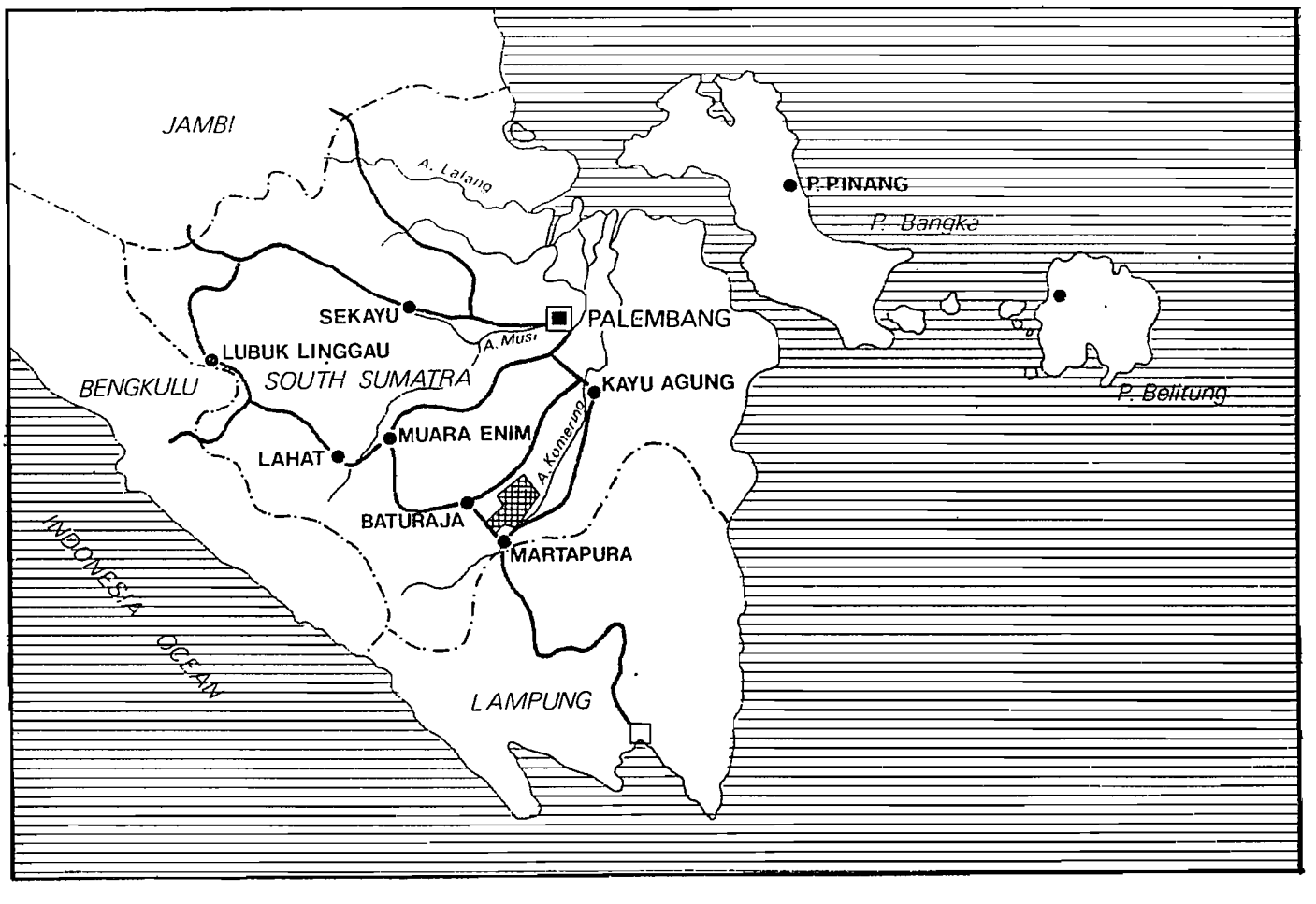
DEPARTEMEN TRANSMIGRASI
(REPUBLIK INDONESIA)
BIRO PERENCANAAN

INSTITUT FRANCAIS DE RECHERCHE SCIENTIFIQUE
POUR LE DEVELOPPEMENT EN COOPERATION
(REPUBLIQUE FRANCAISE)

BATUMARTA

AGRO - ECONOMIC SURVEY OF A TRANSMIGRATION CENTER ON SOUTH SUMATRA



INDONESIA - ORSTOM TRANSMIGRATION PROJECT PTA - 44
JAKARTA 1984

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AGRO-ECONOMIC SURVEY OF A TRANSMIGRATION CENTER ON SOUTH SUMATRA

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Translated from French by Mrs. M. MENGER

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DEPARTMENT OF TRANSMIGRATION
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PREFACE

As part of the working agreement between the Ministry of Transmigration of the Republic of Indonesia and the Office de la Recherche Scientifique et Technique Outre-Mer (O.R.S.T.O.M.), a comparative study of several Transmigration Centers was begun in September 1982. This study will continue for three to four years and will include, in all, about a dozen Transmigration projects distributed over several provinces on Sumatra, Kalimantan, and Sulawesi.

The initial objective of these studies is the obtention of basic agro-economic data that is as precise and reliable as possible. A complete record of the restrictions and of the factors favorable to the growth of agricultural production, both at the physical and human levels, is essential to the understanding of the production systems. It is also an indispensable preliminary to any suggestion for improvement, for the ultimate objective of these studies will be to provide the Transmigration Authorities with a coherent set of propositions and recommendations.

The following report only concerns one Transmigration Center, located in South Sumatra, and covers the period from September 1982 to June 1983.

In order to obtain data that is as precise as it is reliable, it was necessary to question the Transmigrants themselves. To this end, a random survey of 60 Transmigrant families was carried out, through direct enquiries and field observations, in four visits spaced two months apart. There are many advantages to this method, because it allows the observer :

- to follow the same families for an entire agricultural year;
- to gain the farmers' confidance, after the trauma of the first visit;
- to compile surveys which are more complete than those taken in a single visit (after an hour of questioning, the persons being polled have violent headaches);
- to verify the truthfulness of previously-given answers (there are numerous dissimulations or exaggerations, especially concerning yields and incomes);
- to get a better grasp of the evolutions of the situations encountered;

- and to obtain precise quantitative data by encouraging the farmers to record the amount of time spent in work, to note the amounts of seed, fertiliser, and pesticides used, and to measure their yields.

Along this same line, 10 of the householders (who were sufficiently well-educated, serious, and who wished to collaborate) were chosen to keep a journal. The results surpassed our highest hopes, as out of the ten selected families, nine kept their journals consistently and conscientiously for seven months.
They were asked to keep daily records of :

- their food : type and quantity of food eaten at the morning, noon, and evening meals;
- their work schedule : by type of occupation and length of time for every member of the family; participation of outside help; reciprocal assistance; paid labor; agricultural and non-agricultural jobs;
- their incomes : in cash or in goods, of agricultural source or not;
- and their expenditures : daily expenses and exceptional ones, gifts of cash or of goods.

The success of this method is without a doubt due to the personal interest which most of the householders took in their journals, especially where the family budget is concerned. Several of them insisted upon receiving the results of the analysis, at the end of the survey.

Only a part of the information obtained in this way was used to prepare the present report. The remainder will be the object of separate publications.

Note : See also :
"SEBAMBAN I : An Agro-economic Study of a Transmigration Center on South Kalimantan". ORSTOM - Trans. Dep. 1984.

I. TRANSMIGRATION IN SOUTH SUMATRA

With its area of 103,700 km^2, SUMATRA SELATAN (South Sumatra) is the largest of the Sumatranese provinces. Though relatively under-populated at the beginning of the century, the province has undergone an unusually rapid population growth, essentially due to a heavy migratory flow that is both spontaneous and organized. There were 4,630,000 inhabitants at the time of the 1980 census, or in other words, an increase of 67% with respect to the 1961 census, and the population density rose from 27 to 45 inhabitants per square kilometer in the same period.

The first organized transferrals of population to Sumatra Selatan date back to the colonial period and were occasioned by an urgent need of labor on the Dutch plantations. These got off to a particularly difficult start, since the first total failure of a Migration Center took place at Mata Lintang in 1919. Only two centers survived the colonial period : Tugu Mulyo and Belitang, both set up around 1937.

After a halt due to the Japanese occupation, the war for independance, and the reorganization of the young republic, the Transmigration operations started again in the early 1960's. From that time on, the goals of organized migration increased consistently, reaching their maximum during the third 5-Year-Plan with about 100,000 transmigrant families - one-fifth of the national objective - planned for Sumatra Selatan alone.

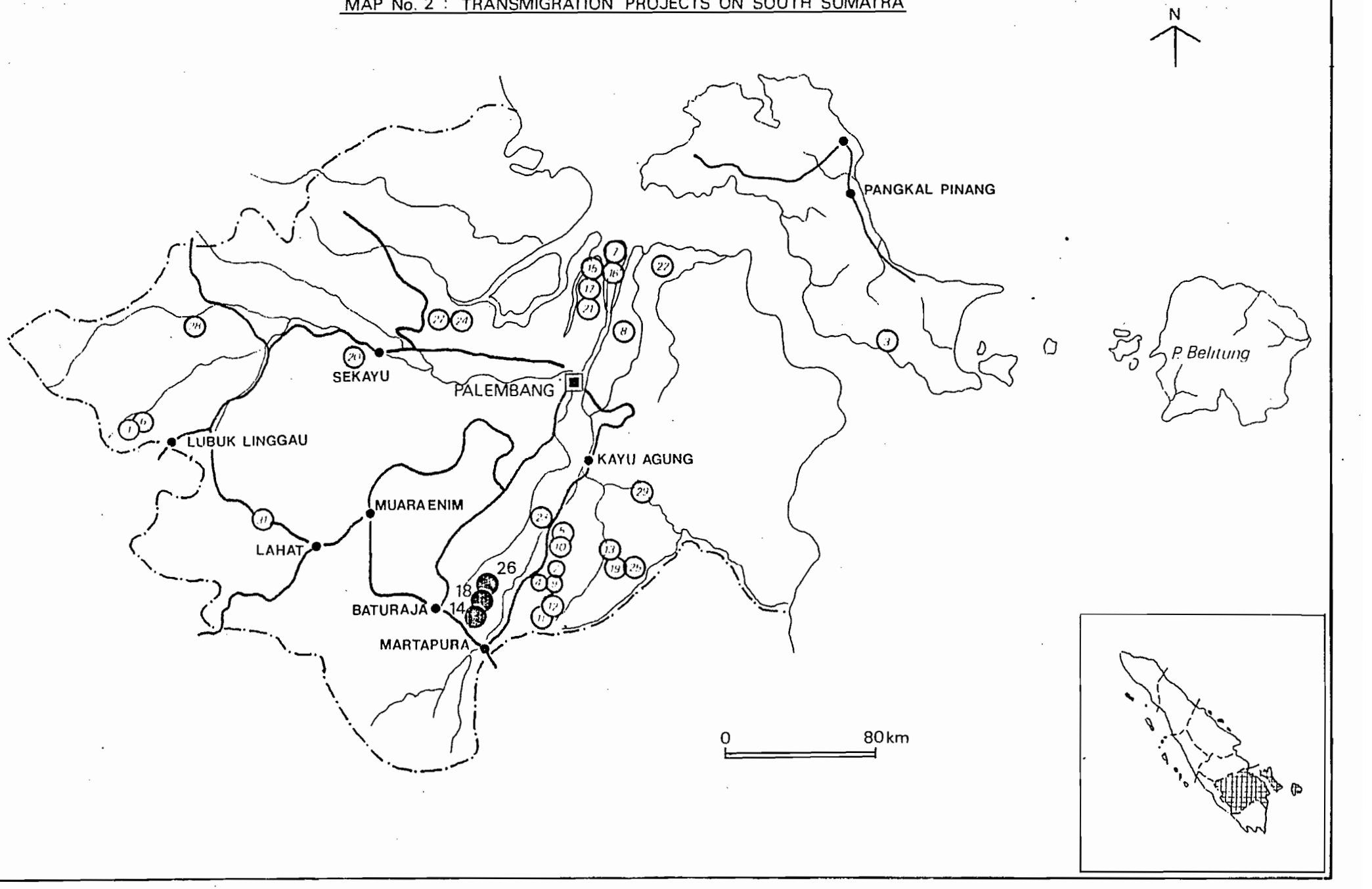
Table No. 1 gives the number of families transferred to Sumatra Selatan from 1950 to the end of December 1982, in function of the provinces of origin.

Map No. 2 shows the location of the 31 Transmigration Centers existing in the province in 1982.

The Baturaja-Martapura Transmigration zone, commonly called Batumarta, was the one selected for this study. The reasons behind this choice were :

- the type of financing of the project (IBRD - World Bank), which aims to make Batumarta a pilot project;
- the size of the Center, with 14 units of 400 to 700 families actually installed by 1983;

MAP No. 2 : TRANSMIGRATION PROJECTS ON SOUTH SUMATRA



MAP no 2 : TRANSMIGRATION PROJECTS ON SOUTH SUMATRA

LEGEND :

Colonisation : 1940

1. Tugu Mulyo /Air Deras
2. Belitang

PRA PELITA 1950 - 1968

3. Batu Betumpang
4. Belitang
5. Rasunan / Mendayun

PELITA I 1969 - 1974

6. Tugu mulyo
7. Upang
8. Cinta Manis
9. Belitang
10. Rasuan / Mendayun
11. Way Hitam II
12. Way Hitam
13. Pulau Panggang
14. Baturaja - Martapura
15. Talang

PELITA II : 1974 - 1979

16. Upang
17. Talang I - II
18. Baturaja - Martapura
19. Pematang Panggang

PELITA III : 1979 - 1984

20. Sekayu
21. Talang
22. Air Saleh I - II
23. Air Sugihan
24. Betung / Babat
25. Pematang Panggang
26. Baturaja - Martapura
27. Betung
28. Lembah Liam
29. Kayu Agung
30. Pangkalan Kersik / Betung
31. Lahat / Tebing Tinggi

- the Center's age : the first units were set up in 1976, the last are in the process of being installed;
- the type of development planned, combining food-crops and rubber plantations;
- the large amount of scientific and technical assistance given to the project;
- and the strategic location of the site, near the Trans-Sumatranese Road and the Tanjung Karang - Palembang rail line.

TABLE 1

Families Transmigrated to Sumatra Selatan

Province of origin	Pra Pelita (1) 1950 - 1968	Pelita I 1969 - 1974	Pelita II 1974-1979	Pelita III (2) 1979 - 1982	Total
West Java	5,371	1,190	1,972	12,047	20,940
Central Java	5,740	2,734	4,451	20,849	33,774
Yogyakarta	5,786	1,042	1,188	4,592	12,608
East Java	4,924	2,672	4,714	20,267	32,577
Bali	818	313	270	400	1,801
Jakarta	-	248	-	465	713
APPDT (local)	-	-	655	5,811	6,466
TOTAL FAMILIES	22,999	8,199	13,250	64,431	108,879
TOTAL PERSONS	97,355	36,726	60,373	277,298	471,752

(1) Pelita : 5-Year-Plan

(2) To end December only

II. THE BATUMARTA TRANSMIGRATION ZONE

1. Location

Situated between 3°59′ and 4°59′ S. latitude and between 104°10′ and 104°35′ E. longitude, the Batumarta Center is under the jurisdiction of 4 kecamatans in the Kabupaten Ogan Komering Ulu (OKU).

Since 1976, 14 units of 400 to 700 families each have been installed on the 65,000 hectares set aside for the Center, which is still growing at present.

Located about half-way between Baturaja and Martapura, the project can easily be reached by road from either of these towns (one hour by car) or from Tanjung Karang (5-6 hours by car). From Palembang, traveling by train is preferable due to the poor road conditions; Baturaja is situated about mid-way along the Palembang - Tanjung Karang line.

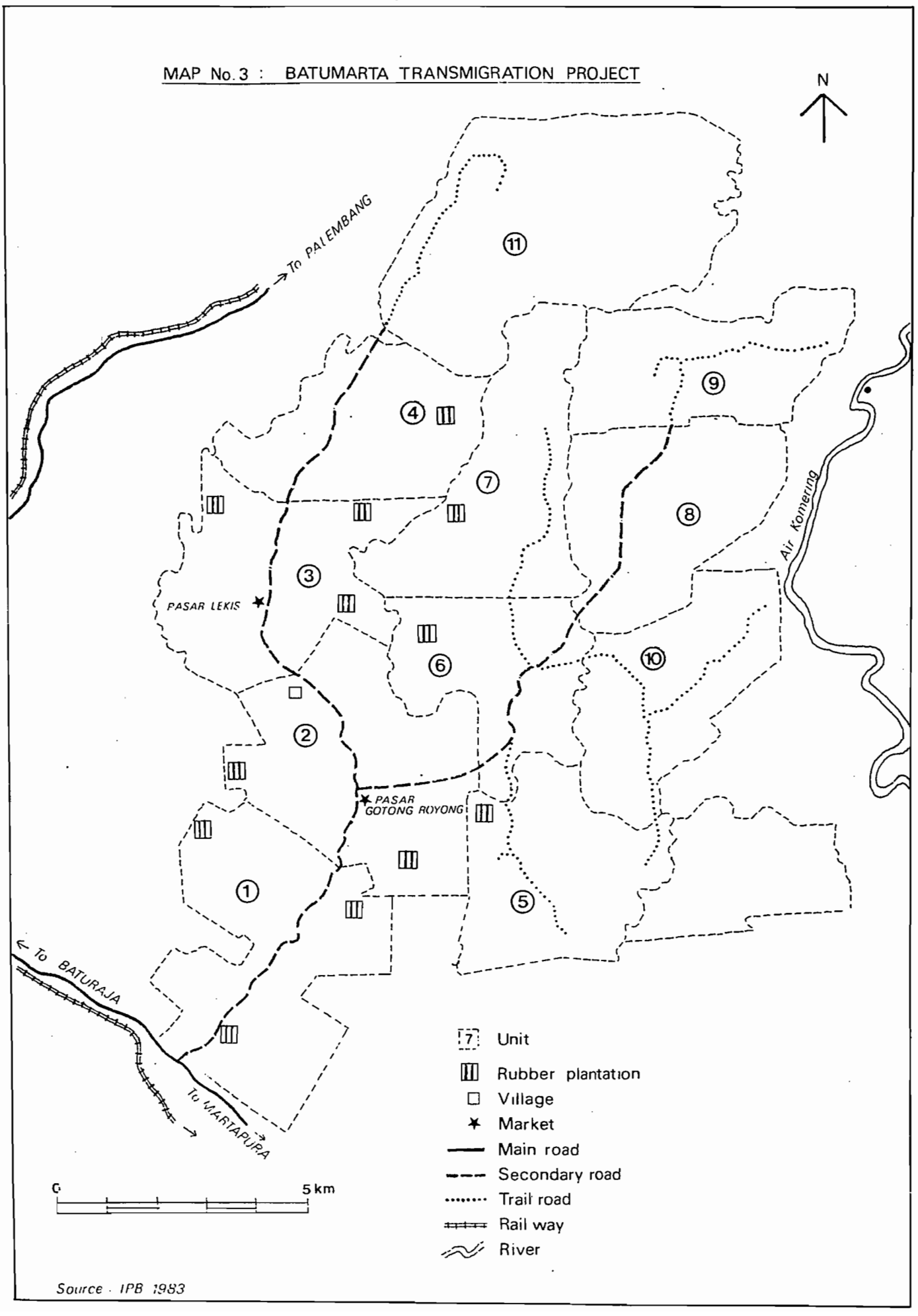
Due to such a favorable location, accessibility to the Batumarta Center is excellent.

2. Climatic Conditions

The only serious, complete climatological data available for the Batumarta region were collected in 1980, when a weather station was installed at the Seed Farm on Unit II. Available data collected prior to this date for Baturaja and Martapura only concerns the pluviometry and unfortunately appears somewhat unreliable.

The Annual Rainfall ranges from 1980 to 3760 mm, with an average of 2800 mm, for an average of 200 days of rain. December and January are the rainiest months, while June and July regularly show a considerable pluviometric deficit.

A dry season of variable length (1 to 5 months) can occur between May and November. 1982 was an exceptional year, since the dry season spread over six consecutive months, from the beginning of June to the end of November.


MAP No. 3 : BATUMARTA TRANSMIGRATION PROJECT
N
To PALEMBANG
PASAR LEKIS
PASAR GOTONG ROYONG
Air Komering
← To BATURAJA
To MARTAPURA
0
5 km
7 Unit
Rubber plantation
Village
Market
Main road
Secondary road
Trail road
Rail way
River
Source : IPB 1983

On the other hand, the period from December to April is consistently rainy, with a monthly pluviometry of more than 200 mm.

The table below shows the frequency of water shortages at Batumarta over the last ten years.

TABLE 2

Frequency of Water Shortages
(over the last 10 years)

Month	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Frequency/ 10 years	0	3	8	8	6	5	4	2	0

The Temperatures+ remain remarkably stable all year round. The average daily minimum is 22.0° C, and the average daily maximum is 33.0° C. The average overall temperature comes to 27.4° C with a maximum range of 2.0° C between the "coolest" and "warmest" months.

Daily Evaporation+, measured in a Class A container, varies from 2.7 mm/day in January (rainy season) to 7.0 mm/day in September (dry season).

The Relative Humidity+ comes to an average 82.5%, with a maximum of 96% in January and a minimum of 70.2% in September.

Wind Speed+ ranges from 52.9 km/24 hours and 107 km/24 hours with a yearly average of 74.7 km/24 hours.

The Daily Duration of Sunlight+ varies between 5 and 7 hours on the monthly average.

The climatic conditions of the Batumarta zone are favorable for the development of all tropical crops. The perennial plants whose root systems are already well-established easily survive the dry spells. However, the food crops might suffer from a water shortage between June and October. The pluviometric distribution is particularly favorable to two cropping seasons :

+ Unit II Weather Station; 2 complete years of observation only.

- An initial season from November to March would be particularly adapted to the cultivation of upland rice, either in monoculture or complanted with maize and cassava;
- A second season, from March to early June, could be profitably used for crops of shorter cycles than that of upland rice, namely, peanut, soya, or maize.

Due to the high risk of water shortage for annual crops, the period from June to October should be set aside for clearing and soil preparation.

3. Edaphic Conditions

The edaphic conditions of the Batumarta region are far from being as favorable as the climatic conditions.

On the whole, the zone has a slightly to moderately rolling topography with slopes that are generally inferior to 8%. There are nevertheless certain areas with slopes of 12 to 16%, but over short distances. Yet despite the slight nature of the slopes, as soon as the soil is under cultivation, certain forms of accelerated erosion appear after a few heavy rains. It is absolutely necessary for soil conservation to build terraces wherever the slopes exceed 8%.

Following excessive clearing, the greater part of the land is covered in Alang-Alang (Imperata cylindrica) as well as a few stretches of secondary forest. A handful of enclaves of small plantations owned by natives complete the landscape.

Aside from the recent alluvial deposits, on either side of the main waterways, the majority of the soils in the Batumarta region come under the classification of moderately desaturated tropical ferralitic soils. The pedological studies carried out by the L.P.T. (Center for Soil Research of Bogor) gives the following results :

- Rather thin upper horizons (15 - 30 cms) of good structure and correct drainage, covering more compact horizons that are very poor in organic matter and of slow drainage. Hydromorphic spotting and iron concretions often appear at slight depths. Despite the absence of any physical obstacle to their penetration, the root systems of perennial plants generally remain limited to the 50 first centimeters.

- Texture : sand, 2%; loam, 76%, clay, 22%. (The amount of loam, far too high for tropical soils, is probably due to a poor dispersion of the clays during the analysis.)
- Acidity : pH (H_2O) = 4.5 and pH (KCl) = 3.8 in the surface horizon.
- Organic matter : C = 1.81% and N = 0.13%, that is, a C/N ratio of 13.9 in the surface horizon.
- Exchangeable bases :
  Ca : 1.7 meq/100 g
  Mg : 1.0
  K : 0.3
  Na : 0.1
  or a total of 3.1 meq of exchangeable bases for a cationic exchange capacity of 9.9 meq, which is to say, a 31% saturation rate only. The amounts of exchangeable Aluminium are always very high.
- Reserves (in HCl at 25%) :
  P_2O_5 = 160 p.p.m.
  K_2O = 180 p.p.m.

The physico-chemical characteristics of the Batumarta soils are none too favorable for any intensive use for annual crops (food crops or cash crops).

Most of the soil's fertility - which is already mediocre - is linked to the organic matter, as the majority of the clays are of the kaolinite type with a low exchange capacity. The relatively compact nature and slow drainage of the underlying horizons leads to the formation of temporary water tables and increases the risk of accelerated erosion, even on slight slopes. The heavy rainfall, combined with limited cationic exchange capacities, reduces the effectiveness of fertilisation and leads to heavy losses if the fractioning is insufficient.

The high level of acidity in these soils prohibits the proper development of micro-organisms, which is a serious handicap for peanut and soya crops. The large amounts of exchangeable Aluminium, often combined with large amounts of Manganese, can lead to toxicity phenomena, especially in maize and leguminious crops.

Correcting the soils' acidity level and lack of phosphorus would necessitate massive quantities, on the order of :

- 4 to 10 tons of lime per hectare, and
- 5 to 10 hundredweight of TSP per hectare.

Needless to say, the cost of such an operation is absolutely impossible for the Transmigrants to bear.

But, if the soils in Batumarta are not favorable to intensive food-cropping, they are on the other hand particularly well-adapted to heveaculture. It was for this reason that Batumarta was chosen by the World Bank for the organisation of a pilot project of the N.E.S. (Nucleus Estate System) - rubber type.

4. Batumarta : a Pilot Project

The type of development chosen for the Batumarta Center (as well as for the Way Abung Center, in Lampung, and the Rimbo Bujang Center at Jambi) is based heavily on the Nucleus Estate System that the FELDA experimented with in Malaysia.

In the FELDA system, the migrants are given four hectares of plantations and a small garden, but no land for food crops. The Indonesian national objectives of food self-sufficiency have led the authorities to prefer, for Batumarta, a mixed system combining annual crops and rubber plantations.

Batumarta differs from a classic Transmigration Center essentially on two points :

- an investment of U.S. $ 5,000 to U.S. $ 6,000 per transmigrant family; to wit, almost double that of a traditional Center.
- an allotted area of 5 hectares per family, whereas the usual allotment is only 2 hectares.

Due to the large amount of financing provided by the World Bank, both Indonesian Universities and institutes, and international consultants were able to carry out numerous studies prior to the installation of the transmigrants. The administrative services have considerable means at their disposal, and a great deal of scientific and technological knowledge is being put to use. Thus Batumarta has a well-equipped weather station, a seed farm, and an experiment farm (C.R.I.A. : Central Research Institute for Agriculture, and I.P.B. : Bogor Agricultural Institute).

Each unit is subdivided into hamlets of 30 to 40 families each, installed near small dams built to collect rainwater which secure the supplies of fresh drinking water. Each family is allotted :

- 25 ares of garden (orchard, vegetable garden) around the house;
- 75 ares, also near the house, for food crops;
- 100 ares for the second food-cropping parcel, this time located on average one to two kilometers from the house;
- 100 ares of spare land;
- 100 ares of rubber plantation, set up by the PTP-X, which will not be given to the transmigrants until the sixth year, when the tapping begins;
- 100 ares of land which the transmigrant will plant in heveas himself.

As on the typical Centers, the settlers each receive a house, farm tools, fertilisers and pesticides, seeds and plants, cooking utensils, a mosquito net, etc....., as well as complete alimentary aid to cover the needs of the family during the first year of installation.

Contrary to the other Transmigration Centers, the large number of cattle brought in allows each family to have one animal, by the third year of installation at the latest. Supplies in fertiliser and pesticides are also larger, since they more or less meet the transmigrants' needs for the first three years.

Given the many studies and reports that have already been done on Batumarta, a supplementary monograph has but very little interest. Rather than studying Batumarta as a whole, the following outline was preferred :

- Follow precisely about 60 transmigrant families for an entire agricultural year (November 1982 to June 1983);
- Determine their lifestyle as it was in the province of origin, then as it is on the Center;
- List all of their activities, favorable factors, and constraints;
- Study precisely the reasons behind the rejection or acceptation of the cultivation methods and technical suggestions that are proposed to them;
- And then bring forth a list of propositions and recommendations adapted to the transmigrants' needs and possibilities.

In order to do this, 60 transmigrant families living in Unit I (installed in 1976-77) and Unit VII (installed in 1979-80) were chosen at random and followed in-depth during the 1982-83 agricultural year. As one of the householders left the Center during the study, the results only concern 59 families.

III. THE BATUMARTA TRANSMIGRANTS

1. Living Conditions and Human Factors in the Provinces of Origin

Due to the choice of Units I and VII for the study, only 5 of the 8 provinces of origin are represented in the sample.

Ethnic Composition of the Sample Group

West Java	: 27%
Central Java	: 37%
East Java	: 17%
B a l i	: 17%
Local transmigrants	: 2%

Housing

Only 39 of the 59 families, or 66% of the sample group, owned lodgings in the province of origin. The others either took advantage of the hospitality of parents or in-laws or, like many of the Balinese, lived in huts on the plantations which they were hired to maintain.

Out of the 39 families who owned their own home, only 19 sold their house just before their departure. The average sale price was Rp 314.000. The other 20 families preferred to leave their lodgings in the care of family members, as its sale would not have brought in a profit.

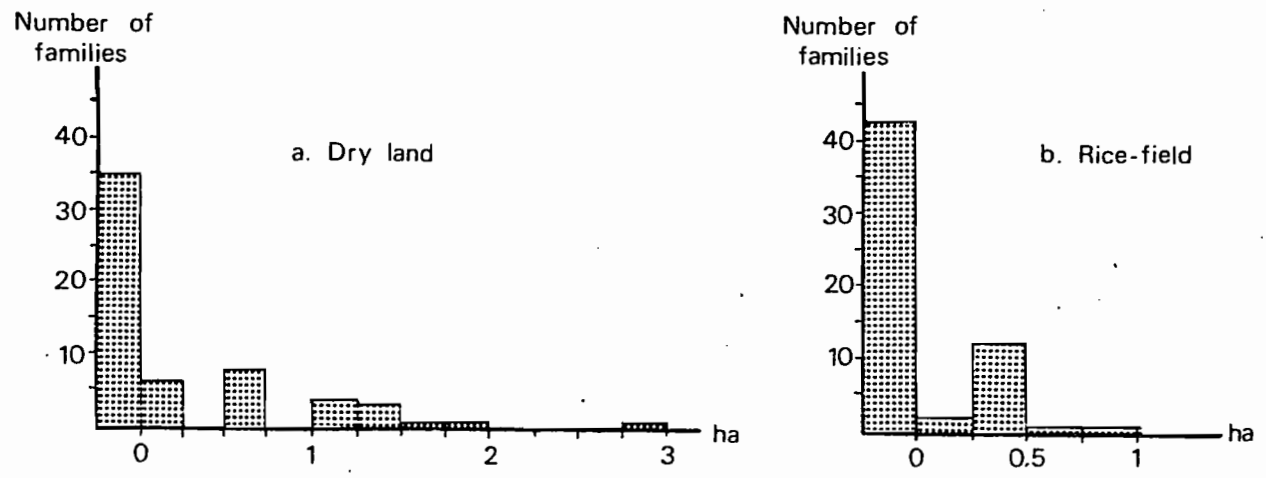
Land ownership

For the sample group as a whole, the average amount of land-holdings comes to 27.9 ares of upland and 10.6 ares of rice paddies.

These average have but little significance, as shown by the following histograms. In fact, 35 of the 59 families owned no upland and 43 out of 59 owned no rice paddy.

GRAPH No. 1

Land Ownership



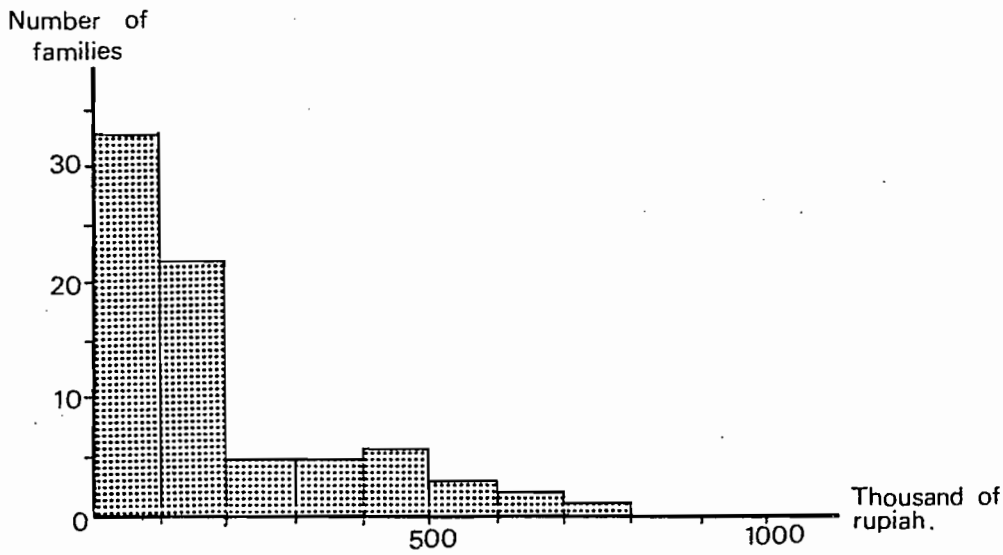
Out of the 24 proprietors of dryland, 11 sold their fields before departure, at prices which vary considerably according to the regions and locations. As for the 16 migrants who owned rice paddies, 6 chose to sell, and the others preferred to leave their parcels in the care of a family member.

Wealth

The wealth for one family, based on the total estimated value of saleable goods (farm animals, bicycle, radio, furniture, jewelry, etc.) comes to an average Rp 138.000. However, variability is high, as shown in the histogram below :

GRAPH No. 2

The Families' Wealth



33 families out of 59 (56%) owned less than Rp 100.000 in goods.

Out of the average Rp 138.000 in goods owned per family :

- Rp 77.000 worth was sold before departure,
- Rp 28.000 worth was brought to the Center,
- Rp 33.000 worth was given to family members.

Available cash upon arrival at the Center

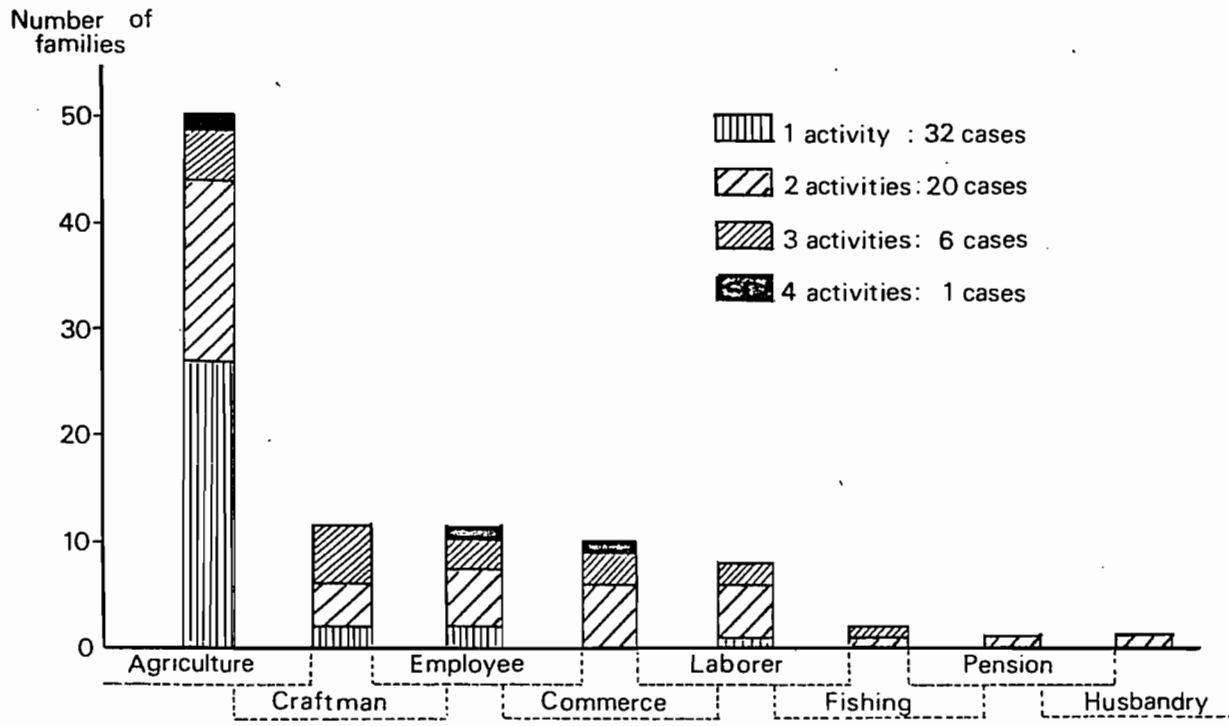
At the time of their arrival at the Center, two families had Rp 3.000.000 in cash at their disposal. Two other families had Rp 2.000.000 in cash, and 12 families had between Rp 100.000 and Rp 500.000, while the other 43 - to wit. 73% of the study group had less than Rp 100.000 in ready cash.

Sources of income in the provinces of origin

The next graph shows the migrants' activities in their home provinces and lists the number of activities per family.

GRAPH No. 3

Sources of Income in the Provinces of Origin



Agricultural activities remain predominant, as 50 families out of 59 had an agricultural occupation.

More precisely, within the sample group :

- 9 householders did not consider themselves farmers,
- 20 householders had only been agricultural workers,
- 5 were share-croppers and agricultural workers,
- 5 were small-scale landowners and agricultural workers,
- 5 were exclusively share-croppers,
- and 15 cultivated their own land only.

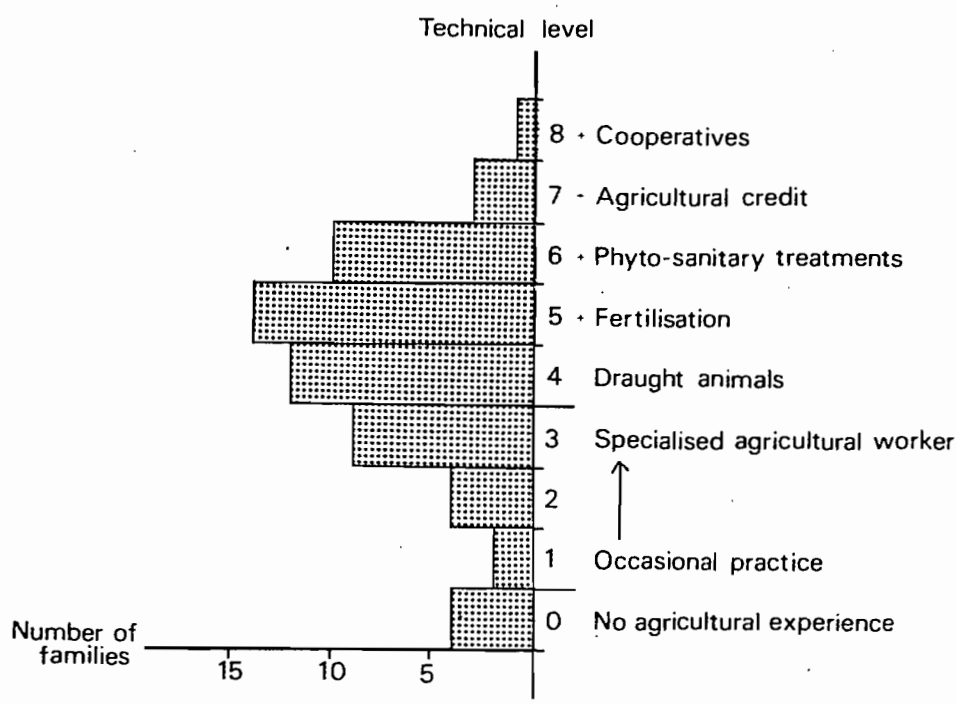
Technical level in agriculture

In order to evaluate the technical level of agricultural skills reached by the transmigrants, a system of "scores" was used, with the emphasis on the following subjects : experience in dry-farming, in rice paddies, in plantations, in the use of draught animals, in fertilisation, in crop protection, in agricultural credit; membership in a farmers' cooperative or in a group of productors, and the use of motorised equipment. Each skill is worth one point.

The following graph shows the results obtained by the sample group. Beyond a score of four points, the adoption of a new technical skill is always done in a precise order. For example, the adoption of fertilisation methods always occurs before that of phyto-sanitary treatments.

GRAPH No. 4

Technical Level of Agricultural Skills



On the whole, the transmigrants' technical level is relatively low, since in the study group :

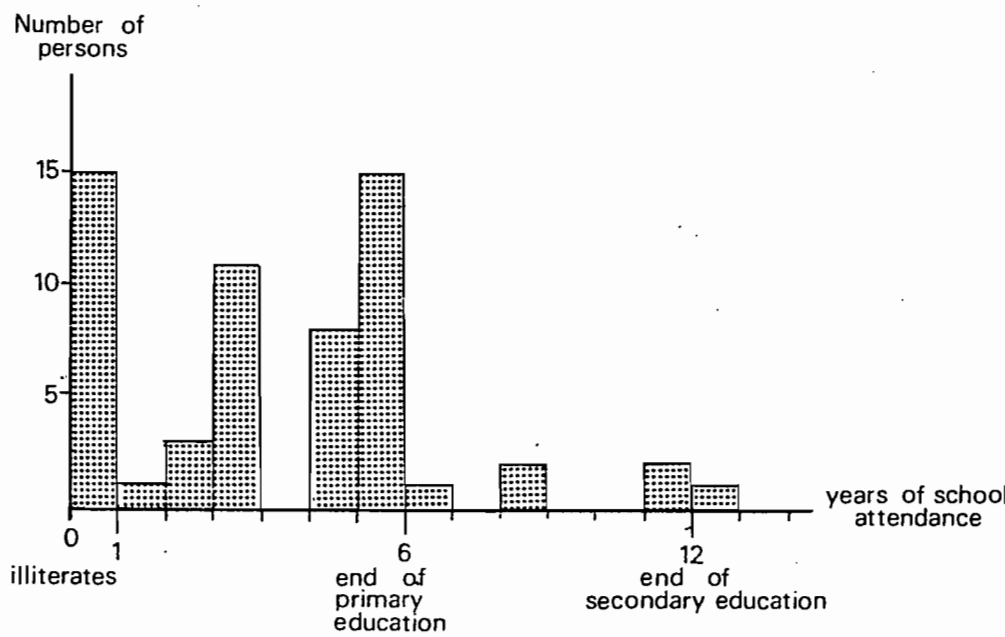
- only 47% of the heads of family regularly practised fertilisation;
- only 24% carried out phyto-sanitary treatments;
- and only 5% regularly took advantage of agricultural credit.

Householders' educational level

Graph No. 5 shows the considerable variability in the educational level of the heads of household :

GRAPH No. 5

Educational Level : Head of Family



- 25% of the householders are illiterate;
- 39% attended school but did not obtain a diploma;
- 36% have the general education certificate or higher.

Once again, it will be noted that the average educational level of the transmigrant population is considerably higher than that found in the provinces of origin.

Experiences in inhabitual surroundings

The following table is a good illustration of the Javanese or Balinese householders' limited mobility prior to their arrival at the Transmigration Center.

TABLE 3

Previous Travel Experiences : Heads of Family

DESTINATION	No of cases	%
Never traveled before	41	69
Within the province of origin	4	7
Within the native island	2	3
To another island	3	5
To SUMATRA	9	15
	59	99

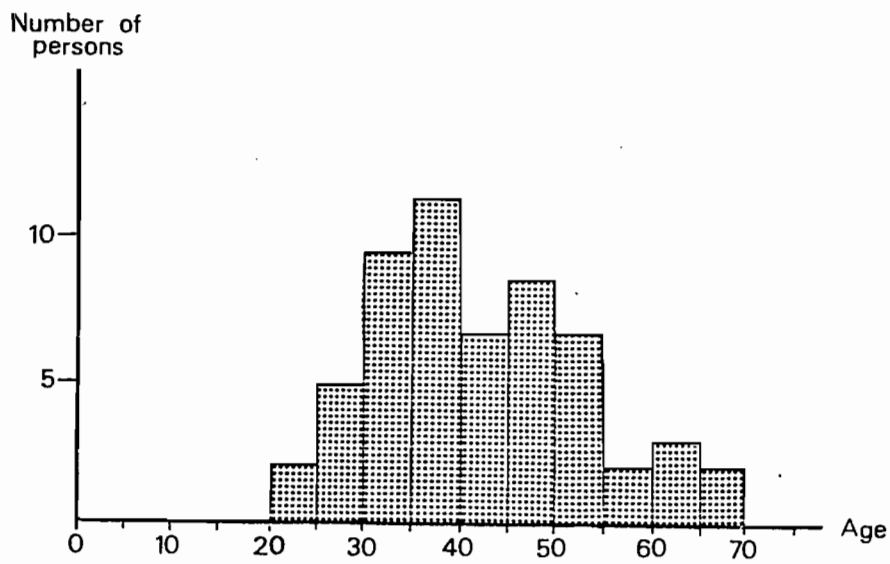
79% of the transmigrants had never left their native island (Java or Bali) before moving to Batumarta. This perfectly explains the difficulties in adapting to a very different environment which the majority of transmigrants have. However, 15% of the householders had already been to Sumatra : some had been agricultural laborers in Lampung, and others had previously been involved with Transmigration.

Age of the householders

The age limit of 40 years established for those who volunteer to transmigrate does not seem to have been scrupulously respected at Batumarta, since the average age of the householders in the sample group comes to 40.7 years. However, it is true that this age limit does not apply to victims of natural catastrophes (floods in the Semeru region), neither to retired army and police personnel, nor to those whose land was expropriated for general interest projects (construction of the Wuriantoro dam), all of whom are relatively numerous at Batumarta.

GRAPH No. 6

Householder's Age



Family composition

There is no notable difference in age between the householders in Unit I and Unit VII, but the same cannot be said of the family composition.

TABLE 4

Family Composition

	Number of persons	aged ≥ 15 years	aged < 15 years
Unit I	6.7	3.8	2.9
Unit VII	4.8	2.9	1.9

The Unit I families have on the average one more child and one more adult than the Unit VII families, thus a notably larger labor force.

The above-mentioned figures only take into account children that are still supported by the family. Those children who are already married are included only if they live with their parents, if they participate in the agricultural chores, and/or if they share in the income and expenditures.

Though the transmigrants are all in the same initial situation when they arrive at the Center, numerous factors from their past experiences - technical and educational level, amount of cash available in the beginning, family labor force, etc. - will lead to a large heterogeneity in the development of the agricultural exploitations.

2. The Transmigrants' Agricultural Activities.Evolution of Landholdings

To prevent the transmigrants from selling their parcels, the Authorities have recently introduced the idea of usage rights for a limited period, which replaces the property rights. Thus, only the transmigrants in Unit I have titles to their land, and the Unit VII families only have a usufruct for their parcels. When the Provincial Authorities take responsibility for the Center (5 years after installation, as a rule), the settlers will be able to ask that their usufruct be transformed into full proprietorship. This perspective is extremely worrisome for the families, as it will necessitate numerous administrative paperwork and, of course, considerable expenses.

Moreover, this measure does not seem to be very effective, as it in no way prevents land from changing hands, as one soon found out :

- Of the 59 families in the sample group, 57 were allotted 5 hectares. One transmigrant combined his lot with his mother's parcel after his father's death, giving him a total of 10 hectares. One spontaneous transmigrant only received 50 ares.
- Rather than clear their distant lots, three settlers in Unit I preferred to buy, respectively, 1.5 ha., 1 ha., and 0.25 ha. closer to their houses.
- For the same reason, two families in Unit VII chose to rent 0.5 ha. and 1 ha. of land near their houses.

- Sixteen families out of 59 cleared between 0.25 ha. and 1 ha. of community land, without authorisation.
- Cases in which land was sold, or more precisely, transferred for an indemnity (local terms), concern 6 families for areas ranging from 0.25 ha. to 0.75 ha.

Most of the migrants hesitate to cultivate the second plot set aside for food crops, which is usually between 1 and 2 kilometers from the house. Aside from the distance that must be covered, these plots are often close to wooded areas and are regularly ravaged by herds of wild pigs.

Evolution of cleared surfaces

Theoretically, upon arrival each family should be able to have one hectare of land that has been plowed using a tractor and is ready to be seeded. However, the areas that were actually labored with a tractor differed greatly, as shown in the table below.

TABLE 5

Surfaces Prepared with a Tractor

Surface	0 ares	1-10 ares	11-20 ares	21-40 ares	41-60 ares	2 ha.
Number of cases	17[x]	1	3	32	5	1[xx]

x of which 16 are in Unit I

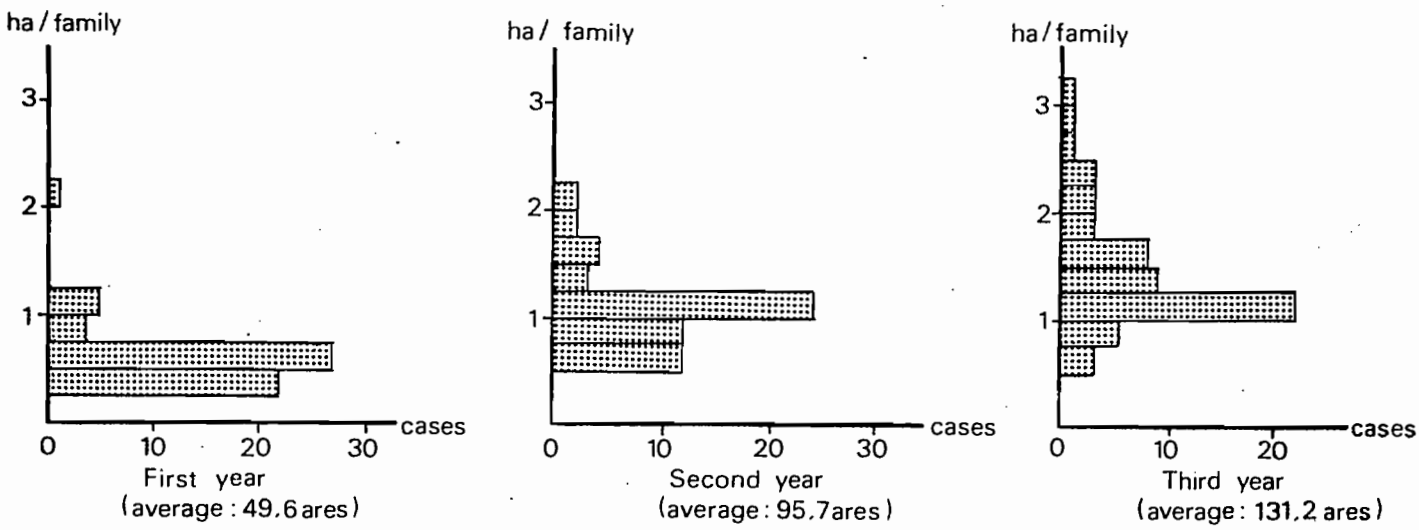
xx plowed by mistake

The evolution of the surfaces that were cleared and cultivated during the first three years after arrival at the Center is very closely linked to the areas that were previously plowed with a tractor and to the family labor force.

The next graph shows the evolution of the labored areas during the first three years.

GRAPH No. 7

Evolution of Cleared Surfaces



Though relatively homogenous in the first year, the areas cleared per family rapidly evolved, and a large dispersion can be seen as early as the third year (from 0.5 to 3.25 ha. per family).

After the fourth year, the average surface area cleared comes to 145 ares in Unit VII, while after the same period, it was only 114 ares in Unit I. (After six years at the Center, the average for Unit I comes to 163 ares.)

This difference between the two Units can be explained essentially by the earlier use of draught animals, as well as by the employment of private tractor drivers in Unit VII. The next table lists the main methods of laboring the soil, and the period in which draught animals were first put to use.

TABLE 6

Methods of Laboring the Soil

	Use of draught animals beginning in the 2nd year	3rd year	4th year	Still manual	Employment of tractor driver
Unit I	12%	35%	22%	31%	
Unit VII	12%	45%	10%	2%	9%

By the end of the third year, the growth of the perennial crops set out in the "pekarangan" - the 25-are parcel around the house - progressively prevents their use for the food crops. For Unit VII, of the average 145 ares cleared per family, 15 ares had already been ser aside for the orchard in 1983. In Unit I, the orchards take up an average 20 ares or so. Some of the plots cleared in the first years had already been abandoned.

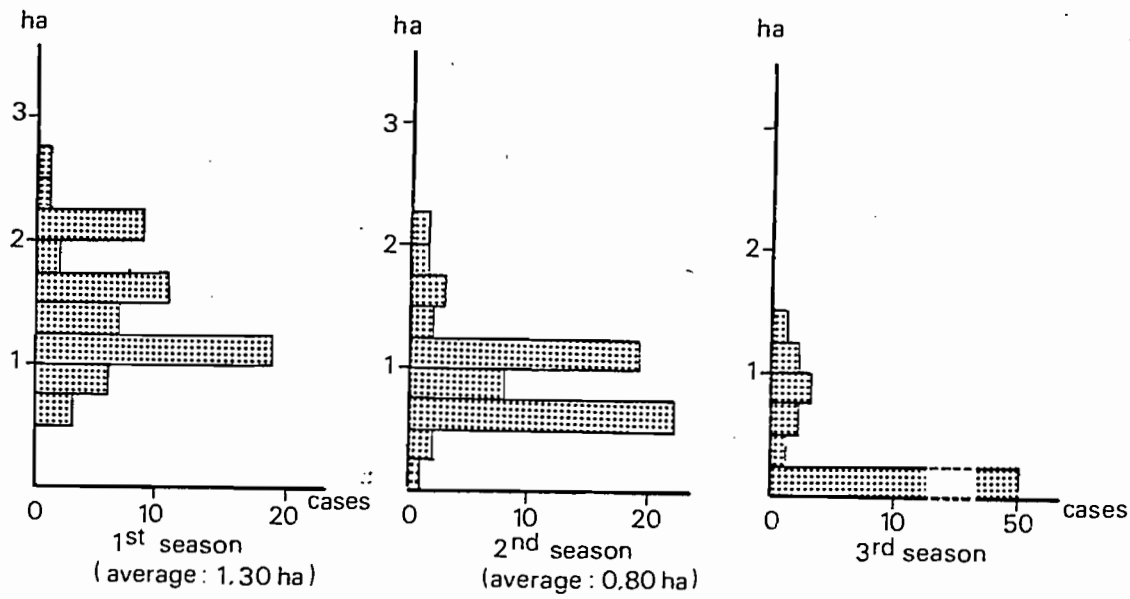
The annual crops

The climatic conditions in the Batumarta area always allow two cropping seasons, and sometime a third, if the dry season is late. However, in view of the high risk of drought, most of the transmigrants (50 out of 59) would rather not take chances.

The surfaces that were actually cultivated in food crops during the three seasons are given in the next graph.

GRAPH No. 8

Surfaces Under Annual Crops



Of the 130 ares cultivated in the first season, only 80 were used for a second season. There are several reasons behind this reduction :

- the necessity of seeding the parcels as quickly as possible so that the harvest will fall before the dry season incites the migrants to reduce their cultivated surfaces;
- the lack of seed often makes it necessary to reduce the planted area;
- the second cropping season being generally reserved for plants which are very tempting to the wild pigs (maize, peanuts, soya), all the parcels located at a distance from the house are usually left fallow.

Among the first-season crops, rice - the basic food - is obviously the transmigrants' preference. Of the 130 ares cultivated in the first season, an average 104 ares are set aside for rice.

Upland rice is traditionally cultivated in "Tumpang sari", that is to say, complanted with maize and cassava (41 cases out of 59). Where the distance of the plots leads to a risk of raids by wild pigs, rice as a single crop is the only solution. Aside from this, three families in the sample group set up small irrigated ricefields.

Table 7 lists the types of crops grown, the number of families concerned, the average surfaces cultivated in each crop, and the average surfaces cultivated for the sample group as a whole.

TABLE 7

Annual Crops - 1st Cropping Season

Crop	No. of families	Average surface per family concerned : ares	Average surface for study group : ares
Upland rice	20[x]	102	
"Tumpang sari" -rice	41[x]	100	107
Irrigated rice	3[x]	51	
Cassava	9	28	
Maize	13	28	
Peanuts	6	31	
S o y a	3	25	22
Green gram	7	14	
Sweet potato	2	25	
Truck garden	17	19	
Watermelon	3	21	
Family vegetable garden	59	± 1	± 1
TOTAL	59	≠	130

[x] 5 families had two plots under rice

In the second cropping season, the production is much more varied, as shown in table 8;

TABLE 8

Annual Crops - 2nd Cropping Season

Crop	No. of families	Average surface per family concerned : ares	Average surface for study group : ares
Upland rice	1	25	9
"Tumpang sari" rice	5	82	
Irrigated rice	1	75	
Cassava	6 (+9 in 1st season)	30	69
Maize	27	38	
Peanuts	20	24	
Green gram	17	35	
S o y a	9	32	
Sweet potato	4	50	
Truck garden	21	20	
Kacang tunggak[x]	20	46	
Watermelon	5	22	
Family vegetable garden	59	1 - 3	1 - 3
TOTAL	59	=	80

x Vigna unguiculata

Only seven families out of 59 grew rice in the second season. The transmigrants preferred to raise maize, peanuts, green gram, and truck crops. The choice of one or the other crop is essentially based on dietary habits, available seed, and the previous year's experiences. Within the sample group, the choice is also highly influenced by the block or quarter in

which one lives. It is very rare for a transmigrant to single himself out by choosing a crop that is different from his neighbors', for were it to fail, he would be the laughingstock of the neighborhood. On the other hand, should he succeed, there would soon be a great many others following in his footsteps.

In the third cropping season, if the farmers have been able to prepare the soil before the onset of the dry season, some settlers try a crop of peanuts, green gram, or kacang tunggak on plots of around 50 to 75 ares. Those families who have parcels near water holes prefer to raise vegetables, a very profitable crop during the dry season.

Nevertheless, in an average year, only 9 families out of 59 cultivate their fields during the third season.

The average yields obtained for the various crops since the opening of the Center are given in the following table.

TABLE 9

Crop Yields

Crop	Average minimum kg/ha	Average yields kg/ha	Average maximum kg/ha
Upland rice	500	800	1090
Irrigated rice	500	1600	3000
Maize - complanted	200	300	700
Maize - single crop	300	450	600
Green gram	120	200	340
Peanuts (unshelled)	150	450	850
S o y a	170	290	400
Cassava	1300	3500	6000
Sweet potato	300	900	1100

Rice cultivation, since it is of such importance to the transmigrants, deserves a more detailed study. Moreover, as it is the only crop grown on a large-scale basis by all the transmigrants, studying it will allow one to evaluate the farmers' technical level in agriculture.

A Dominant Crop : Upland Rice

The following figures were obtained through personal enquiries and field observations of the 59 families surveyed during the 1982 - 1983 agricultural year.

Soil preparation

There is a great deal of heterogeneity in the methods of soil preparation (tools used and number of passages) employed by the migrants. However, for a single exploitation, the same technical steps are generally followed for all the plots, with the exception of recently-cleared fields where the presence of roots and stumps does not permit the use of draught animals.

In 1982 - 1983, for 59 settlers :

- 18 prepared the soil exclusively with a hoe,
- 3 used a hoe on the recently-cleared plots and a plow on the others,
- 36 used draught animals, with occasionally one or two passages carried out manually,
- 2 hired private tractor drivers.

The frequency of the preparation methods, the number of passages, and the usage patterns are given in the following tables.

TABLE 10a

Manual Soil Preparation

Number of passages	Usage patterns[x]	No. of cases/59	
3	CCM	6	8
	CMP	2	
2	CC	11	
1	C	2	
TOTAL MANUAL		21 (of which 3 on part of their land only)	

[x] See following page.

TABLE 10b

Soil Preparation with Draught Animals or Mixed

No. of passages	Usage patterns	No. of cases/59	
7	BBBBBBB	1	
5	BBBBB	1	
4	BBBP	8	15
	BBBM	6	
	BBMP	1	
3	BBM	8	14
	BBP	4	
	BMP	2	
2	BB	6	8
	BM	2	
TOTAL USE DRAUGHT ANIMALS		39 (of which 3 on part of their land only)	

TABLE 10c

Motorised Soil Preparation

Two cases only : TTCC, and
TCBC

x Key to abbreviations in Tables 10a, 10b, and 10c :

C : cangkul - laboring the soil with a Javanese or Balinese hoe
M : meratakan - levelling the soil with a hoe
P : parit - building of small dykes or runoff trenches
B : bajak - plowing with a Javanese plow
T : traktor - plowing using a tractor-pulled disk-plow

The quality of the soil preparation, whether done manually or with draught animals, is generally correct since the majority of settlers adjust the depth capacity of their tools to the thickness of the horizons that are rich in organic matter. On the other hand, as has already been mentioned, the tractor-drivers tend to plow too rapidly and too deeply, without taking into account the heterogeneity of the ground.

Sowing

Due to the extremely long dry season in 1982, the soil preparation was complete before the rains began at the very end of November. For this reason, the dates on which the upland rice was sown are spread over a much shorter period than in the other years. The sowing operations began December 1, 1982 and were finished around December 15, 1982.

According to the area to be seeded, the sowing is done either as a family or in reciprocal assistance (5 to 20 people, sometimes more). The men make the seed-holes with a dibbling stick, and the women and children push dirt over the holes with their feet. An average 29.3 kgs of seed is sufficient to cover one hectare.

A list of the varieties of upland rice used is given in Table 11 :

TABLE 11

Varieties of Upland Rice Used

Variety	No. of families using the variety/59	Length of cycle : months
Gando	28	5
Serendah	21	4
Semester	20	5.5 - 6
Medan	16	5
Lampung Kuning	5	4.5

Fifteen other varieties are also used, but these are of limited importance as they only appear in one or two cases and concern limited areas. On the other hand, the large majority of migrants cultivate one or two varieties of glutinous rice on surfaces of around 10 ares.

The number of varieties used per family is usually not very large, as shown in the next table:

TABLE 12

Number of Varieties of Upland Rice Used per Family

No. of varieties	1	2	3	4	5	TOTAL
No. of families	22	23	13	-	1	59

Maintenance operations

Surprising though it may seem, the alang-alang (Imperata cylindrica) poses almost no problem for the crops. As a matter of fact, the use of the hoe in the clearing operations is done so efficiently that the Imperata rhizomes can be grubbed out and removed. The most bothersome weeds are short-cycle Graminaceae, most often of the genus Digitaria. Though infrequently seen on ground covered in alang-alang, these weeds proliferate quite rapidly once the ground is cleared. As their cycle is terminated in 30 to 45 days, most of them have already dropped their seeds by the time the first maintenance operations are carried out.

Thus, the stock of weed seeds in the soil considerably increases from year to year.

For this reason, three passages are necessary in order to ensure the proper upkeep of the crops in Unit I, whereas two passages are usually sufficient in Unit VII.

The number of passages that were actually made in 1982-1983 is given in the table below :

TABLE 13

Maintenance Operations

No. of passages	4	3		2			1
Type of operation [x]	KKCC	KKC	KCC	KK	KC	CC	K
Unit I, in %	5	53	5	32	-	-	5
Unit VII, in %	9	30	6	42	6	6	-

[x] K = koret : worn-down hoe, or light hoe
C = cabut : weeding by hand, or using a sickle or machete

The most frequently-used tool is the traditional hoe whose iron blade has worn down to one-half or one-third its original length. This tool is generally used during the early stages of plant growth, for about six weeks after sowing. In the later stages, the migrants use small sickles or light machetes, and more often than not pull up the weeds with their bare hands.

The first maintenance operation begins 15 to 21 days after the plot has been seeded and usually lasts two to four weeks. A second passage generally takes place between one and 2.5 months after sowing and in some cases a third, more rapid, going-over (manual weeding) is carried out. The maintenance operations end at the latest three months after sowing.

No transmigrant used herbicides in 1982 - 1983.

Fertilisation

While only 47% of the heads of family regularly carried out fertilisation in their home provinces, in 1982-1983 all used TSP (Triple Super Phosphate) and Urea to fertilise their crops of upland rice.

However, only 20% of the farmers spread the natural phosphates distributed by the Agricultural Services (500 kgs/family). Most of the time the sacks were piled in a corner of the garden and left to rot.

The use of potassium fertilisers and manure remains limited, respectively, 5% and 8% of cases.

For the TSP and the Urea, the average amounts spread per hectare come to :

TABLE 14

Average Doses of Mineral Fertilisers

	TSP (kg/ha)		Urea (kg/ha)	
	average	deviation	average	deviation
Unit I	87.4	68.6	98.2	54.5
Unit VII	70.7	39.6	81.1	35.7

The differences between Unit I and Unit VII are due to a greater heterogeneity in Unit I 12% of the settlers spread large doses of fertiliser. This heterogeneity is clearly shown in the next table :

TABLE 15

Amounts of Fertilisers Used

Dose in kg/ha		0	30	60	90	120	150	180	TOTAL
% of migrants in Unit I	TSP	12	28	20	24	4	0	12	100
	Urea	4	24	24	20	8	4	16	100
% of migrants in Unit VII	TSP	9	39	24	15	9	0	3	100
	Urea	3	24	33	24	9	6	0	100

A comparison of the doses actually used with those recommended by the BIMAS : TSP = 140 kg and Urea = 105 kg, shows that the actual amounts are too low in 86% of cases for the TSP and in 57% of cases for the Urea.

With respect to the recommendations forwarded by the CRIA-LP3 (TSP : 150 kg, and Urea: 150 kg), the amounts spread are insufficient :

- in 88% of cases for the TSP and in 80% of cases for the Urea, in Unit I;
- and in 97% of cases for the TSP and 94% of cases for the Urea, in Unit VII.

The average doses used amount to about half the doses recommended by the CRIA.

Both the splitting of the fertilisation and the spreading methods were quite unsatisfactory, especially in Unit VII.

TABLE 16

Fertilisation : Splitting of Amounts Used

In % of migrants

No. of applications	Unit I		Unit VII	
	TSP	UREA	TSP	UREA
1 X	15	18	53	35
2 X	60	59	32	55
3 X	20	18	11	7
4 X	5	5	4	3

More than half the migrants in Unit VII limit themselves to a single application of TSP, mixed in with the seeds, and to two, broad-casted applications of Urea, one at the tillering stage and the other around primordia stage.

Mixing the TSP with the seed has two advantages for the farmers :

- It allows the quantity of seed used to be reduced, especially if children help with the sowing, as they tend to cast large handfuls into the seed-holes in order to finish their work more quickly.
- It ensures a vigorous - and above all, visible - sprouting of the rice for a relatively small amount of fertiliser (30 to 50 kgs of TSP/ha.).

In Unit I, this method of fertilisation has been almost completely abandoned and replaced by two broad-casted distributions of TSP and Urea mixed together, at the tillering stage and again at primordia stage.

One must admit, then, that fertilisation is a technical skill which the majority of transmigrants still have not mastered well. Unfortunately, the same is also true of crop protection.

Phyto-sanitary treatments

Here again, there is a great diversity between units and between migrants within the same unit. The use of pesticides is also a novelty for many farmers, since only 24% used pesticides in their province of origin.

The frequency of treatments is quite variable :

TABLE 17

Frequency of Pest-control Treatments

No. of treatments	0	1	2	3	4	5	6	7	15	Total
% of migrants in Unit I	25	0	38	25	4	4	4	-	-	100
% of migrants in Unit VII	3	0	26	15	21	18	9	3	6	101

In Unit VII, only 3% of the migrants did not carry out any phyto-sanitary treatments, as opposed to 25% in Unit I. The latter explained that they had given up all crop protection beginning in their third year at the Center, as the pesticides were no longer distributed free of charge and there were no sprayers that worked properly.
In reality, however, it would seem that, having obtained poor results due to an insufficient mastery of the skill, these farmers considered such treatments ineffective.

In fact, the migrants rarely follow the manufacturers' recommended doses for these product :

TABLE 18

Pesticides : Doses Used per Treatment

AMOUNT	None	Very low	Low	Correct
% of migrants in Unit I	25	46	8	21
% of migrants in Unit VII	3	44	32	21

Only 21% of the farmers in the study group used the correct amounts of pesticides.

Likewise, the notion of preventive treatments is still altogether foreign to a good many transmigrants.

TABLE 19

Date of First Treatment

Growth stage of the rice :	21 d	30 d	45 d	60 d	90 d	120 d[X]	140 d[XX]	Total
% of migrants in Unit I	13	0	13	6	19	25	25	101
% of migrants in Unit VII	32	24	16	16	0	8	4	100

[X] earing stage

[XX] ripening stage

In 1982-1983, only 13% of the migrants inUnit I carried out a preventive treatment during the first month after seeding, as opposed to 56% in Unit VII. 50% of the Unit I farmers, and 12% of those in Unit VII, did not begin treatments until after the ears had formed on the rice, when the infestation of pests was at its maximum. At this point, as many as four bugs could be counted per panicle, or more than 100 bugs per square meter.

Whereas the damage was irreparable and the insect population diminishing for lack of food, many transmigrants continued to spray their plots. Thus, for the total number of treatments carried out in Unit I, 51% were done too late, against 40% in Unit VII.

Phyto-sanitary treatment is by far the technical skill the most poorly mastered by the transmigrants, be it at the level of the frequency of treatments, the dates, the doses, or even the specific uses of such products. For example, many of the settlers were surprised when the insecticides proved to be of no effect on viral diseases or fungi; still others used only one bottle of Diazinon to treat a one-hectare plot 15 times, thus a dose of 3.3 centiliters per treatment, when a minimum of one liter was necessary.

Harvest

Once it has reached maturity, the upland rice is harvested panicle by panicle using an ani-ani, or small harvesting knife. If the yield is small, the labor is exclusively a family affair. On the other hand, should the production prove to be quite high, it will be necessary to get outside help. Extra workers are paid according to the "bawon" system, with a fraction of the harvest given to each worker. The cost of the harvest will depend to a certain extent upon the availability of laborers, but is above all in function of the yield. If the yield is high (heavy density of mature panicles, high percentage of well filled-out ears) a skilled worker can harvest 80 to 100 kg of panicles a day and will be satisfied with one-seventh of the harvest. Should there be a lower yield, the worker will lose a great deal of time selecting the panicles and will only bring in 40 to 50 kg of panicles a day. In this case, he will receive up to one-fifth to one-fourth of the harvest.

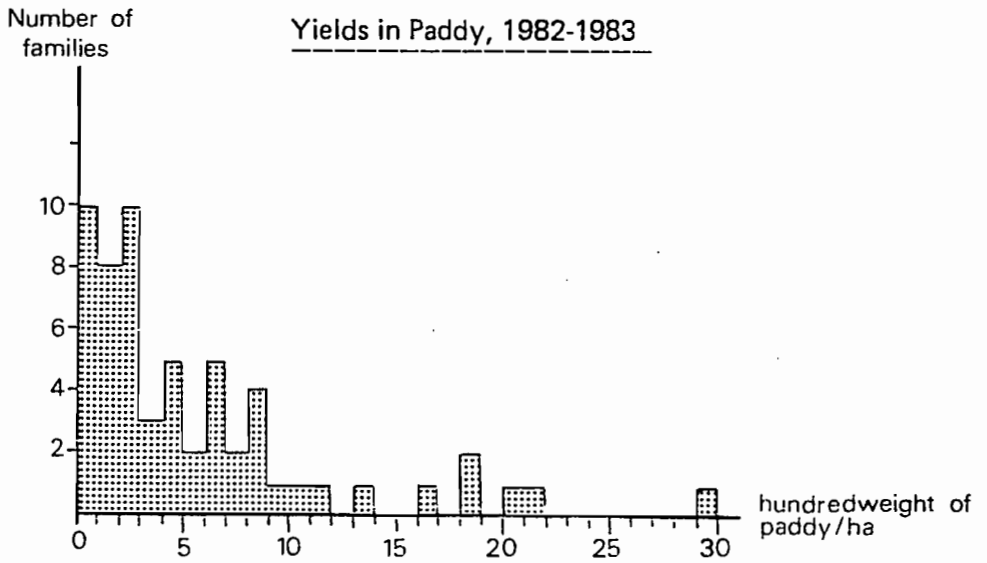
Once cut, the panicles are brought to the house, spread to dry, trod out, and winnowed. The paddy will then be placed in sacks and stored in the house. If the production is higher than the amount needed for the family's use, the surplus will be sold at the nearest rice mill.

Yields in paddy, 1982-1983 season

The considerable variation in the yields obtained can be explained for the most part by the heterogeneity of the farmers' technical levels. The Batumarta area had an unusually heavy infestation of pests in April 1983, and only the transmigrants who used the correct doses of pesticides managed to prevent the damage these bugs would have caused.

GRAPH No. 9

Yields in Paddy, 1982-1983



Average yields come to :

- 399 kg of paddy/ha. in Unit I, and
- 704 kg of paddy/ha. in Unit VII,

with extreme figures ranging from 50 kg/ha to 2,900 kg/ha.

Only 15% of the families obtained yields that were superior to their yearly needs, and 61% had a supply of less than 6 months' worth at their disposal.

Economic results of this crop

In 1982-1983, very few migrants hired paid workers. The average family income earned from the cultivation of one hectare of upland rice is given in Table 20.

These figures, which are already low in terms of absolute value, appear frankly derisive when one considers the amount of labor needed to cultivate one hectare of upland rice.

TABLE 20

Economic Results of the Cultivation of Upland Rice in Rupiah

	Unit I	Unit VII
Seed	2,800	3,000
Fertilisers	17,400	13,500
Pesticides	2,600	4,800
Total expenditures	22,800	21,300
Harvest value (Rp 100/kg paddy)	39,900	70,400
Return on family labor	17,100	49,100

Labor costs

The amount of work needed depends mainly on the method of soil preparation. For one hectare of upland rice, the average amounts of labor needed are as follows :

- Soil preparation using draught animals exclusively : 11.6 man-days (but 16.2 days for the team, as the teams only work 5 hours per day).
- Mixed preparation, both manual and draught : 26.6 man-days (of which 12 for the team)
- Manual preparation exclusively : 118 man-days for two passages and 136 man-days for three passage.

Seeding the parcels does not vary to any great extent from one family to the next, and takes an average of about 20 man-days per hectare.

For the maintenance operations, Table 21 shows both the theoretical amounts of labor - that is, the amount of time the migrants estimate as necessary for proper upkeep - and the time actually spent in maintenance during the 1982-1983 agricultural season.

TABLE 21

Amounts of Labor Needed for the Maintenance Operations

Pattern of operations	Theoretical needs man-days/ha.	Actual time spent in maintenance (man-days/ha)
3 passages (KKC)	105	88
2 passages (KK)	87	55
2 passages (KC)	66	40

The amount of time needed for fertilisation and phyto-sanitary treatments is relatively low, respectively 2 and 4 man-days/ha. on the average.

For the harvest, it has already been pointed out that the time needed for this labor depends closely on the yield, especially for the treading (or threshing) and winnowing operations. However, as the labor is less efficient when the yield is low, it takes almost as much time to harvest one hectare yielding 500 kgs of paddy as it does to harvest one hectare yielding 1500 kgs of paddy.

In 1982-1983, for the study group, the harvest operations took an average of about 30 man-days.

Therefore, it can be considered that the amount of labor needed for the cultivation of one hectare of upland rice is :

± 140 man-days, if the soil is prepared using draught animals,

± 155 man-days, if the soil preparation is "mixed" (draught + manual),

± 245 man-days, if the soil preparation is exclusively manual.

The next table shows the amount earned on the work-day in function of the method of soil preparation, for average yields of 400 kgs (Unit I) and 700 kgs (Unit VII).

TABLE 22

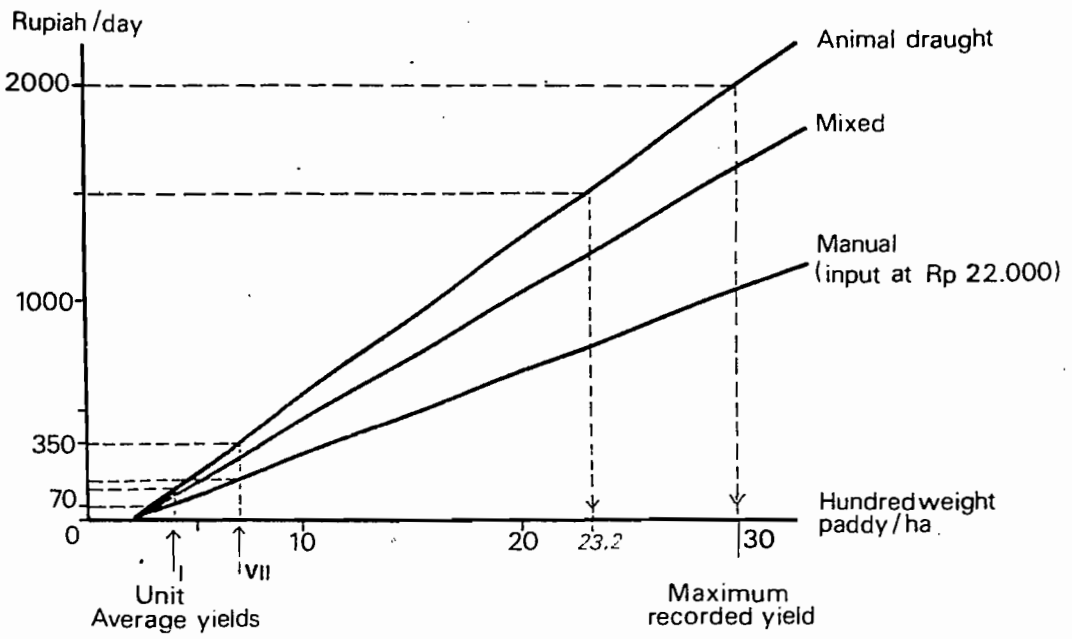
Returns on the Work-Day

Type of soil preparation	Unit I	Unit VII
Draught	Rp 122	Rp 352
Mixed	Rp 110	Rp 317
Manual	Rp 70	Rp 200

The following graph shows the daily returns with respect to the yield obtained and the soil preparation method. The costs of seed, fertiliser, and pesticides have been set at Rp 22,000/ hectare.

GRAPH No. 10

Returns on the Work-Day in Function of the Yield



As a hired worker at Batumarta receives Rp 1.500/day, it would take a minimum yield of 2320 kgs of paddy to cover the crop's labor cost. Now, in 1982-1983, for the 59 families surveyed :

- only 6 got a return of Rp 1.000 or more on their work-day;
- 8 obtained between Rp 500 and Rp 1.000;
- and 45 obtained less than Rp 500 per work-day.

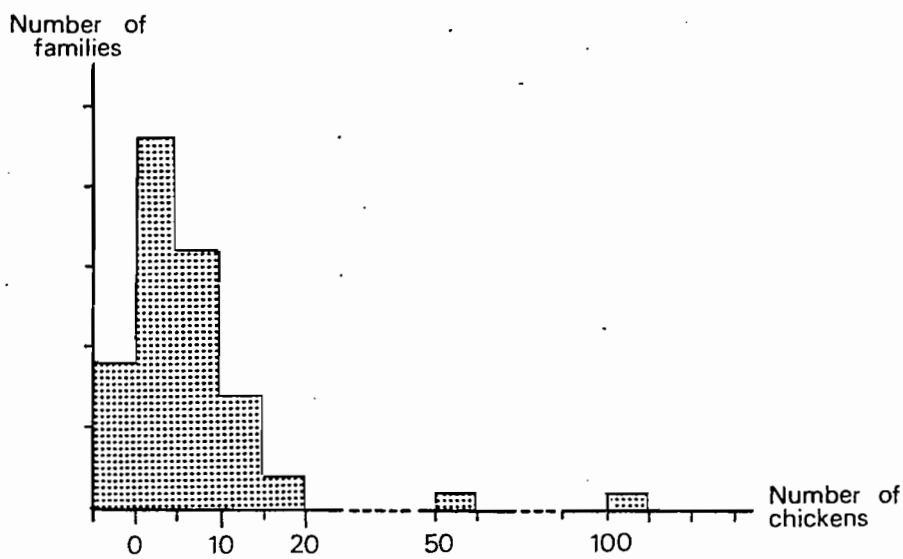
Stockbreeding

For the majority of migrants, small-scale animal husbandry is not considered an extra source of proteins, but rather as a small capital which can easily be sold in case of urgent need. Thus the poultry population fluctuates considerably with time, according to the epidemic and the families' financial difficulties.

In May 1983, the number of chickens per family was distributed as shown in the next graph

GRAPH No. 11

Number of Chickens per Family



There are relatively few other animals raised :

- Ducks : Two families have respectively 4 and 30 ducks.
- Goats : Eight families have in all 23 goats.
- Sheep : One family owns 3 sheep.
- Pigs : Five Balinese families are fattening one pig each.

Raising cattle is the largest and above all the best distributed form of stockbreeding. In May 1983 every family in the study group (both in Unit I and Unit VII) had been given a cow or a pair of cattle. Full proprietorship of these cattle becomes effective only after two calves have been returned to the project.

Out of the 26 cows given to the transmigrants in Unit I, one died and 3 were sold back. Forty calves were born, of which 29 were still suckling. Only 2 families increased their stock by buying cattle from outside sources.

In Unit VII, the low number of births that was noted can be explained by the fact that the animals were too immature (having been recently distributed, in most cases). For 33 cows distributed, 5 deaths and 6 births were registered. Two of the six calves born at the Unit had already died.

Some families consider owning a cow to be a hindrance instead of an advantage. Indeed, since the animals cannot be allowed to wander, they must be fed and watered at the stable; parasites must be dealt with, and the stable cleaned and the manure taken away. All these chores take an average 2 to 3 hours of work per day, which is indeed a handicap for families with only a small labor force, or more exactly, whose children are too young, since this sort of task is usually given to boys 10 years old or older.

Another solution is to place the cattle with a third party, according to the traditional "gaduhan" system in which one calf out of every two belongs to the proprietor of the cow.

Aside from the problems of upkeep, many migrants are unfamiliar with cattle breeding, which explains the relatively high death rate that was noted. The Stockbreeding Service, which is being organized at Batumarta, unfortunately did not have enough qualified personnel to carry out a really serious follow-up of the large number of cattle present at the Center. It appears to be just as unprepared, for the present, to develop the breeding of laying

hens and meat-producing chickens that would lead to an improvement in both the incomes and the diet of the transmigrants.

Plantations

Rubber is naturally the most widely-spread type of plantation at Batumarta. However, as all the planting and maintenance operations are handled by the PTP X, the transmigrants' role is limited to that of day laborers on the plantations. The migrants will not take possession of their hectares of hevea until six years after the trees have been planted, when the tapping begins.

The other perennial plants that are grown remain habitually located in the "pekarangan" (25-are parcel around the house). These plots soon grow into orchards that vary greatly from one family to the next, and contain a large number of plant species : coconut palms, jackfruit trees, coffee shrubs, rambutans, guava trees, custard-apple trees, banana trees, various Syzygiums, plums, cloves, Zingiberaceae, and so on.

Only eleven families out of 59 planted perennial species outside the "pekarangan". The migrants generally prefer Citrus fruit (9 cases out of 11, with from 20 to 1000 saplings planted) and coconut trees (6 cases out of 11, with from 15 to 120 saplings planted around the edges of the plots). On the other hand, guava trees, cashew trees, rambutans, coffee shrubs, and clove bushes are less frequently found (1 to 2 cases out of 11 for each species).

As most of the plantations are not yet producing, and since animal husbandry is still underdeveloped and the income from food crops insufficient, many transmigrants find themselves obliged to carry out non-agricultural activities in order to feed their families.

3. Non-agricultural Activities

Of the 59 families in the study group, only 9 were exclusively farmers. All the others had one, two, or even three complementary sources of income, which are listed in the next table.

TABLE 23

Non-agricultural Sources of Income

Source of income/ type of activity	No. of cases out of 59 families	Yearly Income	
		Minimum	Maximum
Commerce	8	Rp 60,000	Rp 400.000
Employees and retired persons	5	Rp 144.000	Rp 500.000
Agricultural laborers	11	Rp 10.000	Rp 80.000
PTP workers	21	Rp 72.000	Rp 180.000
Craftsmen	19	Rp 100.000	Rp 845.000
"Tahu" (beancurd) fabricants	2	Rp 300.000	Rp 800.000
Aid from family	6	Rp 80.000	Rp 150.000

The commercial activities are quite varied in general, but all concern staple commodities. The amount of capital invested varies enormously :

- from Rp 5.000 to Rp 10.000 for the collection of farm products (vegetables, fruits, chickens) in the blocks and their resale at the local market;
- from Rp 100.000 to Rp 300.000 for the "kios", smallgroceries set up in front of the transmigrants houses;
- from Rp 300.000 to Rp 500.000 for the larger "kios" and the small groceries set up at the local markets.

These transmigrant-owned "kios" can compete with the larger shops owned by the Minangkabau (native of West Sumatra) only by accepting credit. Since reimbursements are often slow in coming and as the families regularly delve into their own stocks, many "kios" are close to bankruptcy.

Retired army or police personnel, as well as those few transmigrants with stable jobs (public service, PTP foremen, etc.) have regular, relatively high, incomes.

The possibilities of finding jobs as agricultural day-laborers are still very limited at Batumarta, for two main reasons :

- few families have an income large enough to allow them to employ paid laborers;
- The transmigrants give priority to their own farms and only seek such jobs during the slack periods in agricultural labor.

On the other hand, jobs as day-laborers on the PTP plantations can be had relatively easily during the first three years. In the majority of the Unit VII families, it is mainly the wives who work for the PTP. Unfortunately, this source of income dwindles by the third year, since the plantations that are already well under way do not require as much labor.

The craftsmen : sawyers, woodworkers, and carpenters, could obtain higher incomes if they were better-organized. As they cannot fill large orders, they are most often exploited by local contractors who sub-contract at low prices the greater part of the craftsmen's work.

A few families in Unit I have set up small "tahu" (beancurd) factories that bring them substantial profits. Unfortunately, the low soya production at the Center forces them to buy the soya else-where at a relatively high price.

Aside from these occupations, some families receive financial aid from family members who remained in the province of origin or from grown children who work in town.

Other than the few cases that have been mentioned, the possibilities of non-agricultural employment are still unfortunately very limited at the Center. One must encourage the installation of small entreprises within Batumarta itself, and this as soon as possible so that the second generation of transmigrants will not be obliged to leave the Center to find work.

4. The Transmigrants' Income

Despite the great diversity in the individual situations that were encountered, a look at the transmigrants' average yearly income allows one to get an idea of the Center's level of economic success and above all of the relative role played by each type of activity.

Auto-consumption

Auto-consumption, while relatively large in quantity, remains limited in monetary value due to the low prices of the agricultural productions. The next table lists the main products concerned.

TABLE 24

Yearly Auto-Consumption

Product	Quantity (kg)	Unit price Rp/kg	Total value Rp	% of total
Rice (paddy)	550	100	55,000	43
Maize	200	100	20,000	16
Cassava	200	15	3,000	2
Vegetables	-	-	25,000	20
Fruits	-	-	15,000	12
Poultry	6	1500	9,000	7
TOTAL	-	-	127,000	100

Yearly Agricultural Cash Income

The income earned from the sale of part of the agricultural production varies enormously from one family to the next. The average amounts for the sample group as a whole are given in Table 25; Graph No. 12 illustrates the large variability of individual situations.

Animal husbandry and the fruits and vegetables alone bring in 50% of the agricultural cash income, though the farmers still consider these speculations as very secondary ones.

TABLE 25

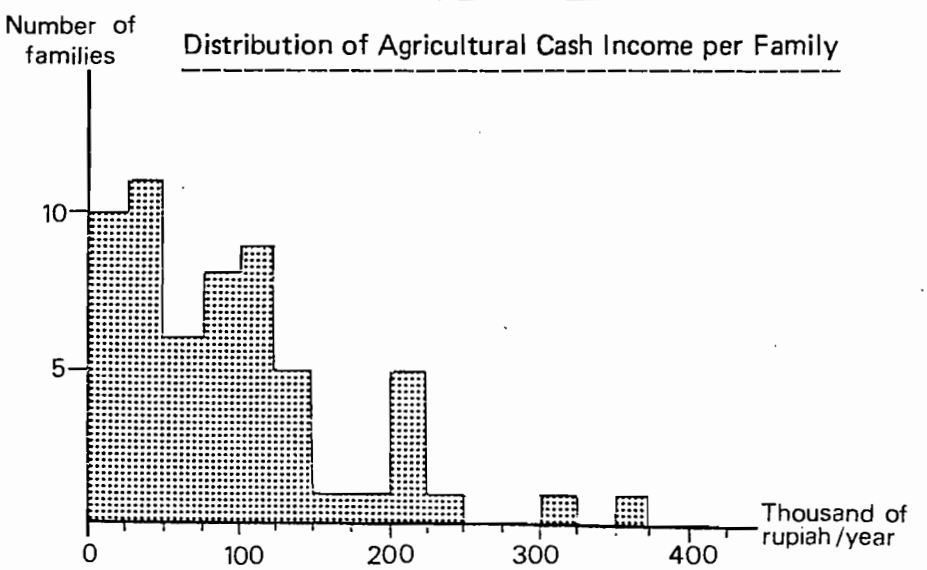
Yearly Agricultural Cash Income

Products	No. of families concerned/59	Average amounts sold/59 fam. in Rps	% of total	
Rice (paddy)	8	13,500	14	
Maize	11	4,800	5	
Peanuts	22	9,600	10	
S o y a	4	1,000	1	50%
Kacang tunggak [x]	11	3,800	4	
Green gram	13	3,800	4	
Cassava	20	11,500	12	
Watermelons	4	2,900	3	
Miscel. fruits	6	2,000	2	22%
Vegetables	31	16,400	17	
Poultry	31	11,500	12	28%
Cattle/goats/pigs	15	15,400	16	
TOTAL		96,200	100	

[x] Vigna unguiculata

GRAPH No. 12

Distribution of Agricultural Cash Income per Family

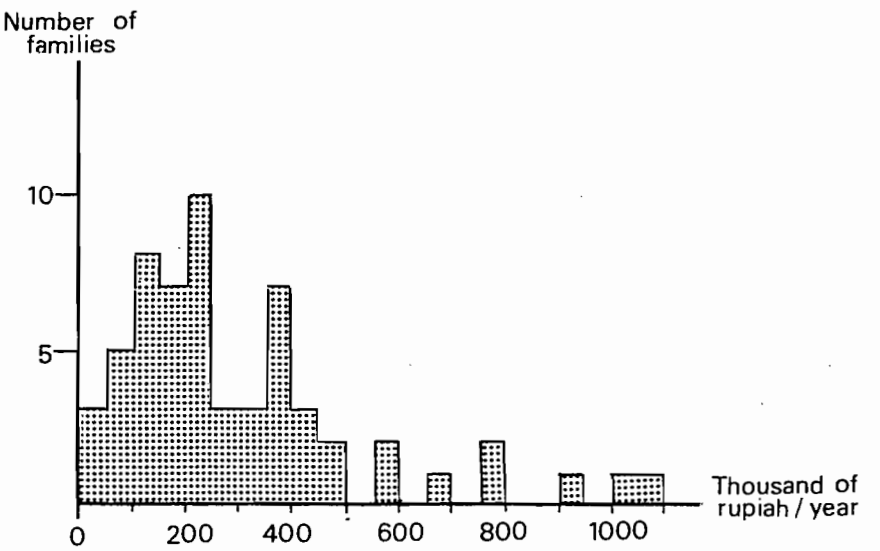


Total Yearly Cash Income

As the incomes obtained from the non-agricultural activities are even more variable than the agricultural incomes, the total cash incomes range from Rp 30,000 – Rp 1,400,000 according to the family. Graph No. 13 shows the distribution of the families with respect to their total cash income.

GRAPH No. 13

Total Cash Income



The average total cash income comes to Rp 303,200/year/family. However, only 34% of the families have a cash income of more than Rp 1000/day, and another 34% of the families earn less than Rp 500/day.

Average Overall Income

Auto-consumption included, the yearly overall income for a single family in the study group comes to an average Rp 430,200 and can be broken down as follows :

TABLE 26

Average Overall Income

	Amount in Rps.	% of total
Auto-consumption	127,000	30
Agricultural income	96,200	22
Non-agricultural income	207,000	48
OVERALL INCOME	430,200	100

Almost half of the overall income comes from non-agricultural activities, though these only represent on the average 20 to 30% of the time spent by the family in work.

Out of the Rp 430,000 in yearly overall income, the families manage to set aside, year in, year out, about Rp 100,000 to cover the exceptional expenses. Table 27 lists the type of expenditure, the number of families concerned, and the average amounts spent per family concerned, over a period of six years, for Unit I, and three years, for Unit VII.

TABLE 27

Exceptional Expenses During the Presence at the Center

Type of expense	Unit I (6 years)		Unit VII (3 years)	
	No.of families concerned : %	Average amount Rp	No.of families concerned : %	Average amount : Rp
Manufactured goods [x] (Bicycle, radio, ...)	81	53,000	48	62,000
Home improvements	50	726,000	30	174,000
Travel (to Java, Bali)	87	137,000	76	130,000
Other : births, weddings, religious festivals	82	172,000	82	117,000
All expenses combined	100	686,000	100	277,000

[x] Purchases-resales not included

Whatever the family's income level, priority exceptional expenses concern the organisation of religious festivals, births, weddings, and so on. On such occasions, the family honor is at stake and one must do at least as much as the neighbors.

The second priority is given to trips back to the province of origin. Some of these are necessary due to the death or illness of close family members, but all are taken advantage of to visit the family, collect a bit of money, and bring back seeds and plants. Since South Sumatra is relatively close to Java and Bali, these trips can be made by bus for moderate sums of around Rp 25,000 - Rp 30,000 round trip (1983 rates).

Purchasing manufactured goods : bicycles, radios, cassette players, jewelry, etc., is considered more as a capital investment than an expenditure. Indeed, should there be an urgent need of cash, this type of product can easily be resold without any great depreciation.

Home improvements only come as a last priority though great amounts of money are spent on them. As the cost of building supplies is rather high, only the wealthiest families can afford home improvements. Of course, every family dreams of owning a large brick and concrete house with a tiled roof, glass windowpanes, and woodwork painted in loud colors. But the low incomes unfortunately force many families to put their dream aside for the present.

All the result given in this chapter were obtained through repeated enquiries made in 59 families in the sample group. The verifications carried out during the second and third sessions allowed for the correction of a great many mistakes and omissions made by the transmigrants. However, the figures obtained are only estimations. In fact, many householders, hoping to obtain new government aid, tend to considerably underestimate their incomes. Others, on the contrary, wish to stress the difference between their situation and that of their neighbors, and overestimate their incomes.

For this reason, ten families in Unit VII were chosen to keep a journal during the seven to eight months of the study. The next chapter presents a part of the results obtained for limited sample.

5. The Family Budget

To obtain precise, reliable data concerning the transmigrants' incomes and expenditures, ten families in Unit VII agreed to keep a journal for the entire study period.

Naturally, this limited ten-family sample is not representative of the population as a whole, since it was necessary to pick transmigrants who knew how to write, were serious, and wished to colaborate with the survey team. The bias thus introduced can be estimated by comparing the results of the limited group to those of the random sample of 59 families which have already been studied. For example, the income level is 62% higher in the skewed sample with respect to the random one. However, as the results for the latter group were obtained through enquiries, the income level has probably been underestimated. In fact, the farmers rarely take into account such small, incidental, but frequent returns as the sale of fruits and vegetables, whose yearly total is far from negligeable. For all these reason, it can be considered that the bias introduced scarcely exceeds 30%.

For convenience reasons, we have preferred to give the results by year or by month rather than for the actual length of the study period. The seasonal aspect of the agricultural production has, of course, been taken into account in this extrapolation.

Auto-consumption

The amounts and/or monetary values of the products concerned are given in the following table :

TABLE 28

Auto-consumption

Product	Quantity kg	Unit price Rp/kg	Monetary value Rp	% total
Rice (paddy)	846	100	84,600	50
Maize	200	100	20,000	12
Cassava	200-300	15	3,800	2
Fruits	-	-	20,000	12
Vegetables	-	-	25,000	15
Poultry/eggs	-	-	9,000	5
Game/fish	-	-	6,000	4
TOTAL	-	-	168,400	100

The figures obtained are not very different from those of the random sample, with the exception of the rice due to the higher yields obtained by the families in the skewed sample.

Agricultural Cash Income

The agricultural cash income ranges from Rp 30,000 to Rp 382,000. The average figures for the ten families in the sample are given in the table below :

TABLE 29

Agricultural Cash Income

Product	No. of families concerned/10	Average cash income/10 fam.	% of total
Rice	4	Rp 37,670	32
Maize	2	Rp 580	0.5
Cassava	5	Rp 21,405	18
Leguminious plants	7	Rp 9,620	8
Vegetables	7	Rp 6,807	6
Fruits	6	Rp 19,158	16
Poultry/eggs	8	Rp 20,805	18
Pork	1	Rp 2,200	2
Other	2	Rp 543	0.5
TOTAL	10	Rp 118,788	101

The agricultural cash income is only very slightly higher than that of the random sample.

Cash Income of Non-agricultural Origin

The average amounts for the ten families are given in Table 30.

Non-agricultural cash income varies from Rp 83,000 to Rp 1,400,000 per family. The two families whose heads are retired army and police personnel have incomes that are considerably larger than average. For the two poorest families in the sample, the bonusus given for participation in the study (Rp 40,000) make up almost 40% of the total cash income, agricultural income included.

Overall Yearly Income

Auto-consumption, various monetary aids, and cash income combined, the overall yearly income of the families varies from Rp 300,000 to Rp 1,980,000.

For an average overall income of Rp 700,000/year, 41% comes from agricultural activities and 21% from various aids that cannot be renewed for the following years (see Table 31).

TABLE 30

Non-agricultural Cash Income

Source of income	Families concerned/10	Main income for n families	Average income/10 fam.	% of total
Retirement pension	2	2	Rp 118,000	33.1
Commerce	2	1	Rp 86,300	24.2
PTP laborer	5	2	Rp 32,300	9.1
Day laborer	8	-	Rp 20,900	5.9
Family-run crafts trade	2	-	Rp 2,300	0.7
Survey bonus	10	2	Rp 40,000	11.2
Sale of personal belongings	3	-	Rp 6,900	1.9
Loans	3	-	Rp 47,500	13.3
Other (hunting-fishing)	3	-	Rp 2,000	0.6
TOTAL	10	7[x]	Rp 356,200	100

[x] Three families earn the major part of their income from farming.

TABLE 32

The Transmigrants' Expenditures

Category of expenses	Expenses in %			Expenses in Rp/yr.			Expenses in Rp/30 d.		
	mini	average	maxi	mini	average	maxi	mini	average	maxi
Food	24.9	40.1	62.0	78,600	227,700	559,700	5,800	18,720	46,000
Lamp oil	2.2	5.1	5.9	4,380	28,960	32,000	360	2,380	2,630
Tobacco	2.7	8.0	10.6	0	45,430	65,700	0	3,730	5,400
Soap	0.2	0.9	2.6	490	5,110	5,840	40	420	480
Sub-total Daily expenses	30.4	54.1	75.4	10,440	307,200	655,800	8,580	25,250	53,900
Clothing	0.0	3.3	8.0	0	18.740	49,900			
Cooking utensils	0.3	1.1	3.7	1,520	6,250	12,700			
Education	0.0	1.6	6.4	0	9,090	38,700			
Health care	0.1	4.9	25.8	600	27,820	494,000			
Transportation	0.0	5.0	24.9	0	28,390	477,000			
Leisure	0.0	0.6	2.7	0	3,410	27,400			
Various aids	0.0	2.3	9.4	0	13,060	23,700			
Incidental expenses	0.0	0.9	3.3	0	5,110	7,560			
Money orders	0.0	0.5	2.9	0	2,840	17,500			
Jewlery	0.0	2.0	12.5	0	11,360	81,000			
Home improvement	0.0	3.0	13.2	0	17,030	79,800			
Other	0.0	3.6	15.3	0	20,440	99,600			
Sub-total	10.0	28.8	63.9	18,980	163,530	692,300	1,560	13,440	56,900
Agricultural tools	0.0	1.1	3.9	0	6,250	32,500			
Seed	0.0	2.4	12.2	0	13,630	41,900			
Fertiliser	0.0	0.1	1.0	0	570	6,500			
Pesticides	0.0	2.4	9.5	0	13,630	19,000			
Animal husbandry	0.0	3.8	33.0	0	21,580	76,400			
Labor	0.0	6.9	20.7	0	39,180	134,000			
Other	0.0	0.4	3.9	0	2,270	25,300			
Sub-total Agricultural	1.9	17.1	44.6	11,920	97,100	203,200	980	7,980	16,700
General Total	/	100.0	/	152,100	567,820	1,915,800	12,500	46,670	157,500

NOTE : the "mini" and "maxi" columns are to be read horizontally only : "sub-totals" and "totals" do not represent the totals of the columns themselves.

Indeed, during the study period, the incomes and expenditures for each family balanced almost perfectly. As a general rule, any money that comes in is spent in two to three days. Therefore, it is very probable that during the slack periods of cultivation, the settlers expenses are lower. This is the season during which one buys on credit in the neighborhood "kios".

On the average, the major expenses concern, by order of importance :

- food	40.1%	
- tobacco and cigarettes	8.0%	
- hired workers	6.9%	(only for two wealthy families in the sample)
- lamp oil	5.1%	
- transportation	5.0%	(visits to the province of origin)
- medical care	4.9%	(very large hospital costs for one family)

Current daily expenses - food, lamp oil, tobacco, and soap amount to an average Rp 307,200 per year, or Rp 840 per day. This represents an average 54.1% of the total expenses, but 30.4% for the wealthiest family as opposed to 75.4% for the poorest family.

The transmigrants invest relatively large sums in their farms, as agricultural expenses come to an average 17.1%, with extremes of 1.9% to 44.6%.

However, for the large majority of families, the major expenditure concerns food. Therefore, this subject necessitates a more detailed study.

6. The Transmigrants' Diet

Rice

The monthly consumption of rice per family fluctuated greatly during the study. A period of dearth in September and October (long dry season in 1982) was followed by more plentiful months when the special distributions of food were carried out.

The next table shows :

- the actual monthly consumption during the study (Col. 1)
- the highest recorded monthly consumption (which includes inhabitual needs for festivals or agricultural operations carried out through reciprocal help) (Col. 2)
- the amount of rice needed to feed the family according to the settlers themselves : 13.3 kg/adult/month and 6.7 kg/child (Col. 3)
- the difference between the potential consumption and the actual amount consumed (Col. 4)

TABLE 33

Rice - Consumption and Amounts Needed

Families	(1) Actual monthly consumption : kg	(2) Maxi. monthly consumption : kg	(3) Potential monthly consumption : kg	(4) Balance (1) - (3)	Remarks
Sun.	53	65	40	+ 13	the family has a non-paying guest living with them
Sat.	67	89	60	+ 7	two children do not eat at home
P.	100	138	173	- 73	Very large family large amt. cassava used.
W.	66	93	73	- 7	Diet more or less completed with cassava
S.	47	58	53	- 6	
K.	57	75	67	- 10	
A.R.	64	108	67	- 3	
B.	40	50	53	- 13	
NN.	40	65	60	- 20	Rice always mixed with cassava
N.P.	34	66	60	- 26	
Average	56.8	80.7	70.6	- 13.8	80% of needs met.

Of the average 56.8 kgs/month (about 680 kgs of husked rice/year) that is actually eaten by the family :

- 9.5% is purchased
- 44.5% comes from alimentary aid
- 46% is auto-consumption.

Other Foodstuffs

Aside from fruits and vegetables, most of which are grown in the "pekarangan", many foodstuffs have to be purchased by the settlers. The next table lists the quantities and prices of the foodstuffs purchased.

TABLE 34

Food Purchases (other than rice)

Foodstuffs	Yearly amt. spent : Rp	Unit price : Rp	Yearly Quantity	Monthly Quantity
Sugar	25,800	700/kg	36.9 kgs	3.1 kgs
Cooking oil	20,400	600/lt	34.0 lt.	2.8 lt.
Spices	23,400		Rp 23,400 worth	Rp 1.950 worth
Coconuts	12,700	175 ea.	72.6 nuts	6 nuts
Salt	3,700	200/kg	18.5 kgs	1.5 kgs
Fresh fish	1,400		Rp 1,400 worth	Rp 117 worth
Dried fish	16,900	750/kg	22.5 kgs	1.9 kgs
Meat	5,900	1500/kg	3.9 kgs	0.33 kg
Soybean curd	9,100	25/ea	364 cakes	30 cakes
Eggs	900	100/ea.	9 eggs	0.75 eggs
Vegetables	3,700	-	Rp 3,700 worth	Rp 308 worth
Coffee	1,400	1000/kg	1.4 kgs	0.12 kgs
T e a	3,000	650/kg	4.6 kgs	0.38 kgs
Milk	1,600	500/tin	3.2 tins	0.27 tin
Fruits	1,600	-	Rp 1,600 worth	Rp 133 worth
Noodles	2,600	150/pack	17.3 packs	1.4 packs
Biscuits	3,300	-	Rp 3,300 worth	Rp 275 worth
Other	3,800	-	Rp 3,800 worth	Rp 317 worth
TOTAL	141,200	-	Rp 141,200 worth	Rp 11,800 worth

The priviledged foodstuffs are represented by :

- Sugar : 18.3% of expenditures
- Spices and condiments : 16.6% of expenditures
- Cooking oil : 14.4% of expenditures
- Dried fish : 12.0% of expenditures.

The amounts of food consumed are still far from meeting the needs expressed by the transmigrants, but they are adapted to each family's financial possibilities. Sugar consumption is a good example of this problem :

Sun. family : Rp 4.200 in sugar purchases/year, or 6 kgs/year;

B. family : Rp 35.000 in sugar purchases/year, or 51 kgs/year.

The two families are almost exactly the same size, but the Sun. family has only an agricultural income whereas the B. family receives a considerable pension.

Composition of the Meals

The foods eaten at every meal do not satisfy the transmigrants' wishes either, as is clearly shown in the diagrams on the following pages.

- Carbohydrates -

Only 43% of the meals include rice in sufficient quantities. In 33% of cases, the rice is complemented by cassava and/or maize. In 8% of cases, the rice is mixed with cassava during cooking ("tiwul") in varying proportions, but rarely to the rice's advantage.

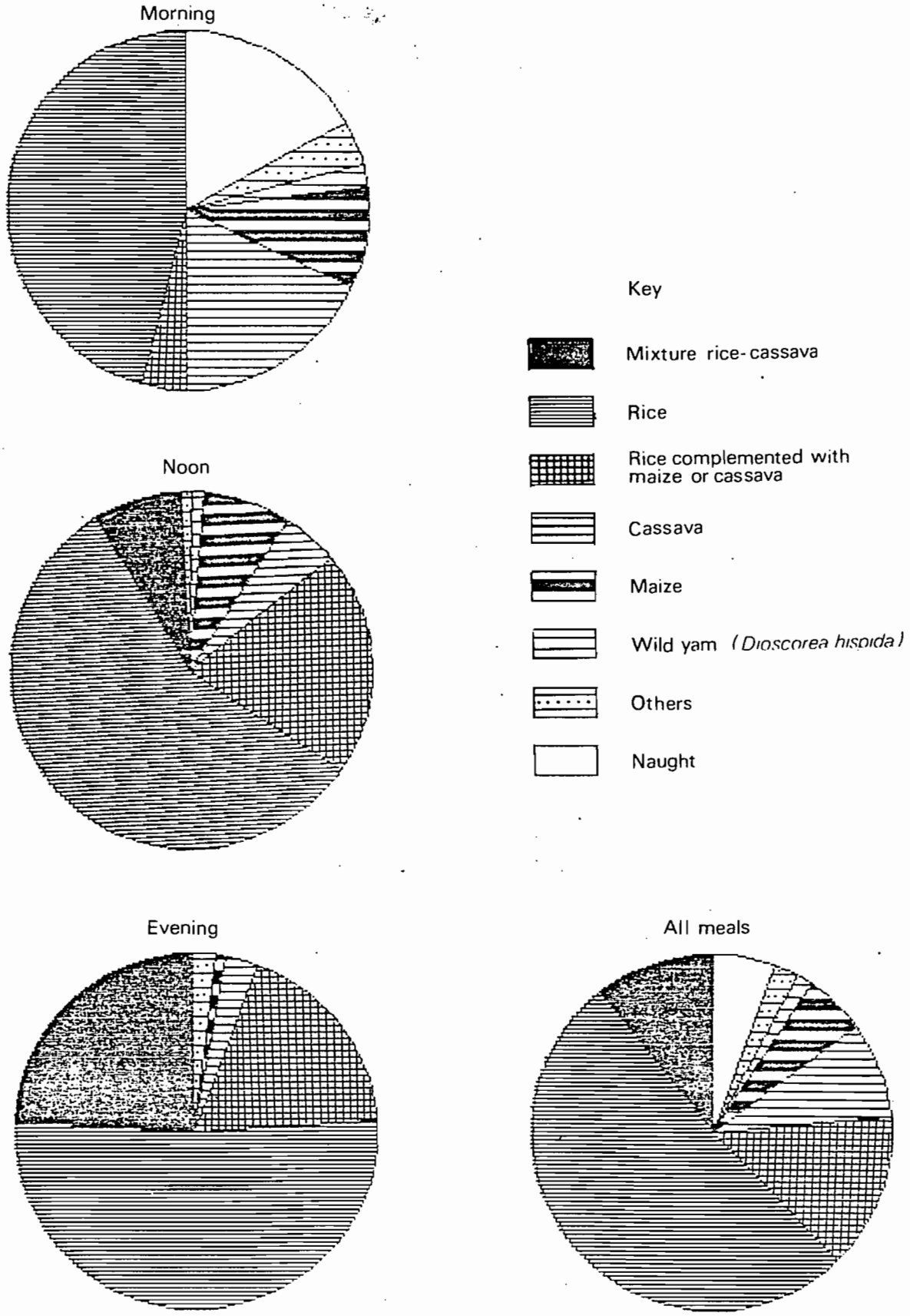
- Sources of proteins -

On the average, only 48% of the meals include proteins, usually dried fish, fresh fish, or "tahu/tempe" (soybean curd), and the quantities are almost always insufficient.

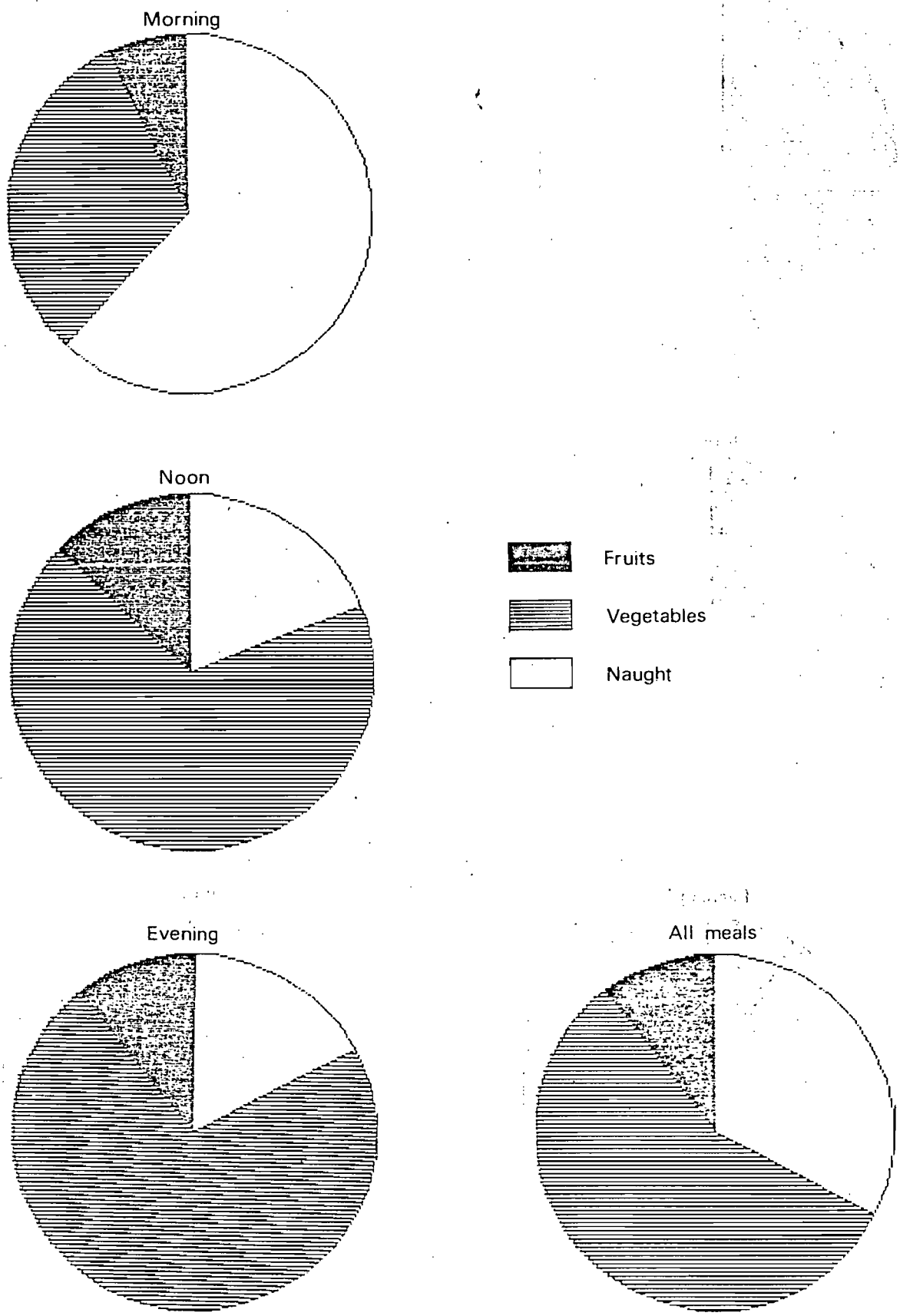
- Fruits and vegetables -

59% of the meals include vegetables, generally boiled cassava leaves. The consumption of fruits seems to be extremely limited, at least at mealtimes (5% on the average). However, the actual consumption must be greater since fruits are often eaten between meals.

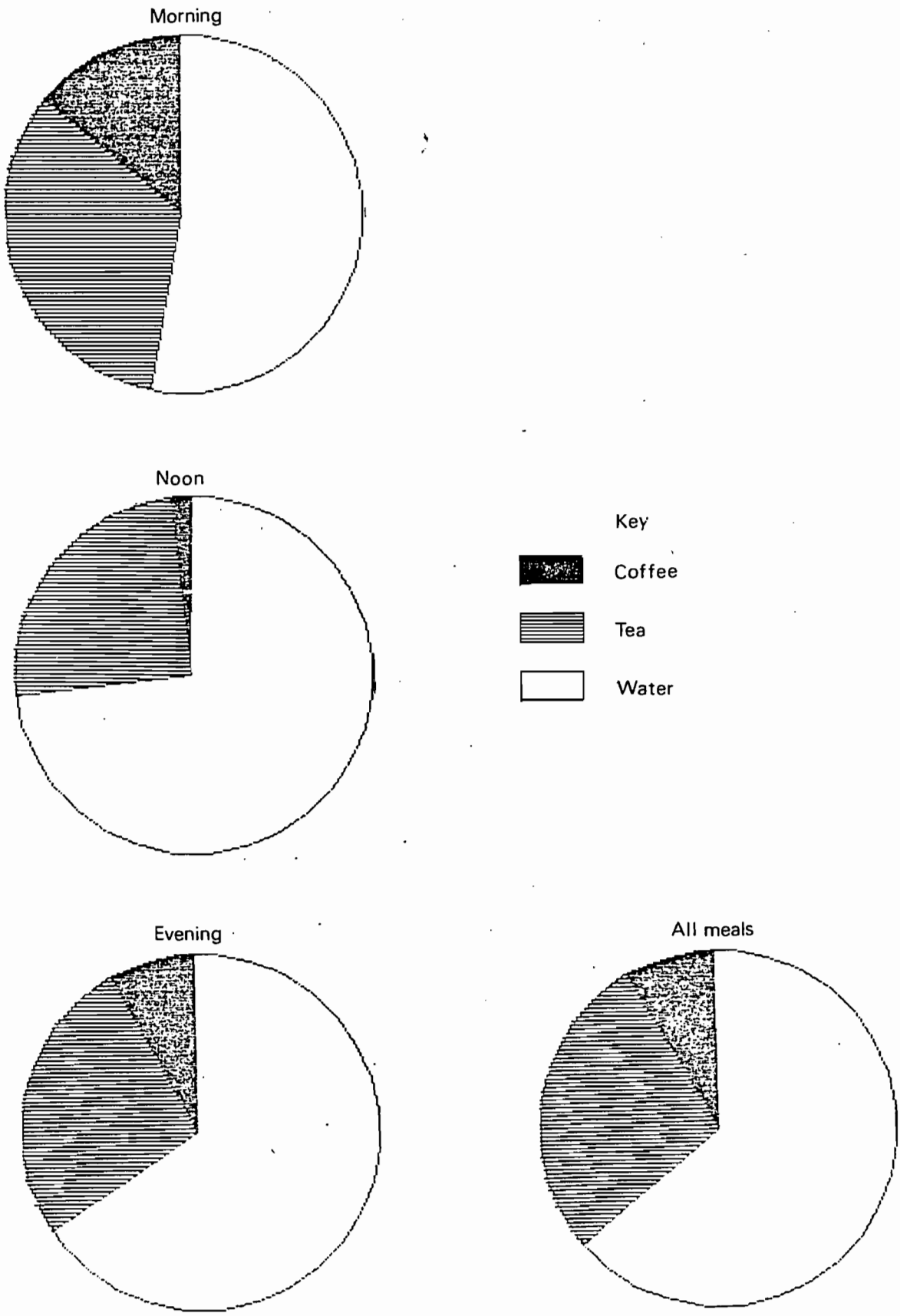
GRAPH 14a : CARBOHYDRATES



GRAPH 14c : VEGETABLES & FRUITS



GRAPH 14d : DRINK



Drinks -
The amount of tea and coffee drunk is still relatively small, as 56% of meals are accompanied by water alone.

Though far from being a healthy, balanced diet, it must be noted that the present composition of the meals is practically the same as that in the transmigrants' provinces of origin.

A considerable effort remains to be made to improve the migrants' diet. Nevertheless, dietary counseling appears unnecessary, since the quantity and quality of food is very closely linked to the families' financial possibilities and not to their eating habits.

In the preceeding chapters, we have attempted to describe, as far as possible, the situation of the "average transmigrant" at Batumarta. Yet in several instances we came across an extraordinary diversity in the situations that presented themselves. Though the transmigrants were placed in conditions that were exactly the same during the installation period, they did not all evolve in the same manner. Some seem to be succeeding, while others are stagnating, or even regressing. In the next chapter, we shall attempt to determine the reasons for these differences.

IV. THE FACTORS OF SUCCESS AND THE TYPOLOGY OF THE EXPLOITATIONS

With a variation coefficient of about 90% and extremes ranging from Rp 200.000 to more than Rp 1.000.000, the yearly overall income of the families is one of the most heterogeneous variable. It is also the most convenient variable for evaluating the migrants' level of success.

In order to determine the factors influencing the families' income level, the correlation method was used, by combining more than 30 variables (for a representative sample of 59 families). The sample was then stratified in function of the overall income and the role of agricultural production in the earning of this income, This new variable was then re-combined with the preceding ones.

1. The Factors of Success

By conserving only the significant links between the variables, it was possible to obtain the diagram on page 72. The "+" and "-" signs next to the arrows respectively indicate the positive and negative correlation between variables.

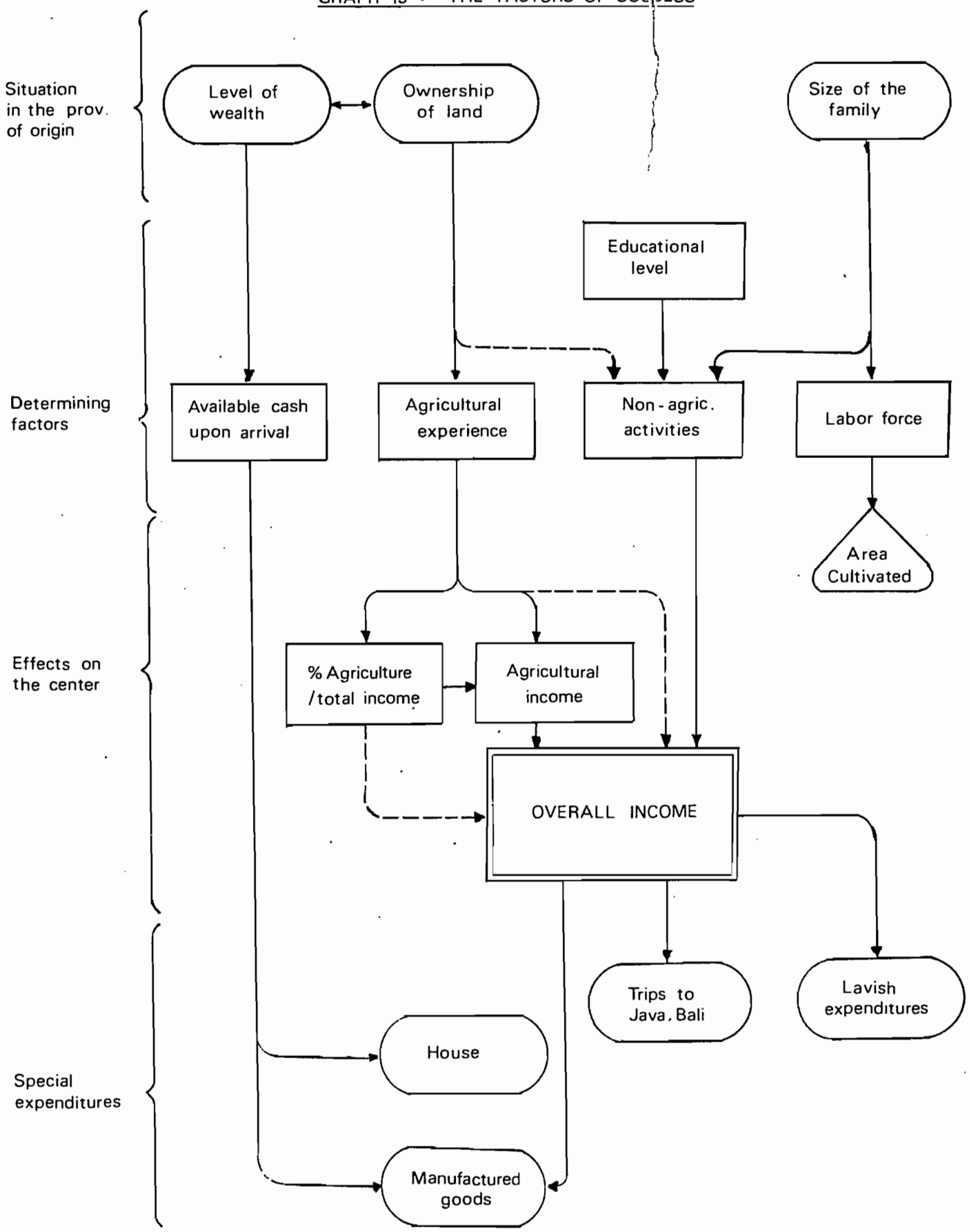
Four determining factors affect the families income level :

- the size of the family and its labor force;
- the type and number of non-agricultural activities;
- the technical level in agricultural skills;
- and the educational level of the head of the family.

A fifth factor, that of the amount of capital brought back from the province of origin, is heavily linked to the standard of wealth at the Center, though it does not concern the family income level.

The size of the family labor force has an obvious effect on the amount of land that is cleared and cultivated. However, there is no significant link between the size of the exploita-

GRAPH 15 : THE FACTORS OF SUCCESS



——→ positive effect ----→ negative effect

tions and the yields or crop productions. In fact, it has already been shown that the amount produced depends for the most part on the quality of the phyto-sanitary treatments, and not on the cultivated surfaces.

The strong link between the size of the family and the number of non-agricultural activities can be easily explained. In the large families, once the heaviest agricultural labor, soil preparation and sowing, is over, the plots can be left in the care of the women and young children. The head of the family and the boys who are old enough to work profit from this slack period to seek paying jobs.

The best-paid types of non-agricultural activities naturally remain the domaine of those settlers with a high level of education (administrative auxiliaries, employees, foremen, and so on), or those who have a professional qualification (carpenters, joiners, etc.). This factor has a decisive influence on the income level.

The farmers who have a high level of technical skills in agriculture were almost all small-scale landowners in their provinces of origin. These migrants are experienced in running an agricultural exploitation and have used fertilisers and phyto-sanitary treatments for a long time. They obtain the highest yields at the Center and consequently a large agricultural income. However, the negative connection that exists between the technical level in agriculture and the total income is proof of the low profitability of agricultural activities in comparison to other occupations. The higher the role played by agriculture in the total income, the lower the total income will be.

Some migrants who were more or less wealthy in their home province brought non-negligeable amounts of capital with them to the Center. The complete absence of any connection between this factor and the income level can be easily explained by the use that was made of this capital. As a matter of fact, these funds were rapidly depleted by the construction of houses made of bricks and by the purchase of consumer goods (motorcycles, bicycles, transistor radios, and so on). Very few migrants invested a part of such capital in a business or in agriculture.

2. Typology of the Exploitations

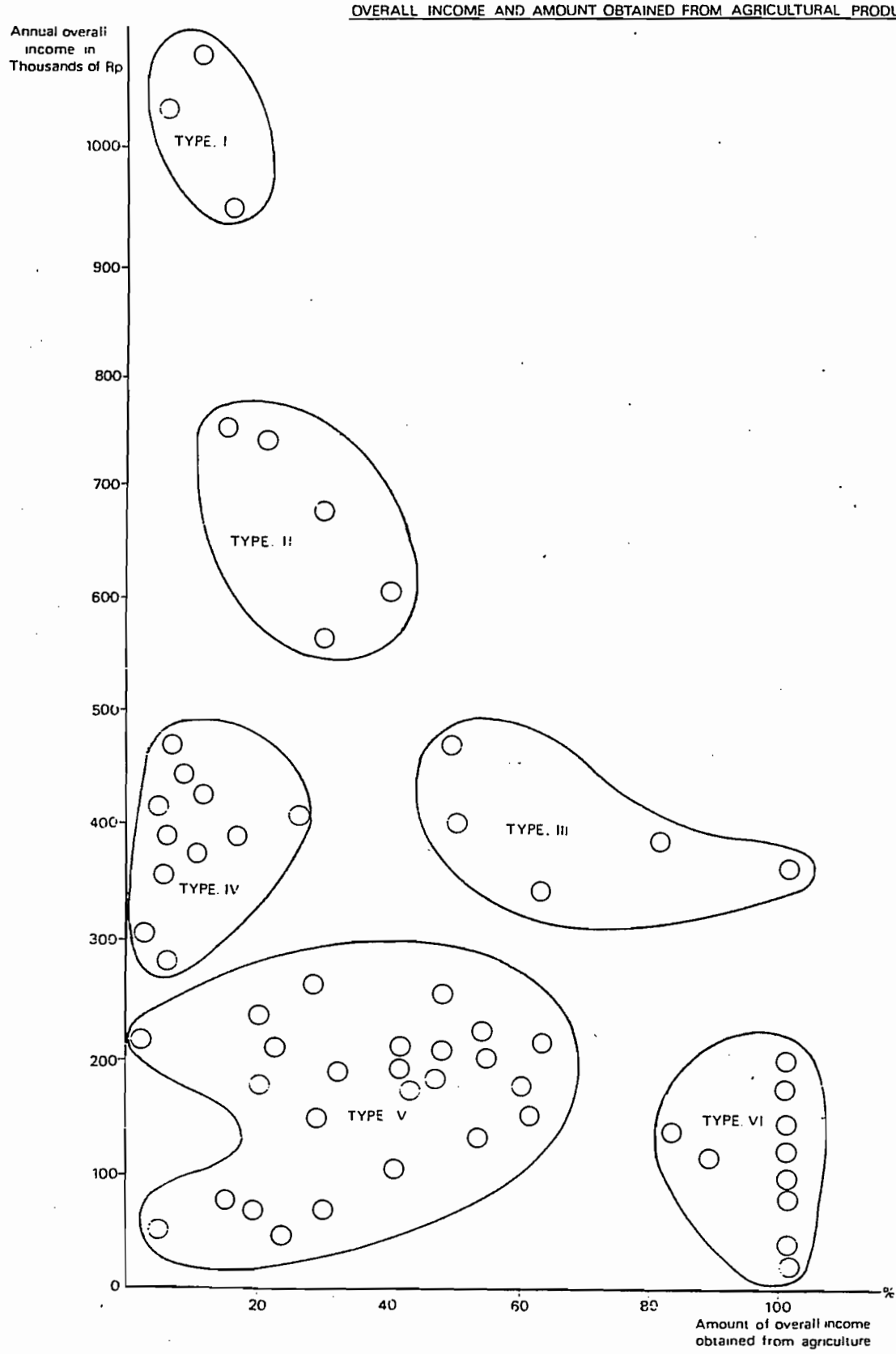
The study of the success factors already gives a primary indication of the typology of the exploitations. By carrying over the total number of families studied to the graph on page 75 with the percentage of the total income brought in by agriculture on the x-axis and the total income level on the y-axis, six types of exploitations show up rather clearly. Their characteristics are summarized in the following table.

TABLE 35

Typology of the Exploitations

TYPES No. of cases	Yearly income level : Rp	Determining factors	Characteristics
I 3 cases	1,100,000	Large family. Available capital. Numerous non-agricultural activities . Little agricultural experience	Small-scale businessman.
II 5 cases	770,000	Large family. Numerous non-agricultural activities. High educational level. Stable income.	Employees Merchants Carpenters Retired persons
III 5 cases	490,000	Mainly agricultural activities High technical level	Experienced farmers
IV 11 cases	480,000	Few agricultural activities. Almost full-time outside work	Full-time laborers. Small-scale retailers.
V 25 cases	300,000	No capital. Low educational and technical level	Part-time farmers. Occasional laborers. Farm workers.
VI 10 cases	220,000	Exclusively agricultural activities. Low technical and educational level.	Traditional farmers

GRAPH 16 : DISTRIBUTION OF THE TRANSMIGRANTS IN FUNCTION OF THEIR ANNUAL OVERALL INCOME AND AMOUNT OBTAINED FROM AGRICULTURAL PRODUCTION



Types I and II cannot in any way serve as models for the transmigrant population, since their success is not connected to Transmigration itself. The persons in these two categories have, as a rule, reinvested capital from the zones of origin and/or profited from the possibilities of the local labor market to obtain stable, relatively well-paid jobs.

Type III is, on the other hand, made up of experienced farmers with a high technical level in agriculture (often superior to that of the extension workers posted at the Center). The diversification of the agricultural production (food crops, cash crops, and small animal husbandry) and proper crop protection allows them to obtain yields that are more than satisfactory. Moving up from Types IV, V, and VI to Type III can only be done by bettering the technical level. This is the job of the extension workers (P.P.L.) Unfortunately, the latter group's lack of experience (the P.P.L. are generally newly-graduated from the schools and very young), the limited means at their disposal, and above all a high level of absenteeism will not help to remedy the present state of affairs.

Having considered the low amounts of agricultural income, the migrants in Type IV have henceforth already chosen to concentrate on non-agricultural occupations. Since there are almost no jobs available in the blocks, the members of this group are obliged to leave their families for periods of from one week to one month in order to find work in the region.

Type V is made up of what are called agricultural laborers. In this category, agricultural activities are still formost. However, the insufficient incomes force one or more members of the family (usually the wife) to seek jobs as day laborers. The main possibility for this type of non-qualified job which is offered the migrants is that of day laborer for the P.T.P.-X (National Plantation Society), which is in charge of planting the hevea blocks. Unfortunately, the labor demand, very high during the first three years, rapidly decreases. This explains the predominance of Unit VII transmigrants (three to four years of presence at the Center) in this category.

The additional monthly income for one family in Unit VII was on the average Rp 15,000 in 1982 and dropped to Rp 6,000 in 1983 (9 to 10 days of work per month at Rp 640/day).

As this source of extra income dries up, the persons in Type V will move :

- either up to Type VI if they decide to favorise non-agricultural activities and if the labor market is open,
- or down to Type VI if they decide to concentrate on agriculture.

Type VI is made up mainly of transmigrants in Unit I who have only one source of income : agriculture. Their educational and technical levels are very low, production is insufficient, and the incomes are generally below subsistence level. All of the above-mentioned factors condemn these migrants to stagnation.

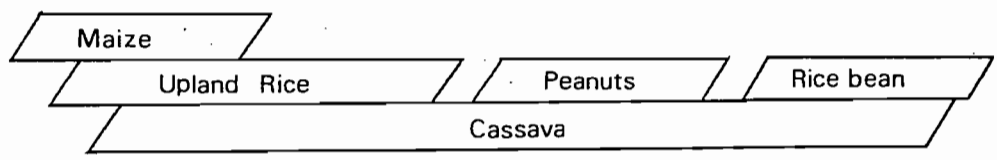
The economic situation of Types V and VI, which include 60% of the transmigrant families, is a particularly difficult one. The Cropping patterns proposed by certain research institutes like the CRIA-LP3 were not followed by the transmigrants. The analysis of the reasons to this rejection is an indispensable preliminary to the definition of better-adapted cultivation systems.

V. IMPACT OF THE MODELS PROPOSED BY THE C.R.I.A.

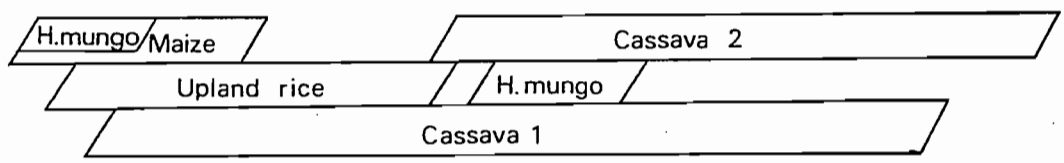
Beginning in 1976, the C.R.I.A. (Central Research Institute of Agriculture) experimented with five types of cropping patterns in several Transmigration Centers.

Each pattern was characterised by the following combination of crops :

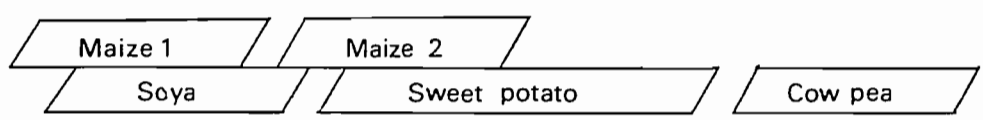
Pattern A



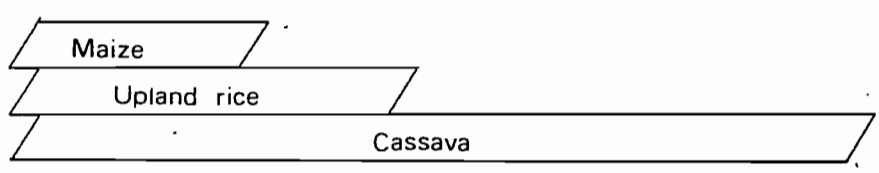
Pattern B



Pattern C



Patterns D & E
(traditional
Tumpang sari)



In Pattern D the operations were carried out by the migrants alone, while in pattern E the operations were done under the supervision of C.R.I.A. technicians.

After three years of experimenting, Patter B was deemed ineffective and abandoned. The follow-up of Patterns D & E was also abandoned under the pretext that all the transmigrants had adopted the systems proposed by the C.R.I.A.I For Patterns A and C, the results of the six-years' experiments are now available.

The impact of the C.R.I.A. unfortunately does not appear as large as their reports lead one to believe. In fact, out of 59 families polled :

- 47 had never heard of the C.R.I.A. patterns;
- 10 were acquainted with the C.R.I.A. as they had worked as laborers on their trial plots;
- 2 had tried the C.R.I.A. models : one gave up after one season and the other more or less adapted the proposed pattern.

Yet, on the purely agronomical level, the suggested models present numerous advantages :

- staggered seeding avoids the problem of cramming together the soil preparation and harvest periods;
- combining different crops allows for a better use of the land and diversifies the production (which lessens the risks);
- the ground is almost permanently covered and thus well-protected from erosion risk;
- the continuous maintenance of the plots all year round (no slack periods) reduces the amount of weeds;
- the relatively high yields signaled by the C.R.I.A. give very interesting net incomes per hectare.

However, from the transmigrants' point of view, the suggested models have two major inconvenients : they necessitate a large amount of input and demand a great deal of labor. Conscious of these disadvantages, the C.R.I.A. tried as early as 1979-1980 to reduce the input level and the amount of labor needed.

The economic results obtained for Pattern A from 1976-1977 to 1981-1982 are given in Table No. 36, on the next page.

The manner in which these figures were obtained, and above all the presentation of the results, can hardly be called satisfactory.

Several criticisms must be made :

- The parcels ruined by the wild pigs (a major problem whenever the cultivation of maize and cassava is concerned) are never taken into account in the calcultaion of average yields. Now, any parcel of rice complanted with maize and/or cassava, and located at any distance from the house, is almost certain to be devastated by herds of wild pigs.

- In the presentation of the results per hectare, the authors have forgotten to specify that the farmers participating in the experiments, these parcels are always near the houses. Therefore, the profits per hectare are only theoretical ones. Moreover, the average labor force of a single transmigrant family (450 man-days/year) would allow them to cultivate 50 ares at most, in view of their other activities.

  As the plots destined for "real-life" trials under C.R.I.A. supervision have first priority, the fields are prepared in the proper time limits and the seeding dates are always optimal. To prepare one-hectare parcels within the necessary time limits, hired help is indispensable.

- The costs of hired help are calculated on the same basis as the family labor force, that is, Rp 400 per day for the first years, then Rp 500, and finally Rp 600-700 in 1981-1982. However, the salary of a paid day laborer was Rp 1,500 in 1982.

TABLE 36

Economic Results of Pattern A

1976 - 1982

Year Incomes and costs in Rp./ha.	1976-1977	1977-1978	1978-1979	1979-1980 low input	1979-1980 high input	1980-1981 low input & work	1980-1981 high input & work	1981-1982
Gross income	610,435	664,450	1,104,250	982,750	1,140,950	1,041,675	1,140,225	1,158,950
Material costs	152,108	161,710	149,800	110,850	136,100	124,800	139,050	144,300
Labor costs	343,800	326,200	387,500	342,000	342,000	251,100	295,100	296,700
Net income	114,527	176,540	566,950	529,900	662,850	665,775	706,075	657,950
Amount of labor needed (work days)	817	771	775	582	582	451	525	599

It would be better to only count the costs in hired labor in the economic analysis and to replace the notion of net profit by that of return on the family labor.

- The prices of the goods retained for the calculation of the gross incomes are based on the local market prices and not on the farm values. Thus, the 1981-1982 price of Rp 150 for one kilo of rice is over-estimated by 50% with respect to the actual farm price of Rp 100/ kg.

As a general rule and at several levels, the incomes cited were over-estimated and the costs underestimated. For example, it is interesting to redo the economic analysis of the 1981-1982 results by placing side by side the costs and prices indicated by the C.R.I.A. and those indicated by the transmigrants. To do this, the yields cited by the C.R.I.A. have been taken for granted.

1. Gross Income

TABLE 37

Calculation of Gross Income

Crop	Yields in kg.	Unitary Price : Rp/kg		Gross income : Rp	
		CRIA	Transmigrants	CRIA	Transmigrants
Rice (paddy)	2,181	150	100	327,150	218,100
Maize (grain)	1,457	150	100	218,550	145,700
Cassava	14,100	20	10	282,000	141,000
Peanuts (unshelled)	705	350	250	246,750	176,250
Kacang tunggak	350	250	200	87,500	70,000
TOTAL	-	-	-	1,161,950+	751,050

+ Corrected figure. The total presented in the report was of Rp 1,158,950.

2. Material Costs

For the cost of material, the prices indicated by the C.R.I.A. correspond to the official BIMAS rates for 1982. As the fertilisers and pesticides were delivered to the farmers through the BIMAS (agricultural credit in goods), it would nevertheless be necessary to take the credit to its reimbursal (6 months in general).

TABLE 38

Material Costs

Input	Quantity in kg.	Unit price in Rp.	Cost in Rp.
1. Seed			
Rice	40	250	10,000
Maize	12	150	1,800
Cassava (cuttings)	5000 x	2	10,000
Peanuts	120	400	48,000
Kacang tunggak	40	200	8,000
Sub-total seed	-	-	77,800
2. Fertiliser			
Urea	200	70	14,000
TSP	200	70	14,000
Lime	200	20	4,000
Sub Total fertiliser	-	-	32,000
3. Pesticides			
Furadan	7.5	1700	12,750
Sevin	1.5	1500	2,250
Agrothion	6 lt.	1500	9,000
Diazinon	7 lt.	1500	10,500
Sub total pesticides	-	-	34,500
GENERAL TOTAL	-	-	144,300

x Cassava cuttings

3. Labor Costs

In order to carry out the three successive cultivations called for in Pattern A, the soil preparation and harvesting must be done within relatively short delays. Naturally, this implies the employment of hired laborers whenever the cultivated surface exceeds a certain limit.

Table 39 lists the needs in masculine and feminine labor for the various operations, as well as the amount of labor carried out by the family itself and that done by outside help.

The rates used by the C.R.I.A. were Rp 700/day for a man and Rp 600/day for a woman; the total labor costs amount to Rp 396,700.

TABLE 39

Amount of Labor Needed for 1 ha in Pattern A

1981-1982

(in work-days)

Operation	Labor needs men	Women	Family labor Man	Women	Outside help Man	Women
(1) First crop						
Soil preparation	146	-	60	-	86	-
Seeding and base fertilisation	17	29	17	17	-	12
Weeding	10	20	10	20	-	-
Fertilisation	7	7	7	7	-	-
Crop protection	12	-	12	-	-	-
Harvest (rice & maize)	20	20	10	10	10	10
Sub-total (1)	212	76	116	54	96	22
(2) Second crop						
Soil preparation	40	12	20	10	20	2
Seeding & fertilisation	10	22	10	10	-	12
Weeding	4	12	4	12	-	-
Treatments	12	-	12	-	-	-
Harvest (peanuts)	15	25	2	2	13	23
Sub-total (2)	81	71	48	34	33	37
(3) Third crop						
Soil preparation	36	12	10	10	26	2
Seeding & fertilisation	10	22	2	2	8	20
Weeding	4	12	4	12	-	-
Treatments	8	-	8	-	-	-
Harvest - K.tunggak	15	25	7	7	8	18
Harvest-cassava	7	8	4	4	3	4
Sub-total (3)	80	79	35	35	45	44
GENERAL TOTAL	373	226	199	123	174	103

However, in 1981-1982, at Batumarta, the daily costs of a hired worker was Rp 1.500 per man and Rp 1.000 per woman. This gives costs, for hired help only, of :

- 174 man-days, at Rp 1.500 = Rp 261.000
- 103 woman-days, at Rp 1.000 = Rp 103.000

Total = Rp 364,000

Using the C.R.I.A. rates for the return on the family labor, one obtains :

- 199 man-days, at Rp 700 = Rp 139.300
- 123 woman-days, at Rp 600 = Rp 73.800

Total = Rp 213.000

In consequence, the total labor costs (family labor and outside workers) comes to Rp 577,100 and not Rp 396,700 as cited by the C.R.I.A.

By redoing the economic analysis with the corrected figures and comparing them to those given by the C.R.I.A., one obtains the following table :

TABLE 40

Comparative Economic Analysis

	C.R.I.A. figures Rp	Corrected figures : Rp
Gross income	1,161,950	751,050
Material Costs	144,300	144,300
Labor Costs	396,700	577,100
NET INCOME	620,950	29,650

The net income cited by the C.R.I.A. is 21 TIMES GREATER than the net income obtained from the corrected figures.

Rather than arbitrarily fixing the daily return on the family labor and reasoning in net income, it is more interesting to evaluate the income of the family labor force.

The maximum contribution in family labor being 322 days (199 for the men and 123 for the women), the maximum cultivatable surface for Pattern A without using hired help would be 54 ares.

Below the 54-are limit, and considering the yields obtained in 1981 - 1982, the return on the family labor comes to Rp 1,013 per worker (man or woman) per day.

Beyond the 54-are limit, the obligatory need for hired help will proportionally reduce the return on the family labor. The return on the family work-day for surfaces of more than 54 ares can be calculated using the formula :

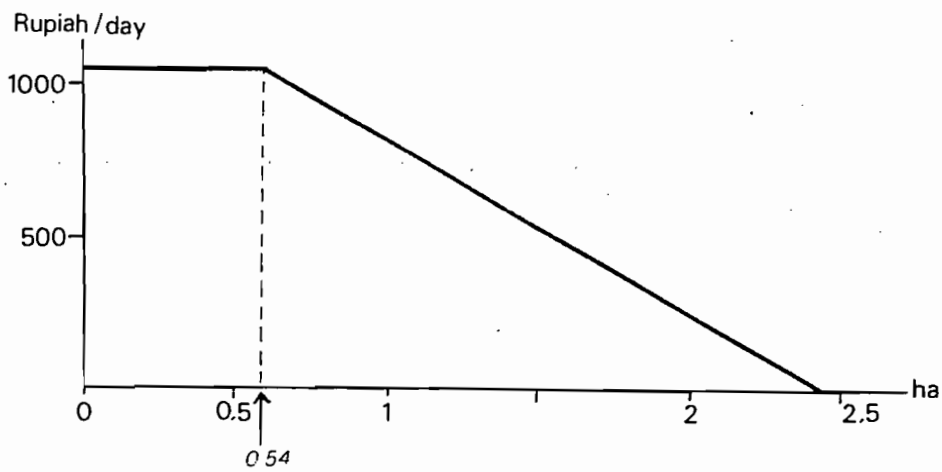
$Rfd = [S(GI-MC-(373 \times 1500) - (226 \times 1000)) + (199 \times 1500) + (123 \times 1000)] / 322$ in which :

Rfd	=	Return on the family work-day, in Rp
S	=	The surface cultivated, in hectares
GI	=	The gross income per hectare
MC	=	The material cost per hectare
1500 and 1000	=	the daily cost of masculine and feminine labor
373 and 226	=	the total amount of time spent in labor per hectare (masculine and feminine)
199 and 123	=	the amount of labor carried out by the family (322 days)

The daily return on the family labor in function of the cultivated surface can be seen on the following graph.

GRAPH No. 17

Daily Return on the Family Labor in Function of the Surface



When the surface reaches 2.4 ha the family no longer obtains a return. Since the cost of hired help is greater than the maximum daily return on the family labor (Rp 1013/day) it is not in the family's interest to cultivate a surface of more than 54 ares using Pattern A.

However, it must be remembered that the validity of the above-mentioned figures implies yields of approximately the same amounts as those given by the C.R.I.A. : 2,181 kgs of paddy/ha. Given the methods by which these yields were calculated, they represent more a potential level than an average one. Once again, the average yields for the study group in 1982-1983 only came to 704 kgs/ha for Unit VII and 399 kgs/ha for Unit I, though it is true that the methods of cultivation were more traditional.

If one considers only the farmers with a high technical level and whose plots were not destroyed by the wild pigs, the yields obtained are very similar to those cited by the C.R.I.A., but for much lower input levels. However, even the farmers who have a high technical level do not seem to be interested in the proposed patterns, even though they give good returns on the family labor on limited surfaces of 50 ares. For these transmigrants, the refusal to adopt the proposed patterns is due mainly to the fact that they have taken into consideration the risks connected with these crops.

For a cultivated surface of one hectare using the C.R.I.A. model, the transmigrant will have to invest Rp 508,300 (Rp 144,300 for the seed, fertiliser, and pesticides, and Rp 364,000 for the hired help) to obtain a (very hypothetical) return on the family labor of Rp 242,800 However, by limiting the cultivated surface to 50 ares, the investment would only be Rp 72,150 for a hypothetical return of Rp 303,375.

Now, considering the precarious financial situation of the transmigrants, a Rp 72,150-investment represents about two months' worth of the total family income. For example, the average amount invested for the sample group in 1982-1983 only came to Rp 22,000 $\pm$ Rp 8,000.

Moreover, in view of the climatic risks, the raids by wild pigs, the growing number of rodents and other pests, one can easily understand why a transmigrant hesitates to take on debts in order to invest in the agricultural domaine.

Whatever the farmer's technical level, the potential income he might obtain from food crops would not allow him to rise very far above the subsistence level. By the sixth year at the Center, the heveas will begin producing and rapidly compete with the food crops. The high, and above all regular, income from the plantations will invariably lead to the reduction, if not to altogether abandon, of the surfaces devoted to food crops.

On our last trip to Batumarta in June 1983, the heveas in Unit I had already been tapped for three months. The initial results appear promising.

VI. INITIAL RESULTS OF HEVEACULTURE

Three months after the tapping began, the following average figures were noted for a sample group of 22 transmigrants from Unit I.

For one hectare of heveas,
- 408 were already being tapped
- 69 trees were not yet producing.

For two weekly tappings, the yields came to :
- 15.4 liters of latex per day during the first month of tapping
- 26.6 liters of latex by the third month.

In other words, by the third month, the yield is an average 228 liters per month, which is to say a gross income of Rp 33,000 per month at the average price of Rp 145/liter, and a net income of Rp 30,000/month (10% is taken off by the cooperative system set up by the PTP-X).

This means that for a minimal amount of work (4 to 5 hours per tapping day) the income earned from one hectare of heveas will be, in the first year of tapping, about equal to the total 1982 cash income of one transmigrant family.

As the yield in latex increases consistently, the migrants will soon compare the plantations' profitability to that of food crops. Moreover, the income from latex sales has the advantage of being secure and regular, and not hypothetical and seasonal as it is for food crops. Under these conditions, it is very probable that in the next few years the surfaces under food crops will be reduced and those planted in heveas increased.

Thus there is very little chance that the objective of food self-sufficiency will be met, since the migrants prefer to buy their rice with the profits made from heveaculture.

On the other hand, the transmigrants' standard of living will rise very rapidly. Within a relatively short time one should see the creation of a class of small-scale planters who hire spontaneous transmigrants to carry out the maintenance and tapping of the heveas.

VII. DIAGNOSTIC AND RECOMMENDATIONS

A difficult present, but a promising future : Because of the role of "pilot project" that the World Bank chose to confer upon Batumarta, this Center is altogether different from a classical Transmigration Center.

1. BATUMARTA BENEFITS FROM MANY FAVORABLE FACTORS

- Very large amounts of money were spent, since the cost of installing one family at Batumarta is almost double the amount generally allocated.
- The Center's administrative framework is solid and qualified. The Transmigration personnel posted at Batumarta are competent and the working conditions very favorable (offices, vehicles, etc.).
- Serious preliminary studies allowed the housing blocks to be set up near small retaining dams so that fresh water would be available.
- Employing the PTP-X to set up the hevea plantations made possible the creation of industrial-quality plantations.
- The considerable scientific framework (Research Institutes, Universities, International consultants), though it has not yet resolved all the problems, has led to a sound knowledge of the area's characteristics and potential. There are a great many available basic data at the "seed farm", "test farm", and weather station.
- The large-scale distribution of cattle allows for the rapid development of draught traction.
- A large number of infrastructures have already been set up : access roads, schools, dispensaries, houses of worship, cooperatives, markets, et cetera.

2. THERE ARE STILL A FEW PROBLEMS, HOWEVER

- If the administration of the Center as a whole is of good quality, that of the Units is often lacking. Spontaneous transmigrants wishing to settle on the lots abandoned by migrants who had left the Center found themselves having to pay up to Rp 600,000 to certain Unit headmen.

- The technical framework at the unit level is probably the least satisfactory aspect. The PPL (agricultural extension agents) posted in the Units are on the whole too young, inexperienced, and not very motivated. The average length of stay of the PPL in Unit VII is only six months, not to mention the frequent absenteeism. Certain PPL's stocked plants for several weeks before distributing them to the transmigrants, thus causing a great many losses.
- The quality of the agricultural tools that were distributed was so disasterous that the transmigrants did not even consider using them.
- The KUD (village cooperatives) still function very badly and above all do not carry out their role in the commercialization of the agricultural production.
- In the units located at some distance from the administrative center, the costs of transportation are often prohibitive.
- The organization of artificial insemination and technical assistance for the stockbreeders is taking a long time.

But the main problem for all the transmigrants is that of ensuring their self-sufficiency, or at least their families' survival for the six years prior to the first tapping of the heveas. After this difficult period, the incomes earned from the rubber plantations will rapidly provide a secure future for the transmigrants.

3. RECOMMENDATIONS

All too often, the recommendations made by the various Institutes and Consultants mention but rarely the limiting factors and constraints which the transmigrants must overcome.

Such factors boil down to three main ones :
- a relatively low technical level,
- a limited labor force,
- and financial possibilities that are practically inexistent.

As a result, any proposition that supposes an increase in the financial burden or the amount of labor will never be accepted by the transmigrants.

Furthermore, any ambitious project such as building a tapioca or liquid sugar factory, vegetable of fruit canneries, and so on, will only merit consideration when large financial sources have become available.

For all of these reasons, we have confined ourselves to making only simple, realistic, inexpensive propositions which take into account the transmigrants' possibilities and respond to their needs.

These propositions concern :

- improving the effectiveness of the agricultural work,
- crop protection,
- the development of animal husbandry,
- increasing the possibilities of non-agricultural employment,
- and improving the commercialization of the productions.

3.1. For more effective agricultural labor

- The reduction in the amount of time spent clearing the land would be quite considerable if all the families had actually received one hectare cleared with a tractor as planned. This type of operation, while absolutely discouraged in the case of clearing primary or secondary forest, does not pose too many problems on land that is covered in Imperata cylindrica, as is frequently the case at Batumarta. Unfortunately, the quality of the clearing done with a tractor often leaves a great deal to be desired. The tractor-drivers tend to plow too deeply and too rapidly, without considering the differences within the plots. In this manner, in the zones where the surface horizons are thin, the compact underlying horizons that are rich in iron concretions and poor in organic matter and nutrients are brought to the surface by plowing that is too deep.
  Ultimately, the poor growth of crops in these zones gives the plots a characteristic "leopard-skin" appearance.

  To remedy things, it would be necessary to :
  . improve the formation of the tractor-drivers and introduce the notion of labor quality in the specifications required of the contractors.
  . favorise the use of pronged tools rather than disks in the zones where the superficial horizons are thin, so that the soil will be broken up without turning it over.

- Soil preparation

The large number of cattle distributed at Batumarta allows the migrants to make a rapid changeover to draught traction for the soil preparation operations. Nevertheless, in some units, the absence of blacksmiths hinders the fabrication and repair of plowshares and mould-boards. It would be useful to plan and finance the installation of at least one or two blacksmiths per unit.

- The amount of time needed for the sowing operations could be significantly decreased through the introduction of simple, efficient seeders mounted on the frame of multi-cultivators of the type commonly used in Senegal.

The fabrication of this sort of material should be considered in Indonesia, and why not near the large Transmigration Centers? Using seeders that would permit the obtention of regularly-spaced seed-rows, the introduction of draught-traction weeding would be possible for the first maintenance passages.

By reducing the amount of labor needed for soil preparation and sowing, the introduction of a complete set of draught-powered tools would allow for :

. a better result on the work-day and consequently a better return,
. an increase in the surfaces cultivated with no need for paid laborers.
. a reduction in the total amount of time needed for the operation, which would permit the sowing dates to be more closely narrowed down to the beginning of the rainy season.

Proper grouping of the sowing dates is an indispensable preliminary to an effective fight against the infestation of bugs, stem-borers, and other pests.

3.2. For better crop protection

Without spreading massive doses of fertilisers, one will never obtain very high yields in the conditions of soil fertility at Batumarta. Unfortunately, the cost of such fertilisation is still impossible for the large majority of transmigrants to bear.

On the other hand, improved crop protection would permit the farmers at Batumarta to at least double their yields, and this at a very low cost.

In fact, in the study group, the 10% of farmers whose technical level is high and who master phyto-sanitary treatments correctly obtain yields that are two to three times greater than the average, though the doses of fertilisers are identical.

Given the limited technical level of most of the PPL (extension workers), it appears unrealistic to count on them to organize any sort of effective crop protection. The best solution would be to promote agricultural groups such as the "Kelompok Tani" that already exist and to place the responsability for crop protection in the hands of groups and not of individuals. This solution has numerous advantages :

- Distributing the pesticides to the "Kelompok Tani" would avoid seeing them wasted or resold,
- The migrants with a high technical level would automatically take charge of the operations, which would permit the generalization of preventive treatments and correct dosing of pesticides. This would also prevent correctly treated parcels from suffering from the proximity of infested plots.
- Organizing labor in reciprocal assistence ("Gotong Royong") would avoid additional labor costs and would allow for a rapid evolution in the average technical level of the migrants.
- The regrouping into "Kelompok Tani" would facilitate both access to agricultural credit and the introduction of new methods.

For the crops other than upland rice, the raids made by wild pigs remain the major problem, especially for the Moslem settlers. As a matter of fact, the problem does not seem to trouble the Balinese, who are extremely fond of pork. Much to the contrary, some Balinese complain of the progressive increase in the distances they must cover to reach their hunting grounds. Unfortunately, the relatively limited number of Balinese does not allow for permanent crop protection on all the units at Batumarta.

As the fencing of certain plots has proved to be costly and above all powerless to discourage the wild pigs, the organization of regular hunts seems to be the best solution. To do this, the Transmigration Authorities could call upon the Army and Balinese beaters. The result of the battues would largely cover the necessary costs and would also allow for an improvement in the Balinese families' diet.

3.3. The development of animal husbandry

Cattle breeding

Cattle breeding is already relatively developed at Batumarta and will ensure the transmigrants a non-negligeable income within a few years. At present, the main obstruction to its development seems to be the limited manpower, financial means, and formation of the personnel in the Breeding Services. After having started almost from scratch, these Services are progressively getting organized, thanks to the large demand created by Transmigration.

Small-scale poultry farming

Contrary to many transmigrants' wishes, the official Services have not yet given much attention to this activity.

Credit facilities with the Bank Rakyat Indonesia would allow certain migrants to specialize in the breeding of laying hens and meat-producing chickens. This credit would be given under the condition that the applicant participate in the training courses organized by the Breeding Services.

Pig farming

This activity, which many Balinese would like to develop, comes up against the obstacles that are habitually present in the predominantly Islamic provinces. As the private transport companies refuse to take on loads of pigs, it is absolutely necessary that the Authorities organize the introduction of selected breeding stock. The system used for cattle could easily be adapted to breeding pigs.

3.4. Increase the possibilities of non-agricultural employment

The presence, in all the units, of numerous sawyers, joiners, and carpenters, could be put to better use by the Transmigration Authorities. More often than not, the latter call upon local companies to do the work of building and expanding the Center. The contractors then subcontract transmigrants for a large part of the work, most often at a low price. If the craftsmen voluntarily accept building contracts for two or three houses, they are obviously not in a situation to accept offers concerning 500 houses plus a dozen or so community buildings.

In order to remedy this problem, the Transmigration Authorities should set up craftsmen's cooperatives along the same lines as the KUD (village farm cooperatives). The existence of such cooperatives would permit, in all : to reduce the construction costs of the transmigrants' houses, to increase the possibilities of employment and formation, and to increase the craftsmen's incomes.

Other artisans, such as bicycle repairmen, blacksmiths, tempe/tahu manufacturers, and so on, should also be able to obtain credit facilities for the purchase of necessary material.

3.5. Improve the commercialization of the agricultural production

Batumarta benefits from a priviledged geographical situation due to the proximity of two secondary urban centers, Baturaja and Martapura; the Trans-Sumatranese road; and the railroad that connects Baturaja with two large urban centers : Palembang and Tanjung Karang. Unfortunately, the transmigrants do not take much advantage of these excellent commercialization possibilities. This is quite obvious from the simple comparison of the prices of the products at the farm with those in Baturaja or Palembang.

On the other hand, transporters and wholesalers are making easy profits on the transmigrants' urgent money need. As they cannot stock their production, the transmigrants sell it in gross amounts after the harvest. The prices drop rapidly at the Center, but remain surprisingly stable in Baturaja.

Certain migrants who are aware of this problem organize the collection and transport of the productions. The high cost of transportation, especially from the units that are at some distance from the administrative center, weighs heavily on the benefits of the operation. Once in Baturaja, the buying prices offered by the wholesalers are only slightly higher than the prices at the Center, due to illicit agreements between wholesalers. Likewise, numerous cases of "weight loss" during transport have been signaled. A 100-kg sack of peanuts (weight verified at the Center) only weighed 85 kgs when it arrived in Baturaja! The transmigrant, having been obliged to advance the transportation fee, finds himself forced to sell at any price.

In order that the migrants do not fall prey to such commercial practices, the Transmigration Authorities should organize :

- the collection of the harvests,
- the temporary storage at the level of the Center, in order to sell during more favorable periods,
- the transportation of the harvests to Baturaja (or Palembang, Tanjung Karang),
- the sale of the products at a market specially set up for the needs of Transmigration.

This type of organization, while difficult to consider for a classical Transmigration Center, could easily be set up at Batumarta due to the Center's size (14 units in 1983) and the quality of its administrative framework. Transport and organization costs considered, the additional profit that would be thus realized would come to about 50% of the present sale price.

Despite a few transitory problems, the future of the Batumarta Center looks quite promising. The few recommendations forwarded above - which mainly concern an effort in formation and organization, both of the transmigrants and the Official Services - would help make this future a less distant one.