | <u>Miguel Martelo</u> - Propietario de 50 hectáreas - cultiva 10 con sus hijos - 25 hectáreas en rotación o reserva - pasto - 40 reses. | |

- | <u>No.</u> | <u>Nombre</u> |
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| 43 | <u>Rafael Madera</u> - No es propietario - Trabaja en el terreno del suegro (Preciliano Bello) 1 hectárea - 5 reses. |
| 44 | <u>Ignacio Madera</u> - Propietario de 8 hectáreas cultivadas - pasto - 5 reses - trabaja 1/2 hectárea arrendada cultiva - <u>Diógenes Domínguez</u> yerno trabaja 1/2 hectárea arrendada. |
| 45 | <u>Marcos Díaz</u> - Propietario de 2 hectáreas - pasto - 3 vacas - arrienda una hectárea - Cura tanto a la gente como a los animales de la picada de culebra. |
| 46 | <u>Joaquín Martelo</u> - No es propietario - Trabaja en la finca del papá Miguel Martelo - ayuda con puercos de su propiedad. |
| 47 | <u>Santiago Ramos</u> - Propietario de dos hectáreas - cultiva una hectárea, en las Cruces 2 1/2 hectáreas - cerdos. |
| 48 | <u>Aura Ramos</u> - No es propietaria y vive con <u>Clemente Figueroa</u> . Las Cruces 1/4 de hectárea - jornalero. |
| 49 | <u>Manuel Pedroza</u> - No es propietario - Vive con (16) Zoraida Pastorizo, o la Nena (49) - tiene dos mujeres. |
| 50 | <u>Gualberto Alvarez</u> - No es propietario - Trabaja una hectárea en Las Cruces -fontanero - revisión de agua. |
| 1 | <u>Miguel Monterosa</u> - No es propietario - tiene un capital de \$2,000 que le produce 5% mensual (100 pesos) - No trabaja - Ayudado por (53) 2 vacas. |

- | No. | Nombre |
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| 52 | <u>Luiz Alvarez</u> - Fallecido-su yerno <u>Remberto Salgado</u> vive en ésta casa de profesión chofer - trabaja con Pablo (hermano) - tiene derecho de trabajar 1/2 hectárea en terreno de los Torres - 30 reses. |
| 53 | <u>Victoria Salgado</u> - Propietaria de 8 hectáreas - Viuda - pasto - un hijo - <u>Victor Ortega</u> - negocia ganado - tiene 6 vacas - tiendecita en la casa. |
| 54 | <u>Miguel Díaz</u> - Propietario de 1 hectárea en paja - 1 1/2 en Las Cruces. |
| 55 | <u>Rafael Alvarez</u> - Propietario de una tienda - negocia con ñame y frijol. |
| 56 | <u>Victorino Salgado</u> - Propietario de 1 1/2 hectáreas, 1 1/2 cultivadas - jornalero - 4 vacas - 62 años - 14 hijos - 10 de la esposa, 2 muertos, 8 vivos. |
| 57 | <u>Rufina Pupo</u> - No es propietaria - hace empanadas y pela arroz. |
| 58 | <u>Manuel Aviléz</u> - Anciano . No tiene propiedad . La hija vive en Monteria y le manda dinero. |
| 59 | <u>Modesto Torres</u> - Propietario de 5 hectáreas . cultiva 1 - jornalero. |
| 60 | <u>Miguel Simón Rivas</u> - No es propietario - jornalero- arrienda tierra cuando puede. |

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e
- No. Nombre
- 61 Martín Torres - Propietario de 1 hectárea - trabaja 1/2 - jornalero.
- 62 Dagoberto Alvarez - Propietario de 1 1/2 hectáreas cultivadas - 4 reses . comercia con fiame.
- 63 Francisco Tomás Torres - Propietario de 15 hectáreas - cultivadas 2 pasto - 20 reses - comercia con fiame.
- 64 Julio Díaz - Rene Pacheco -(propietario de una hectárea) trabaja en Venezuela - Julio es arrendatario - jornalero - construye casa.
- 65 Salvador Torres - No es propietario - jornalero.
- 66 Luis Castilla - No propietario - Jornalero.
- 67 Carlos Rivas - No tiene propiedad - arrienda 1 hectárea - jornalero.
- 68 Eudocia Salgado - Propietaria de 1 hectárea - viuda - la sostienen los hijos.
- 69 Bolívar Hernández - No tiene propiedad - arrienda 1 hectárea - jornalero.
- a
- 70 Juan Pablo Rivas - Propietario de 1 hectárea cultivada y tambien cultiva 1 1/2 hectárea en Las Cruces - 4 reses.

- | <u>No.</u> | <u>Nombre</u> |
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| 71 | <u>Plutarco Rivas</u> - No tiene propiedad - 1 1/2 hectáreas en Las Cruces
10 vacas - paga pasto. |
| 72 | <u>Fernán Sapa</u> - 1/2 hectárea de tierra prestada. Anciano. |
| 73 | (Templo y casa del templo) José Villalba (Pastor) - sueldo. |
| 74 | <u>Néstor Domínguez</u> - No es propietario - 1/2 hectárea cuando es
prestada o arrendada - jornalero. |
| 75 | <u>Jesús Sarmiento</u> - Propietario de dos hectáreas de pasto - 1 1/2 en
Las Cruces - 10 vacas - comercia con ñame. |
| 76 | <u>Casildo Salgado</u> - Propietario de 20 hectáreas de pasto - 50
vacas - propietario de un carro y le paga al chofer. |
| 77 | <u>Tula Torres</u> - Propietaria de 4 hectáreas - cultiva 1 - Vive sola -
edad: 40 años - 5 vacas - los hijos trabajan. |
| 78 | <u>Cristo Salgado</u> - No tiene propiedad - trabaja 1 1/2 en Las Cruces
3 1/2 fuera de aquí - 4 vacas - paga pasto. |
| 79 | <u>Estebán Salgado</u> - Propietario de 10 hectáreas en pasto - 30 vacas
negociante en ganado y ñame. |

- | No. | Nombre |
|-----|---|
| 80 | <u>Pedro Salgado</u> - Propietario de 8 hectáreas - pasto-monte
10 vacas - vive de la venta de leche. |
| 81 | <u>María Naranjo</u> - viuda de 81 años vive en la casa de Guillermo Díaz
quien falleció - María tiene 60 hectáreas, pastos - 40 vacas -
ayuda de dos hijos y 1 empleado. |
| 82 | <u>Andrés Pérez</u> - Propietario de 5 hectáreas - pasto, 8 vacas,
carnicero - mata y vende reses. |
| 83 | <u>Aurelio Salgado</u> - No es propietario de tierra - 5 reses - tienda
artículos de primera necesidad. |
| 84 | <u>Santander Salgado</u> - Propietario de 30 hectáreas - cultiva dos - 45
vacas. |
| 85 | <u>Emiro Díaz</u> - No tiene tierra - de profesión chofer (tiene carro
propio) - 5 reses. |
| 86 | <u>Felicita Torres</u> - No tiene propiedad. Auxilio de los hijos que viven
en otra parte. |
| 87 | <u>Diego Bello</u> - Propietario de dos hectáreas en Pasto - arrienda 2
Albañil la mayor parte del tiempo - dos reses. |
| 88 | <u>Julio Torres</u> - Se fue a Rincón Grande - <u>Juvenal Martelo</u> y el <u>Nene
Torres</u> trabajan en la tierra de sus padres (42) (63). |

- | <u>No.</u> | <u>Nombre</u> |
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| 89 | <u>Bibiana Riveros</u> - Propietaria de 1/2 hectárea - Pablo Salgado le ayuda. |
| 90 | <u>Rafael Enrique Torres</u> - Su padre es propietario de dos hectáreas afuera - negocia en ñame - tiene carro y camión - 15 reses. |
| 91 | <u>Juan Salgado</u> - Propietario de 6 hectáreas - cultiva 1/2 y arrienda el resto. |
| 92 | <u>Pedro y Alfonso Bello</u> - Padre e hijo - propietarios de 25 hectáreas cultivan una - 8 reses - propietarios de un carro. |
| 93 | <u>Francisco Miguel Domínguez</u> - de Profesión carpintero.
<u>Miguel Domínguez</u> - Arrienda 1/4 de hectárea - Padre de Francisco Miguel Domínguez. |
| 94 | <u>Rafael del Cristo Díaz</u> - No es propietario - arrienda 1/2 hectárea jornalero. |
| 95 | <u>Oalterio Pallares</u> - profesión: peluquero - arrienda 1/2 hectárea cerrajero de madera - propietario de una tienda. |
| 96 | <u>Sixto Guavas</u> - Se fue. La casa no está ocupada. |
| 97 | <u>Francisco Javier Pacheco</u> - Propietario de 550 hectáreas - 200 en Cacaotal - 350 fuera - cultiva 10 hectáreas - 40 en rotación - 3,500-4,000 reses- compra ganado - presta plata (otros dicen que él tiene 2,000 o 3,000 reses) Presta plata al 5% al mes. para pasto para los animales. |

- No. Nombre
- 98 Fernando Alvarez - Propietario de 15 hectáreas - cultiva 1 - 25 reses.
- 99 Miguel Martínez - Propietario de dos hectáreas - cultiva 1/4 hectárea viejo.
- 100 Carlos Arturo Rivero - Trabaja en la finca del papá Antonio Rivero (II) - negocia con ñame.
- 101 Jorge Rivero - Trabaja en la finca del papá Antonio Rivero (II)
- 102 Manuel Antonio Avilez - No tiene propiedad - jornalero
- 103 Victoria Barragán - No tiene propiedad - Los hijos son jornaleros
Cocina mazorcas.
- 104 Felicidad Praila - Arrienda 1 hectárea - jornaleros - Tiene un hijo en Venezuela.
- 105 Abraham Ramos - Propietario de 10 hectáreas - cultiva una hectárea 15 vacas.
- 106 Luis Salcedo - Propietario de 4 hectáreas - cultiva 1 hectárea - 2 vacas.
- 107 Jencho Salcedo: No tiene propiedad - Trabaja 1/2 hectárea que pertenece a Manuel Ignacio Salcedo.

- | <u>No.</u> | <u>Nombre</u> |
|------------|---|
| 108 | <u>Manuel Ignacio Salcedo</u> - Propietario de 4 hectáreas - cultiva 1 hectárea. |
| 109 | <u>Francisco Torres</u> - No tiene propiedad - jornalero |
| 110 | <u>Carmelo Villa Diego</u> - No tiene propiedad. Jornalero. |
| 111 | <u>Antonio Pacheco</u> - Propietario de 1 1/2 hectárea - cultiva 1 hectárea .
Jornalea de vez en cuando. |
| 112 | <u>René Pacheco</u> - Propietario de 1 1/2 hectárea - cultiva 1/2 hectárea
Viejo. |
| 113 | <u>Víctor Díaz</u> - Propietario de 20 hectáreas - pastos- 30 reses. |
| 114 | <u>Merardo Figueroa</u> - Propietario de 6 hectáreas - cultiva 1 hectárea
5 vacas. |
| 115 | <u>Lucina Díaz Salgado</u> - Nadie vive en ésta casa. Ella está empleada
en Sincelejo. |
| 116 | <u>María Betín</u> - No es propietaria . Vive de limosma de los vecinos. |
| 117 | <u>Andrés Sarmiento</u> - No tiene propiedad - jornalero. |
| 118 | <u>Luis Francisco Chimá</u> - San Mateo - cultiva 2 1/2 hectáreas en Las
Cruces - no tiene reses. |