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SAUSU, MALONAS, TOLAI LESSONS IN SUCCESSFUL TRANSMIGRATION

Agro—economic study of
Three Transmigration Centers in the
Sulawesi Tengah Province



INDONESIA – ORSTOM TRANSMIGRATION PROJECT PTA-44
Jakarta, May 1986

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Sulawesi Tengah Province**

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FOREWORD

Within the framework of the cooperation agreement between the Ministry of Transmigration of the Republic of Indonesia and the French Institute for Scientific Research and Development in Cooperation (ORSTOM), a comparative study of several Transmigration centers was begun in September 1982. This study will continue three to four more years and will concern, in all, a dozen Transmigration projects scattered over several of the provinces of Sumatra, Kalimantan, and Sulawesi.

At first, the goal of these studies is to obtain basic agro-economic data that are as precise and reliable as possible. A record of the constraints and the factors favorable to the development of the agricultural productions, both in physical and human terms, is necessary to the understanding of the production systems, as well as being an indispensable preliminary to any suggestions for improvement.

The following report concerns three Transmigration centers located in Central Sulawesi and studied from December 1983 to September 1984.

The greater part of the basic data was obtained directly from the transmigrants. To this end, a random sample of nearly 160 settlement families, over the three centers, was followed through enquiries and field observations that took place during four visits, each spaced two months apart. This system has many advantages, as it allows the team :

- to follow the same families during an entire agricultural year;
- to gain the confidence of the farmers who were troubled by the first visit;

- to carry out surveys that are more complete than those done in a single visit. Indeed, after one hour of questioning, the persons interrogated can no longer concentrate and answer incorrectly.

- to verify the truthfulness of the answers given during the earlier visits (many facts are "omitted" or exaggerated, especially concerning yields and incomes);

- to better appreciate the evolution of the situations encountered;

- and to obtain precise quantitative data by encouraging the farmers to keep records of the amount of time spent at labor, to note the amount of seed, fertilisers, and pesticides they use, and to measure their yields.

To this end, 20 householders who were sufficiently educated, serious, and who wished to collaborate with the study team, were chosen in the first two centers to keep a diary. All kept their journals conscientiously and regularly for 275 days, recording the following information :

- their incomes : in cash or in kind, of agricultural origin or not;

- their expenditures : daily expenses and exceptional ones, gifts in cash or in kind;

The success of this method is without a doubt due to the interest that most of the householders felt for their diaries. Many of them insisted on obtaining the results of the analysis carried out after the survey.

TRANSMIGRATION IN THE PROVINCE OF CENTRAL SULAWESI

At the time of the 1980 national census, the province of Central Sulawesi (Sulawesi Tengah) had 1,290,000 inhabitants for an area of 69,700 km², thus a population density of 18 inhabitants per square kilometer. At this same time, the island of Java had a density of 690 inhab./km².

The Dutch colonial administration, in an attempt to reduce this demographic imbalance and also to develop the Outer Provinces, had organized, from 1905 to 1942, the first population resettlements from Java to South Sumatra, Kalimantan, and Sulawesi. Since Indonesia's independence, her government has amplified these organized migrations from the islands of Java, Bali and Lombok to Sumatra, Sulawesi, Kalimantan, Irian Jaya, and the Moluccas Islands.

In Central Sulawesi, the first Transmigration center was opened in 1940. Five others followed between 1951 and 1966. Beginning with the First 5-Year Development Plan, and continuing up to the present, the Transmigration operations have increased in this part of the island, as from 1969 to 1983, more than 22,000 families have been installed in 19 centers (see Table 1 and Map 1).

At first, two centers were chosen for this study :

Malonas I, set up in 1977 and planned for the installation of 500 families. When this center came under the control of the Provincial Administration (thus no longer dependent on the Transmigration Authorities), it was rebaptized "Karya Mukti". For the sake of simplicity, we shall continue in this report to call it by its former name, "Malonas".

Sausu, opened in 1980 and planned for the installation of 770 families. At the time of this study, it was still under the control of the Ministry of Transmigration.

Later on, in order to properly carry out the analysis of the success factors at these two centers, and to estimate their future evolution, we included an older center in the study :

Tolai, created in 1969 and intended for the resettlement of 195 families of spontaneous transmigrants with no State assistance (Trans. Spontan Tanpa Bantuan Biaya).

TABLE 1
TRANSMIGRATION IN THE PROVINCE OF CENTRAL SULAWESI

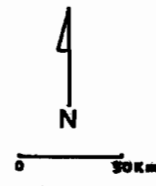
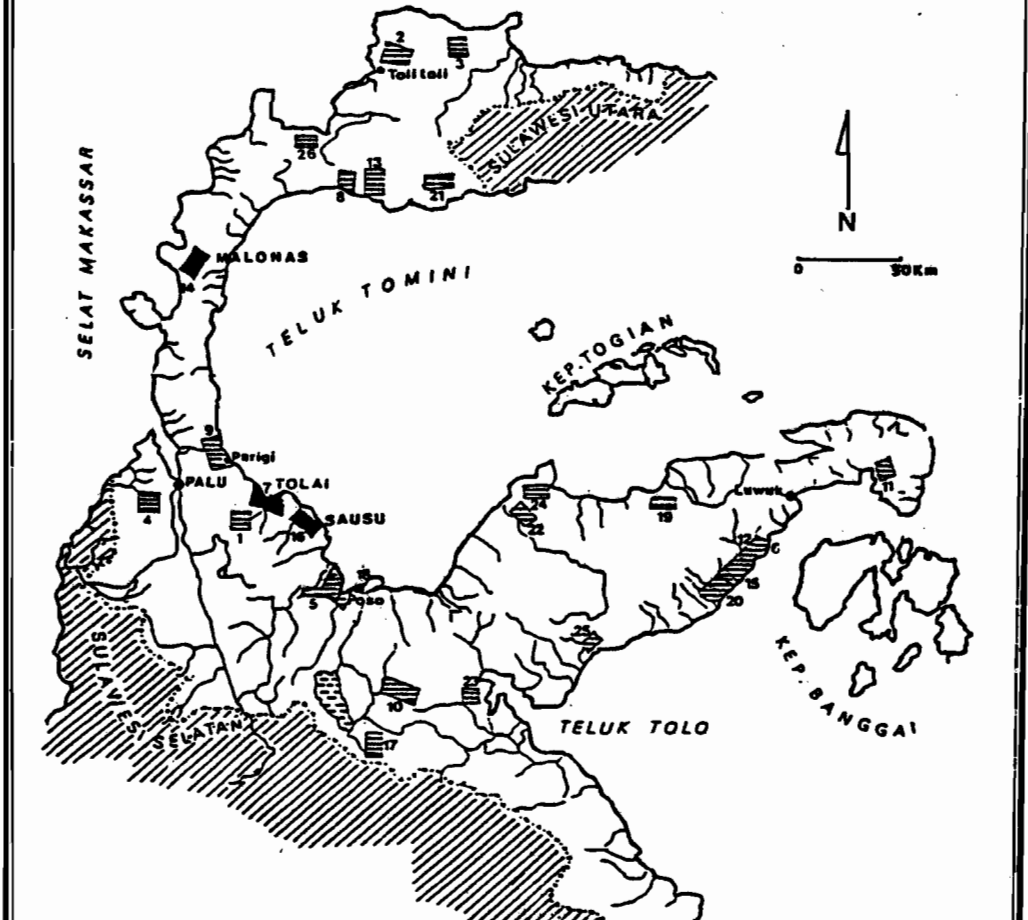
Period	No of families	No of persons
PRAPELITA (1962-69)	1,378	5,948
PELITA I (1969-74)	3,852	17,507
PELITA II (1974-79)	7,800	34,243
PELITA III (1979-83)	10,808	43,055
TOTAL	23,838	100,753

PELITA : 5-Year Plan for National Development

Source : Direktorat Jenderal Transmigrasi

NOTE : The data in this table do not include the spontaneous migrations to this province.

MAP NO. 1
 LOCATIONS OF THE TRANSMIGRATION CENTERS
 IN THE PROVINCE OF CENTRAL SULAWESI



COLONISATION	PELITA III
1. Patolo 1940	12. Ongka-Malina 1974/76
	13. Malonas 1976/79
	14. Toili 1975/79
PRA PELITA	PELITA IV
2. Kalangkangan 1951/58	15. Sausu-Tambarana 1979/80
3. Mmurru 1956	16. Mayoa 1979/80
4. Palu 1959/65	17. Padalenbara 1979/80
5. Kilo 1966	18. Bunta 1980/81
6. Batui 1965	19. Toili 1980/81
PELITA I	20. Taopa Lamburu 1980/83
7. Mepanga 1973/74	21. Bongka 1983/84
8. Parigi 1969/73	22. Kolonedale 1981/83
9. Kamau 1972/73	23. Mamo 1983/84
10. Roe 1972/74	24. P.Tugian-Ampena 1982/83
11. Batui 1973/74	25. Basi Dondu-Oyon Lampesio 1984



Indonesia : Situation map

PART I

SAUSU, MALONAS, AND TOLAI:
THREE TRANSMIGRATION CENTERS IN CENTRAL SULAWESI

A FAVORABLE ENVIRONMENT

Localisation:

Situated on the coastal plains at the foot of the mountainous ridge that runs along the northern arm of the island of Sulawesi, the Transmigration centers Sausu, Malonas, and Tolai lie within the zone between 1 degree North and 1 degree South latitudes and between 120-122 degrees East longitude (Map No 1).

While these centers are all more or less equidistant from the provincial capital of Palu (Sausu: 140 kms; Malonas: 160 kms; Tolai: 120 kms) the conditions of access are quite different.

From this point of view, Malonas is the least fortunate. The access road is paved over only 50 kms; from Palu one must ford 15 rivers. During the rains, the vehicles cannot cross the rivers, or else remain mired as the dirt trail turns to mud. In some places, the drivers prefer to cut through the coconut groves and take to the beach, which is much easier to drive on than the road. Thus, it takes anywhere from 8 hours to 2 days to cover the distance between Malonas and Palu.

This is all the more unfortunate in that, according to the transmigrants, in 1977, the road was quite correct and could be easily negotiated by the machinery needed for the Center's installation. Since then, a slow deterioration has set in from lack of regular maintenance, so that the region is now almost completely isolated from the rest of the Province.

Quite the opposite, the Sausu and Tolai centers enjoy an exceptionally good situation as they are located on the Trans-Sulawesi Road. This partially-blacktopped road is in excellent shape, which makes it considerably easier to travel to Poso (in the southern part of the Province) or to Palu, 4 to 5 hours being sufficient to reach either of these towns.

Climate:

The available rainfall data were recorded either at the center itself (Malonas Seed Farm) or else nearby (Agricultural Services Bureau in Parigi, 30 kms from Sausu and 15 kms from Tolai). The rather recent development of these zones explains the short period covered by the data: 5 years for Malonas, 12 years for Parigi. Therefore, the analysis of the data only gives a partial idea of the climatic conditions in this region.

Furthermore, the extremely hilly relief in this part of the island, which creates very great climatic differences from one area to the next, made it impossible to extrapolate more complete and more reliable data from the Province's other weather stations (Palu airport ...).

Malonas receives an average rainfall of 1954 mm/year. August, September, and October are the "driest" months, with a pluviometry of between 90 and 110 mm, while January and December are the rainiest with monthly averages of 320 and 380 mm, respectively. However, these averages only have a limited significance given the short period covered by the records.

At Sausu and Tolai, the rainfall distribution, with a yearly average of 1658 mm, is reversed with respect to that of Malonas: January and December are the least rainy months, with respective averages of 70 and 64 mm, and the greatest amount of rain, an average 224 mm, falls in July. For these two centers, it is possible to distinguish between a "wet" season, occurring around

Table 2 : RAINFALL DATA (Agricultural Services Bureau - Parigi)

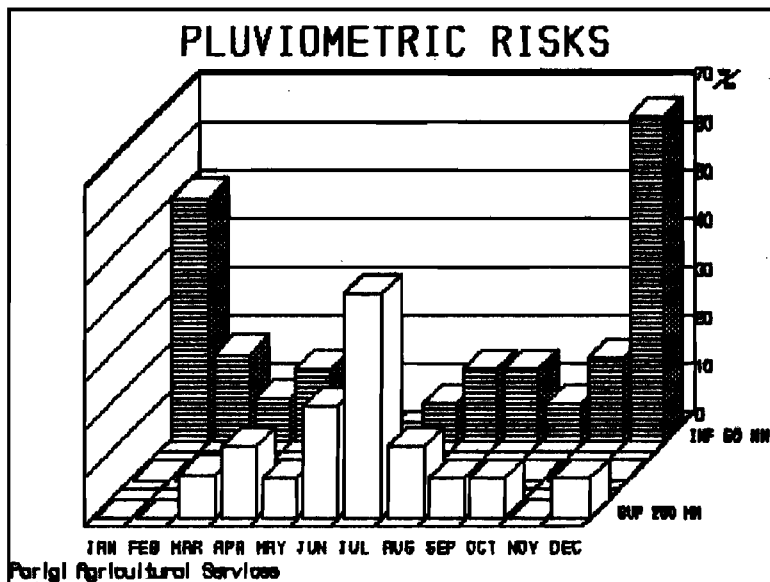
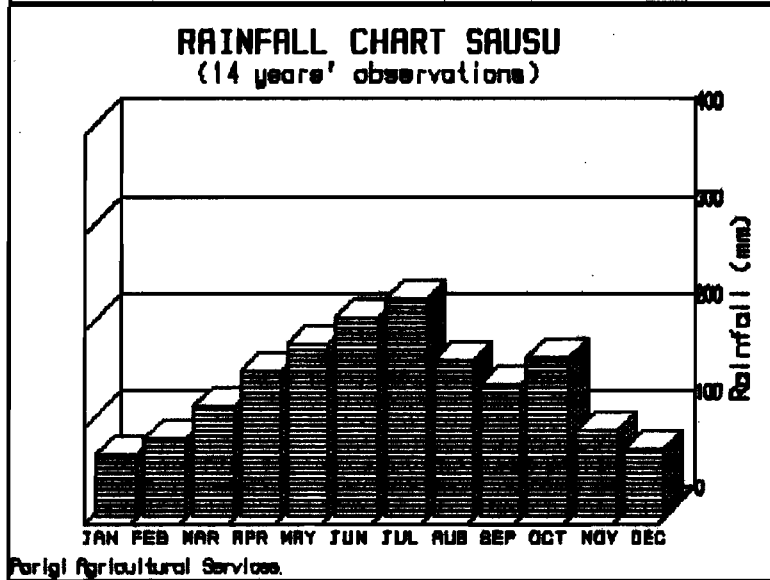
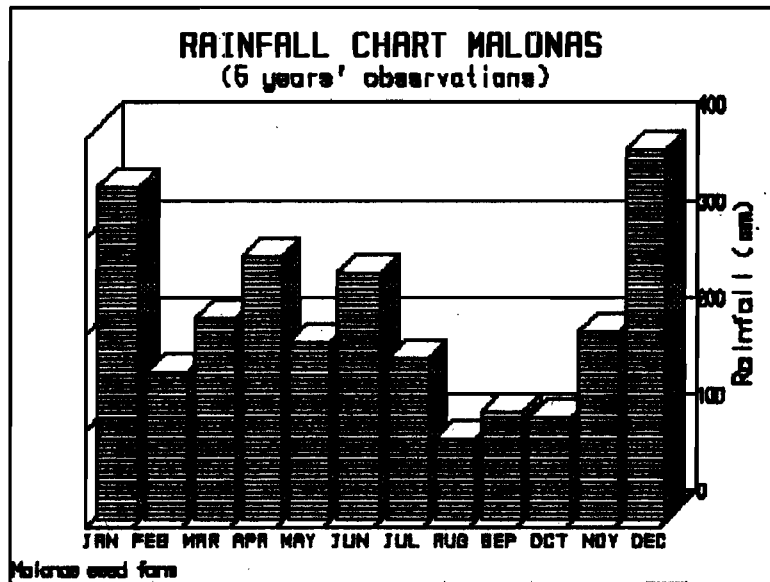
YEAR	71	72	73	74	75	76	77	78	79	80	81	82	83	84	AVG	STD	C.V.
JAN		55	102	36	109	102		29	16	154	16	41	64	41	63.8	41.6	65%
FEB		67	101	82	116			55	100	95	37	75	49	89	78.7	23.5	30%
MAR		52	115	96	38			302	108	102	129	54	154	108	114.4	68.0	59%
APR	82	36	296	113	119	209	49	139	336	133	95	109	226		149.4	87.9	59%
MAY	190	212	248	103	176	177	61	158	88	308	195	217	161		176.5	63.8	36%
JUN	152	214	111	136	149	170	196	138	539	305	115	183	260		205.2	110.4	54%
JUL	273	38	145	207	309	296	190	248	267	300	222	81	330		223.5	86.4	39%
AUG	126	179	455	137	213	160	254	138	48	133	38	157	57		161.2	103.8	64%
SEP	306	141	39	226	232	6	52	205	143	65	233	53	58		135.3	92.7	69%
OCT	144	233	64	316	140	184	135	151	32	242	223	85	166		162.7	75.2	46%
NOV	132	172	52	71	14		25	67	105	90	113	98	110		87.4	42.8	49%
DEC	21	303	131	25	26		45	94	24	30	7	31	101		69.8	79.4	114%
TOTAL		1702	1859	1548	1641			1724	1806	1957	1423	1184	1736		1658.0 *	213.6	13%

AVG : Average STD : Standard deviation C.V. : Coefficient of variation

* Average annual rainfall for 10 full years : 1658 mm

Total of monthly averages : 1628 mm

GRAPH 1



July, and a "dry" season that takes place from November to February. This is confirmed by the charts showing pluviometric risks: in December and January, the risk of receiving less than 50 mm of rain are greater than 50 %; every two years the rainfall for these months is very limited.

On the whole, this region benefits from a regular amount of rain all year round, with risks of shortage that are limited and predictable. This characteristic is suitable for a normal cultivation of food crops and principal plantations.

To these already quite satisfactory pluviometric conditions is added a non-negligible quantity of available watershed, as from the nearby mountain range, which receives abundant rainfall year-round, run numerous rivers with considerable flow rates. Should there be a prolonged lack of rain, these rivers always offer the possibility of satisfactory, gravity-induced irrigation of all the crops, and rice in particular.

However, as the irrigation networks at Sausu and Malonas are not altogether finished, the transmigrants must still take into account the risk of water shortage for certain months, as far as the cultivation of crops such as rice or soybeans is concerned. Despite this, they still manage to obtain two to 2.5 harvests of rice and up to 3 harvests of soybeans per year. At Sausu the situation should get even better with the future construction of an irrigation network beginning at the Sausu River, which is presently under study.

Edaphic conditions:

The only complete pedological data available for this region come from the studies that were carried out in preparation for the installation of the Sausu center (see Map No 2).

The soils at this center are, on the whole, built up on recent alluvions and colluvions. They are rich in organic matter, with a pH that is practically neutral, a total of exchangeable bases of between 10 and 25 meq/100 g for the various soil units, and a silty-clayey texture.

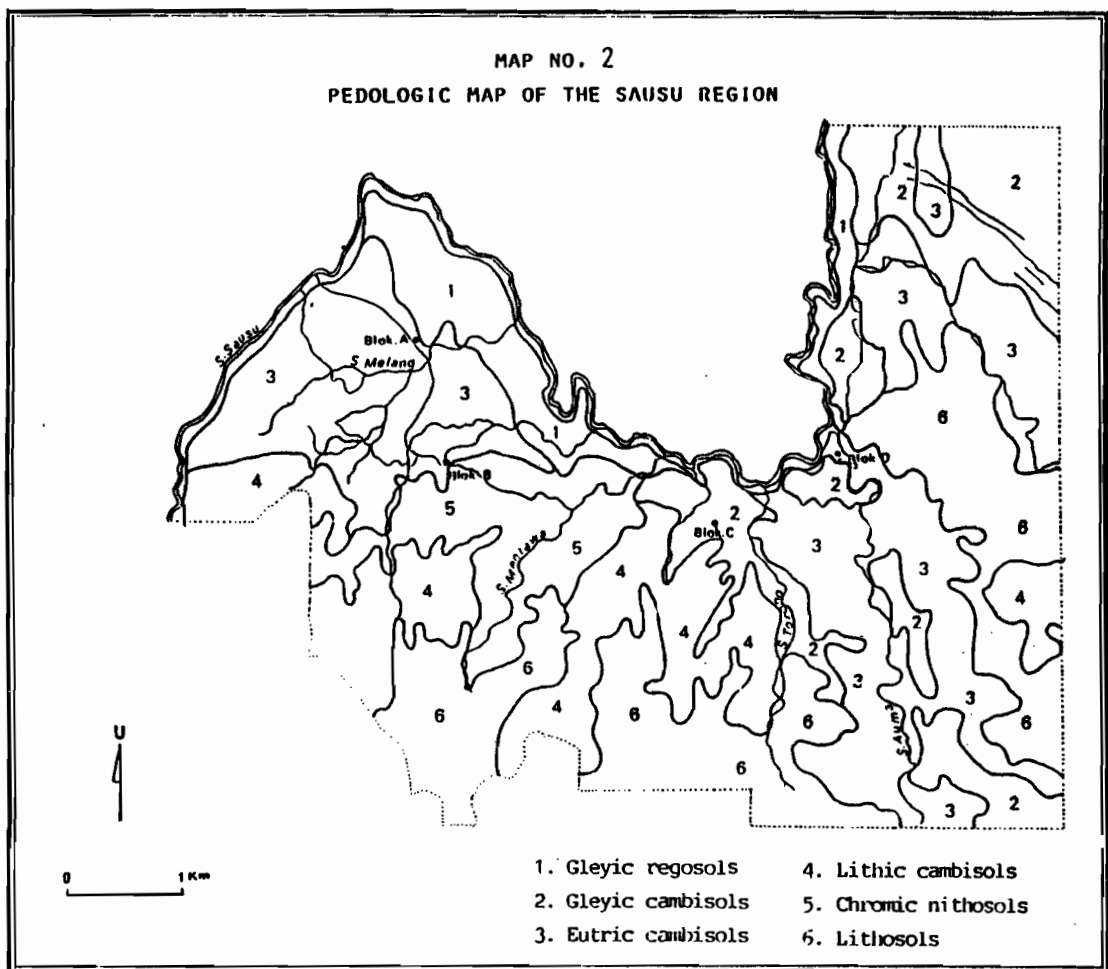
All of these characteristics give these soils suitable agronomical potential for all tropical crops. These are fresh, quite fertile soils: in North Sulawesi, on such soils, the yields in soybeans using traditional methods have remained stable for 10 years without any use of chemical fertilisers.

At Tolai and Malonas, the soils have practically the same characteristics, as they were formed from the same basic material and in the same topographical conditions. However, there are some differences:

- at Tolai, the soils have been cultivated for at least 15 years; moreover, the rice exportations have been greater than the soybean exportations. As a result, the reserves of nutritive elements are exhausted, and the transmigrants must spread fertiliser to compensate for what is used by the crops.

- at Malonas the soils are more sandy in texture than at Sausu: near the first reliefs, they are shallow and have a horizon composed of coarse, sharp-edged sands that greatly impede the crops' root development and the maintenance of the water level in the rice fields.

In all these centers, the soils have a good level of fertility, and the choice of crops depends of the type of relief alone: rice in the flat lowland zones, and yearly upland crops or perennial plantations in the hilly areas.



THE TRANSMIGRANTS**Origins:**

When Sausu and Malonas were set up, they were assigned "governmental" transmigrants (Transmigran Umum) from the usual zones of origin: Java, Bali and Lombok.

TABLE No 3
THE TRANSMIGRANTS' ORIGINS
(Transmigran Umum)
(in No of families)

Provinces:	Central Java	East Java	Bali	NTB Lombok	DKI Jakarta	DI Yogya	APPDT
SAUSU :	100	267	100	100	50	83	70
MALONAS :	145	100	105	150	-	-	-

(APPDT: local transmigrants)

Tolai's is an altogether different case: the center was created solely on the initiative of a Balinese migrant from Parigi. Faced with an ever-increasing number of arrivals from Bali and the resulting land shortage at Parigi, he proposed that the local Transmigration officials open a new center at Tolai. Thus, the population of this center is composed only of spontaneous Balinese settlers. These transmigrants only received partial assistance from the Authorities: seed for the first crop and food subsidies for a few months. They had to clear their lots (2.5 ha each) and build their houses themselves.

Population evolution:

Fifteen years after it was opened, the population of Tolai has reached the point at which all the land in the village has been cleared and put to use and there is none left to offer new families. Yet the Parigi-Tolai area continues to attract a great many spontaneous transmigrants, who settle south of Tolai as far as Sausu. The second generation of the migrants in this region also moves in this direction in their search for available land. Thus we are seeing a regular progression of the settlement line towards the south (see Map No 3). This phenomenon has been amplified by the very creation of the Sausu center.

TABLE No 4
POPULATION EVOLUTION
 (opening date to the present)

	MALONAS	SAUSU (*)	SAUSU (ç)
initial total	500	770	783
abandons	- 49	- 37	- 165
spontaneous	+ 49	+ 96	+ 171
new family units	+ 42	+ 35	+ 48
exchanges	+ 49	+ 37	+ 165
present total	591	901	1002

(*) official figures

(ç) figures obtained by survey

At Sausu, the data concerning the population movements, collected by the center's Authorities (KUPT)✧, are different from those obtained after a direct enquiry made of the local headmen (Kepala RT)✧.

Nevertheless, even if the KUPT's data tend to play down the number of abandons, they do show the same tendencies towards growth of the center's population.

The number of abandons, which might appear considerable, does not mean that transmigration has failed in this area. All these departures took place in the form of exchanges that were carried out without the Authorities' knowledge. Many of the first arrivals gave in to pressure from the wealthier spontaneous transmigrants from Tolai Parigi who, for Rp. 200,000 to Rp. 300,000 easily became the "owners" of 2-ha lots. These exchanges took place during the first 2 or 3 years after the center opened.

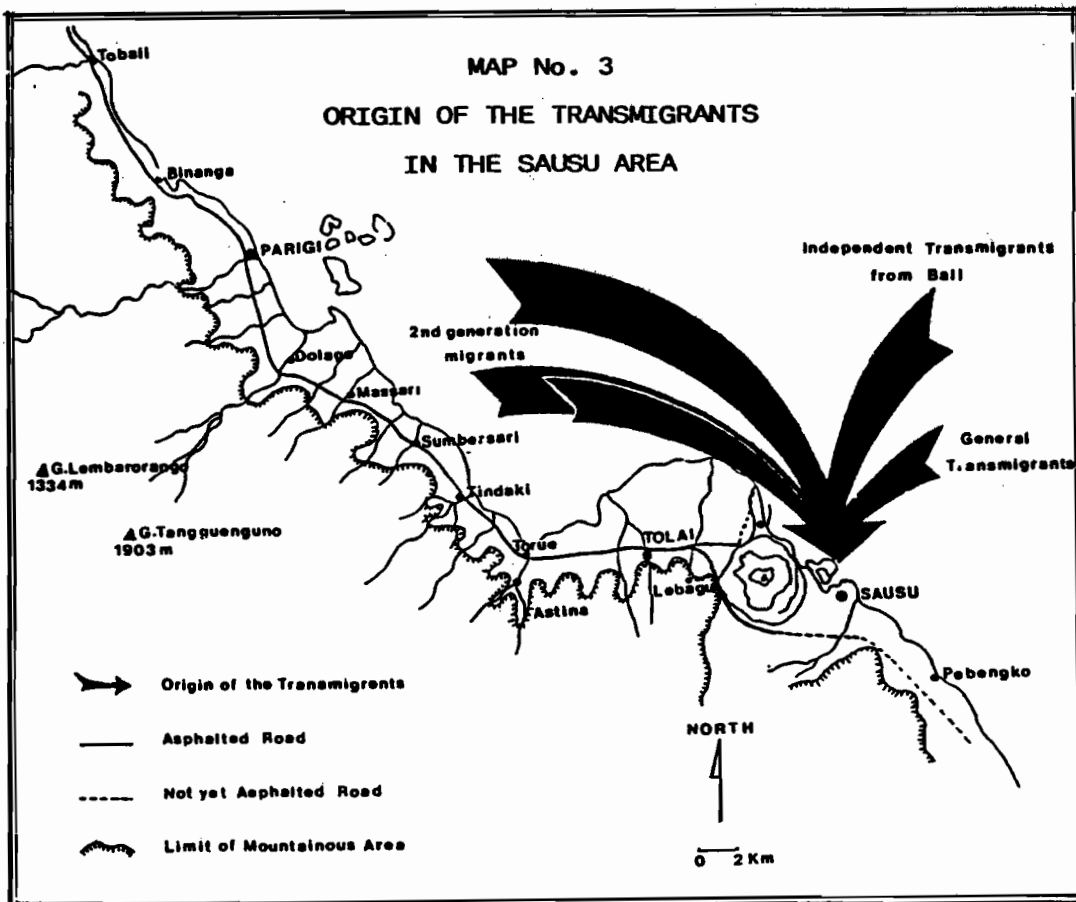
✧. Kepala Unit Proyek Transmigrasi : chief authority of the Transmigration center.

✧. Rukun Tetangga : quarter, district block, housing unit.

There are a great many spontaneous transmigrants: 17% of the total number of families (figures obtained through survey). All are Balinese, either second-generation migrants from Parigi or Tolai, or direct immigrants from Bali itself.

The southerly transition of the settlement line is rapid; in two trips, whole sections of forest are cleared and under crops. In 1982, the Transmigration Authorities in Sausu had to create a new RT (district) which included 48 families of spontaneous Balinese settlers.

The Malonas center is practically isolated from the rest of the province. Moreover, the only land that is still available is located on the first slopes; this land, though fertile, is difficult to develop. Thus, due to this isolation and to the impossibility of reclaiming crop land, the center is not considered attractive by spontaneous transmigrants and is a much less active settlement line than Sausu.



The family labor force

In order to estimate the labor force for each family, the following scale was used:

TABLE No 5
LABOR FORCE: SCALE OF UNITS

TYPE OF WORKER	LABOR UNIT
Adult men and boys more than 15 years of age who are no longer in school	1
Adult women who have no children younger than 5 years of age and girls more than 15 years old who are no longer in school	0.5
Children more than 10 years old who are still in school	0.1
Others	0

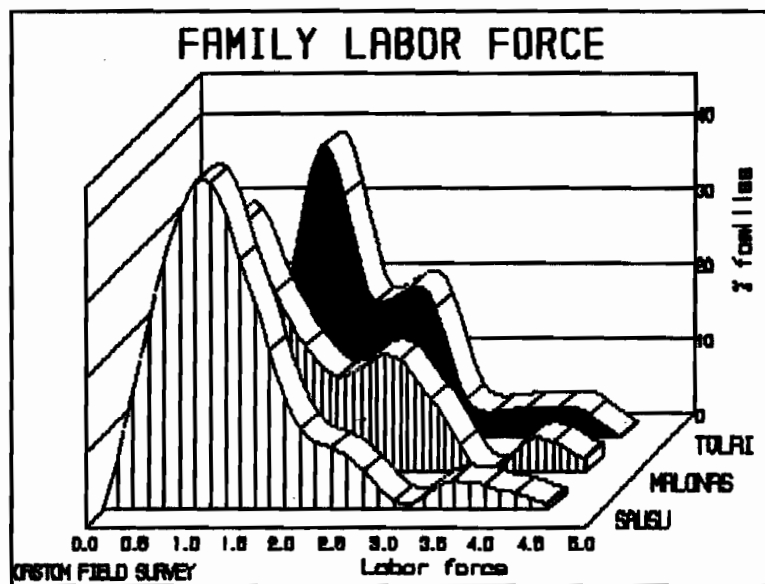
At Sausu, where the householders are still young, the family labor force is rather small on the average (1.6 units). This is very often reduced to a single unit, the householder carrying out the agricultural tasks alone when his wife must care for the very young children and cannot help him in the fields.

At Malonas, the family labor force is slightly larger on the average (1.9 units) though remains limited for many families whose situation is similar to the one in Sausu.

Tolai being the oldest center, the labor force is greater than in the other two centers (2.1 units). Here the heads of household are older, as are their children, who can help full time with the farm chores if they are not or no longer in school.

At Tolai, two categories of householders stand out: those of the first generation with a large labor force, and those of the second generation whose smaller labor force is equivalent to that observed in Sausu in the newly-arrived families (see Graph 2).

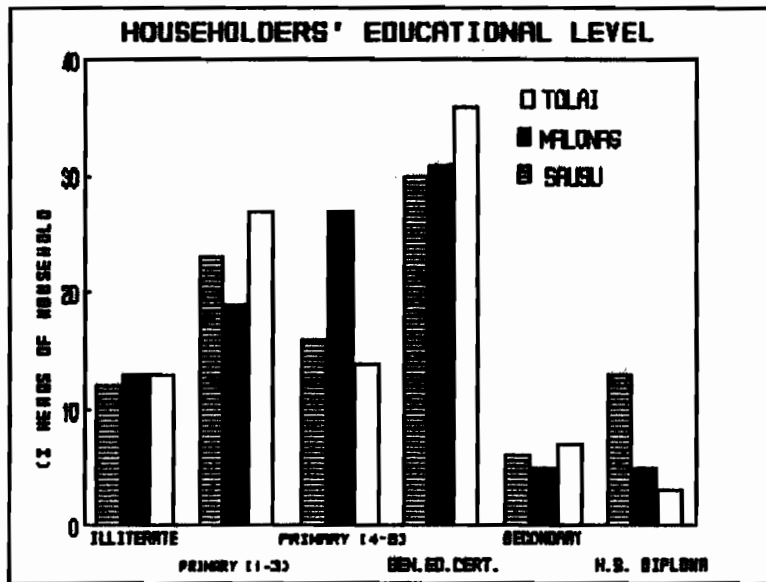
GRAPH 2



Householders' educational level

The following diagram shows the amount of education obtained by each of the heads of household in the study group for each center:

GRAPH 3



One will note that for the three centers, the proportion of illiterate householders is remarkably low: 11% at Sausu, 13% in both Malonas and Tolai. These proportions are much higher in the provinces of origin: on Java, 35% of the population older than 10 years is illiterate, and 38% on Bali. This disproves the frequently-held opinion that those who volunteer for Transmigration come from the lower classes of society and have an educational level that is below average.

The transmigrants' motivations

"Why did you choose to transmigrate?"

The householders' answers to this question are all similar: to obtain land ownership, to work for themselves, to improve their standard of living, and to secure their children's future.

This choice can be explained by the difficult living conditions in the provinces of origin. For example, among the families at Sausu and Malonas, only slightly more than half of the survey group owned a house in their province of origin; one-third of the families owned arable land, and almost all had very little wealth.

TABLE No 6
THE TRANSMIGRANTS' STANDARD OF LIVING

	SAUSU	MALONAS
Owned a house	68%	54%
Owned arable land	46%	39%
Average area owned	50 ares	55 ares
Personal property (*)	Rp. 65,000	Rp. 105,000

(*) includes: animals, bicycles, radios, furniture

At Tolai, given the large proportion of second-generation householders, it was not possible to evaluate the standard of living of these families before their departure from Bali. Many could not remember what their parents owned, as they were still children when they arrived with their families. However, it is quite probable that the living conditions on Bali were identical, if not inferior, to that of the Sausu and Malonas transmigrants in their provinces of origin.

Agricultural experience

The following table gives an idea of the transmigrants' agricultural experience upon their arrival at the center. It can be clearly seen that the settlers at Tolai were rice farmers. These same families left Bali when the BIMAS-INMAS (☆) programs were set up. This explains why few of them had already used fertilisers or pesticides at the time, whereas 60% of the Sausu and Malonas transmigrants were already familiar with the use of such products when they arrived at the centers.

TABLE No 7
AGRICULTURAL EXPERIENCE
 (% householders with farming experience
 before their arrival at the center)

	dryland crops	rice paddies	draught traction	fertili- sation	phyto- san. treat.	no exp.
SAUSU	78	68	75	62	61	22
MALONAS	75	84	57	68	61	16
TOLAI	48	93	59	15	22	7

However, the Balinese householders were not hindered for very long by their lack of experience in these new techniques (fertilisation and phyto-sanitary treatments), since they now all use them correctly, as will be shown further on.

☆. BIMAS-INMAS : Bimbingan Masyarakat, Intensifikasi Masyarakat : agricultural credit systems.

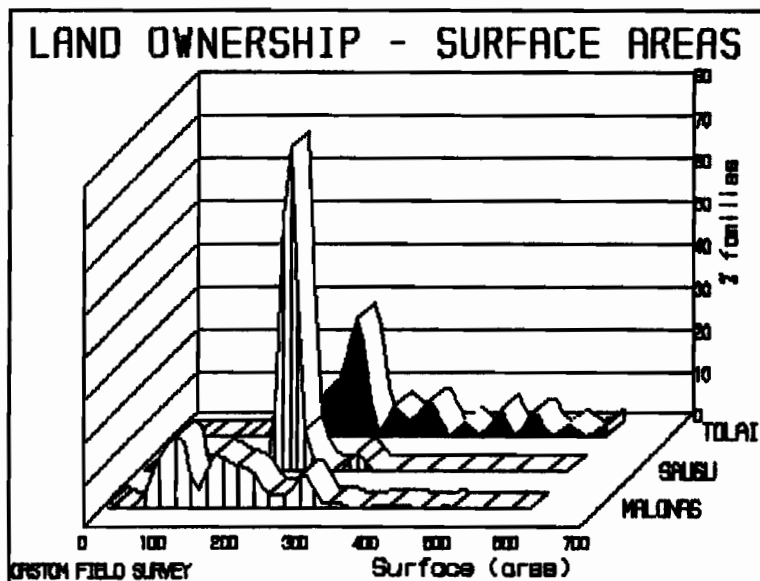
AGRICULTURAL ACTIVITIES

Surface areas

Sausu has conserved its original land-allotment system: 80% of the transmigrants in the study group own 2 ha of land, which corresponds exactly to the area allotted to each family by the Ministry of Transmigration. Few of the transmigrants living at the center have sold part of their land. The only evolution observed in some cases tended towards an increase in land ownership, in the form of parcels that were bought from families who were definitely leaving the center.

After 4 years, due to the families' limited labor force, the area under crops only came to an average 1.07 ha per family, or about half the land owned by each. The rhythm of increase in cultivated surfaces is slowed by the successive swarms of rats, leading many transmigrants to seek outside employment (see Graph No 4).

GRAPH 4



Malonas has very serious land problems. Due to the limited area of the site, the 2-ha lots given to each family included 1 ha of very sloping land that could not be used for food crops. Therefore, many of the transmigrants gave this hectare up for lost and only cultivated the parcels located in the plain. This is why more than 38% claim to own less than 1.25 ha of land only.

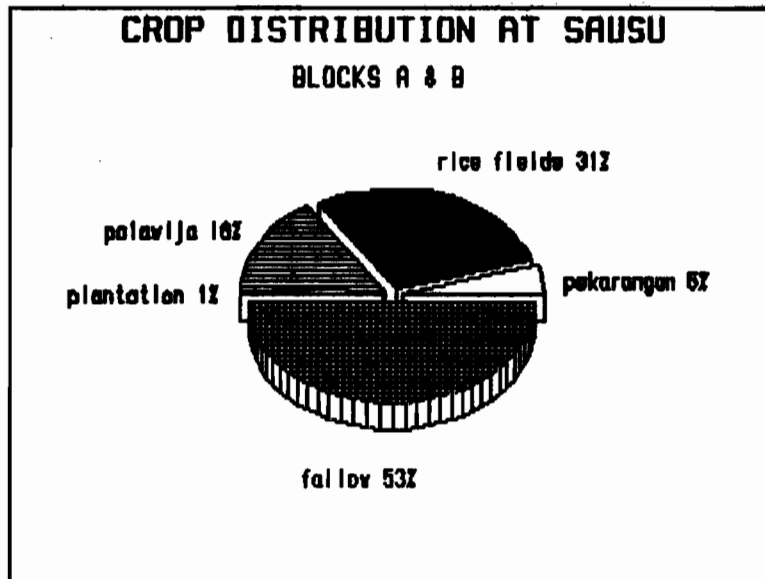
The Malonas transmigrants were less privileged than those of the other centers, as owning one hectare is not sufficient for a family that wishes to earn its living by farming. For this reason, many settlers bought land from families who wanted to leave the center altogether. Some even encouraged their children to marry as early as 17 or 18 years of age in order to be able to profit, before anyone else, from the land reserves set aside for newly-established families.

At Tolai, the lots given to each family were 2.5 ha in size. The Balinese living at this center had to clear the land themselves; later, many of them cleared or bought other plots. Thus 15 years after the center's creation, the average amount of land owned per family came to 3.2 ha.

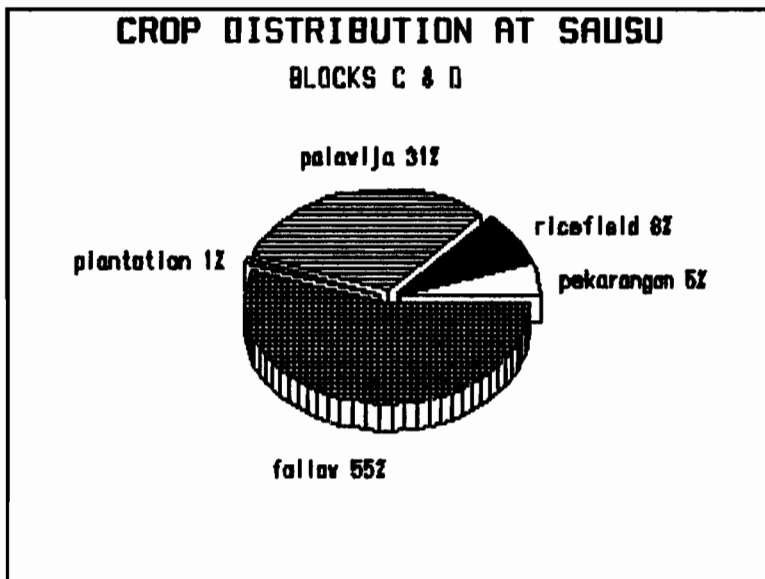
Crop distribution

There are two distinct zones at Sausu: a rice-growing area located in the northern sector of the center on land that has very little slope (Blocks A and B), and a zone that is mainly used for the "Palawija" (annual upland crops: soybean, maize, peanuts ...) located in the hillier southern part (Blocks C and D). The transmigrants who live in this second zone grow soybeans for the most part, while awaiting the end of the installation of the irrigation network that will allow them to grow rice (see Graphs 5 and 6).

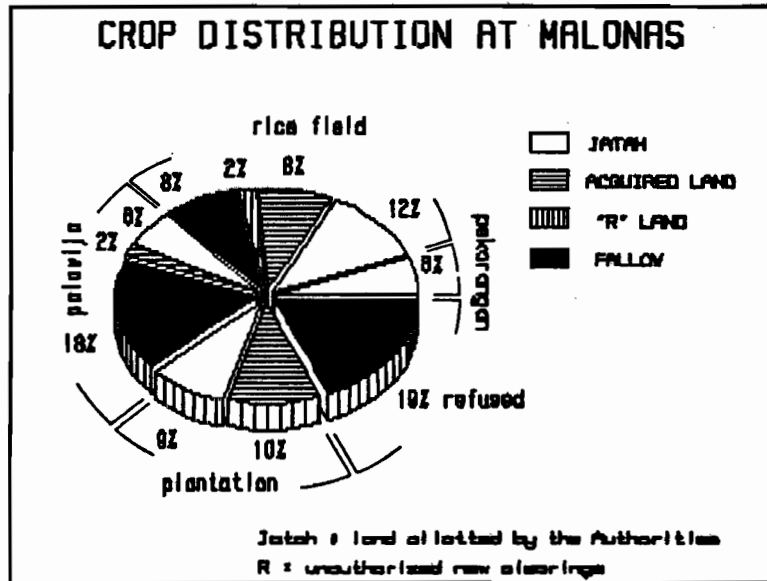
GRAPH 5



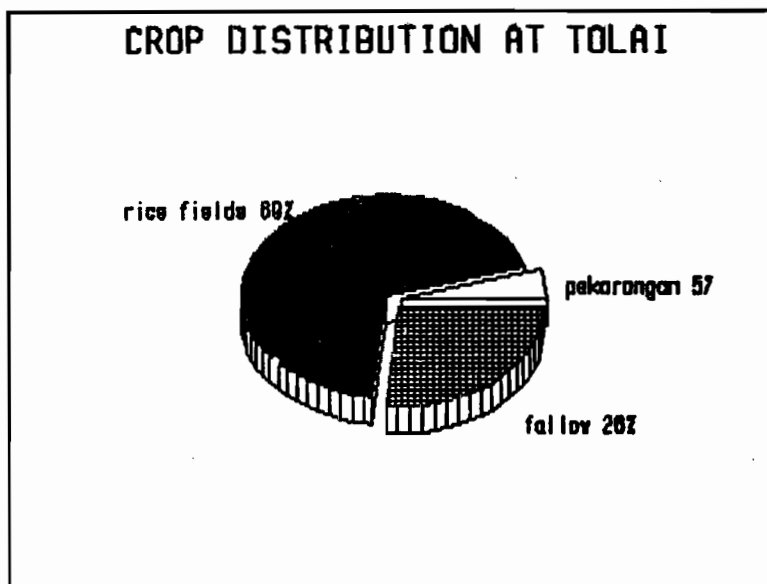
GRAPH 6



GRAPH 7



GRAPH 8



At Malonas, the fact that some fields cannot be used for food crops explains the large number of plantations with respect to other crops, as opposed to the situation at Sausu and Tolai. Cloves is the chosen crop on these plantations, since as soon as the plants begin producing, they bring in a large amount of money due to the high prices per kilogram of cloves (Rp. 6000 to Rp. 7000/dry kg). There are few palawija fields; the farmers give priority to rice so that they may ensure their self-sufficiency. Of the cultivated land, 20% was purchased by the owners (Graph No 7).

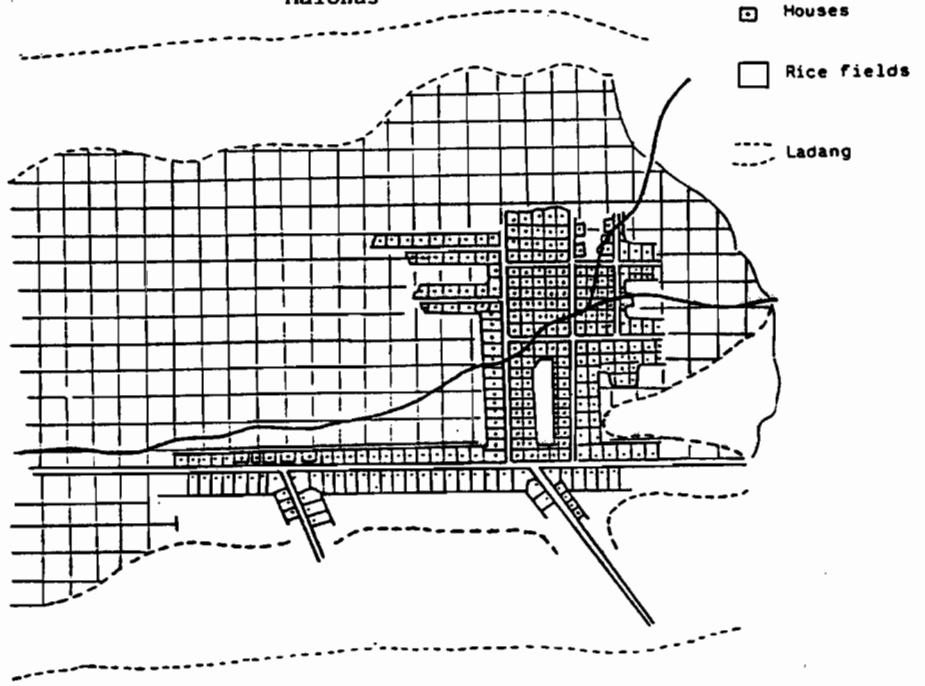
Tolai benefits from an exceptional location: it was possible to transform all the fields into rice paddies. Therefore, all the transmigrants living at the center are exclusively rice farmers (Graph No 8).

Land division

At Tolai, the parcels are laid out in a different manner from the one at Malonas and Sausu. The map of the village shows that the lots and houses are distributed according to the "Teri" system, with the 2.5 hectares allotted to each family forming a single large lot adjacent to the house.

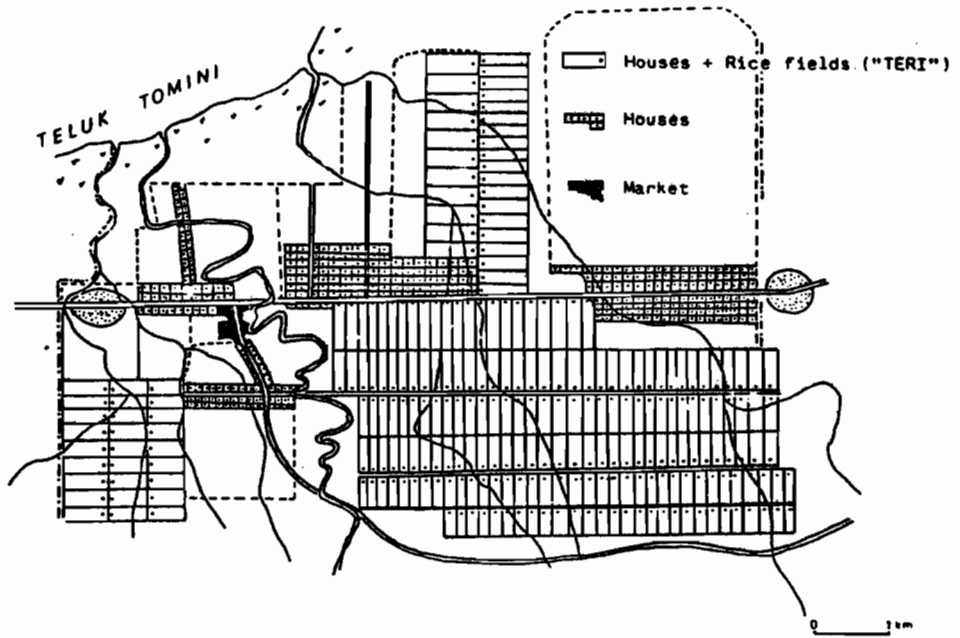
On the other hand, at Sausu and Malonas, the houses are all grouped in one area while the fields are laid out according to a checkerboard model (see map of Malonas). While this system favors the social and economic life of the village it is less favorable to agricultural occupations: lots are occasionally located 3 to 4 kms from the residential area, and the transmigrants cannot take care regularly and properly of their crops.

Malonas



0 0.5 Km

Tolai



0 1 Km

Rice cultivation

All three centers have an extremely marked rice-growing vocation. The proportion of rice farmers is very great: 42% at Sausu, 84% at Malonas, and 100% at Tolai (percentage of the sample group). The amount of land under rice comes to an average 72 ares at Sausu, 65 ares at Malonas, and 220 ares at Tolai.

Soil preparation

In these centers, rice is grown as a single crop. As soon as the harvest is in, the soil preparations for the next crop begin. At Sausu and Malonas, the method used to prepare the rice fields before planting out is still the traditional one using draught traction or hoes.

At Tolai, 86% of the transmigrants use tractors for part of this operation (see Table No 8). To obtain 5 crops of rice in two years on a single field (2.2 ha on the average) the soil preparation must be carried out as quickly as possible. This is why the farmers use tractors, even though all already own oxen or buffaloes. Indeed, the amount of time gained in comparison to draught traction is considerable: breaking ground on a one-hectare field can be done in one day with a tractor (7 hours/day) yet takes 6 days with a draught team (5 hours/day and per team).

One-third of the householders in the study group own a tractor, which is most often bought in multi-ownership. At Parigi, a tractor costs 4 to 5 million rupiah, so three or four farmers will pool their resources to buy one. They also receive loans from the local banks. Even those who own oxen prefer to rent a tractor, at least to break the ground. A tractor and driver can be hired to plow one hectare for Rp. 40,000.

At Sausu and Malonas, the transmigrants do not use motorized machinery. In the first place, these centers are still too recently-installed for the farmers to have enough money for such an investment, and in the second place the checkerboard layout of the fields is not conducive to the use of such machinery: a tractor cannot reach the fields without roads, and in these two centers the only paths to the fields are along the dykes of the rice paddies. The "Teri" system at Tolai has no such inconveniences; for each field there is a road along at least one side.

TABLE No 8
SOIL PREPARATION METHODS
 (technical operations - % of study group)

	BGBG	BBG	BG	CBG	CG	CC	TOTAL
SAUSU & MALONAS	44	10	28	2	2	2	100

(B = ploughing with draught traction; G = harrowing with draught traction; C = hoeing)

	TTGtGt	TTGt	TBGB	TGBG	TGGG	TGG	TGt	BGBG	CCG	TOTAL
TOLAI :	15	30	7	4	7	19	4	7	7	100

(T = ploughing with a tractor; Gt. = harrowing with a tractor;
 G = harrowing with draught traction; C = hoeing)

Planting out

Varieties used:

At all these centers, every farmer uses selected, short-cycle seed varieties: IR 36 at Sausu and Tolai and the virus-resistant IR 50 and IR 54 at Malonas.

However, due to the poor condition of the access roads to Malonas, and the resulting deficiency in the supply services, many transmigrants at this center have complained of not being able to regularly obtain the seed they would like to use.

Nurseries:

Each transmigrant sets up part of his plot as a nursery. The 25-day waiting period between sowing and planting out the rice seedlings is sufficient to carry out the work necessary for soil preparation.

The nurseries amount to about 1/10th of the area planted. The soil is first hoed and then leveled in the form of a bed of mud. The seed is sown by casting, at quantities that come to an average 49 kg per hectare of ricefield.

Setting up the nursery takes about 4 man-days, for one hectare of transplanted rice.

After 25 days, the rice plantings are pulled up and tied in bunches that are ready to be planted out in the paddy. At Sausu and Malonas, this is a family operation, while at Tolai it is carried out by paid jobbers: each worker receives Rp. 10 per bunch. With a 10-are nursery (set up for the planting out of one hectare), about 2,000 bunches of seedlings can be had. Thus the cost of this operation comes to about Rp. 20,000/ha of ricefield.

Transplantation:

This work is always done by hand. The rice plantlings are set out in rows of 3 or 4 at a time with the space between each pocket varying from 20 to 25 cms.

At Tolai, given the large amounts of land placed under crops, the transmigrants must call upon outside help for this operation. Each day laborer earns Rp. 2,000/work-day. As 15 people can finish the planting out in one day at most, the cost comes to Rp. 30,000/ha.

At Sausu and Malonas, the planting out is organised through "Gotong Royong" (system of collective reciprocal aid). In this case the costs are minimal, since the only expenses concern the meals offered to the participants.

The laborers differ according to the origins of the transmigrants. With the Balinese, the men do the planting out, whereas with the Javanese this task falls to the women.

Weed control:

In fact, weeding does not pose any problems at either of these centers. At Sausu and Malonas, this is an exclusively manual task; the weeds are pulled up by hand and buried in the mud between the rows. In general two weedings are carried out: the first begins 15 days after the rice is transplanted, and the second is done later on when the rice is two months old. In these centers this farm chore is carried out by the family labor force alone. Each passage takes about 20 man-days/ha.

At Tolai, the transmigrants use weedkillers that prevent the weeds from sprouting. A correct dose of these products would free the farmers from the necessity of any further manual weeding. Yet they all have to pull weeds since they use quantities that are 2 to 4 times less than those recommended by the manufacturer.

On the average, the operation is done in one day per hectare (8 hours/day); the labor force is made up exclusively of women (20 women to a group, each worker receiving Rp 2,000/day. The total cost of this operation comes to Rp. 40,000.

Thus the use of weedkillers not only reduces the amount of time required for labor, but above all leads to a reduction by nearly half of the costs of weeding (see Table No 9). A correct dosage would bring the costs even further down, to about Rp. 10,000 per hectare.

TABLE No 9
COST OF USING WEEDKILLERS

	Treatment at correct dose	1 weedkilling treatment	No treatment
	weedkiller: +/- Rp. 10,000	weedkiller: Rp. 6,600	2 hand weeding: Rp. 80,000
COSTS		1 hand weeding: Rp. 40,000	
TOTAL	+/- Rp 10,000/ha	Rp. 46,600/ha	Rp. 80,000/ha

Fertilisation:

At Sausu, the recent development of soils rich in nutrients explains the small amount of fertilisers used. As shown in the next table, only a few transmigrants use fertilisers: 43% for urea, 22% for phosphate fertilisers. Moreover, those who do use them tend to use very small quantities per hectare.

At Malonas, where the soils were placed under crops much earlier, fertilisation has become necessary to compensate for the quantities withdrawn by the rice (particularly the very large amounts of nitrogen). Unfortunately, the difficulties in obtaining supplies do not allow the farmers to spread suitable amounts.

Nearly all the farmers at Tolai use urea. However, the doses are rather low, considering that these soils have been in use for 15 years, under crops that withdraw a considerable amount of nutrients.

TABLE No 10
AMOUNTS OF FERTILISER USED
(in % of sample)

		kg/ha	0	25	75	125	175	225	275	>275
SAUSU	TSP	78	9	6	1	5	-	-	-	-
	UREA	57	-	7	14	3	8	1	-	3
MALONAS	TSP	87	-	6	5	2	-	-	-	-
	UREA	53	-	18	8	12	6	-	2	2
TOLAI	TSP	70	7	23	-	-	-	-	-	-
	UREA	3	-	23	47	17	10	-	-	-

TSP = Triple Super Phosphate

Phyto-sanitary treatments:

At Sausu, Malonas, and Tolai, rats are the major pests in the ricefields. At Malonas, the great losses, due to a virus, that occurred during the early years led the settlers to switch from the IR-36 variety to the more resistant IR-50 and IR-54 strains.

In these centers, the phyto-sanitary products are not always used according to the manufacturers' recommendations: many times the treatments are carried out too frequently (especially at Tolai) and the quantities used are too small. At Sausu & Malonas, only half the farmers surveyed used correct amounts (table 11).

For 30% of the transmigrants at Sausu and Malonas, phyto-sanitary treatment is a new technical aspect. Yet this does not fully explain why 40% of the householders in the sample do not use the products correctly. In this case the "PPL" (☆) are responsible in a large way. As they are all too often occupied with administrative paperwork, they do not carry out correctly their role as counselors to the farmers.

TABLE No 11
PHYTO-SANITARY TREATMENTS
 (% sample)

QUANTITY	very small	small	correct	to high
SAUSU/MALONAS	4	32	53	11
TOLAI	-	9	76	5

☆. PPL : Penyuluh Pertanian Lapangan, agricultural counselors.

But this problem is a minor one compared to the swarms of rats...

The rats do a great deal of damage: At Sausu, three successive harvests were completely destroyed. The hordes have infested the entire East Coast; Tolai and Parigi have the same troubles. Even Malonas, despite its location on the West Coast, has recently been touched, although only the last crop (1984) was devastated.

According to the transmigrants, the number of rats is awesome. Some farmers had their entire plot destroyed in a single night. Many have tried to halt the phenomenon with products such as "temik" but in vain. These actions are too sporadic. Only through collective action could the farmers set up an efficient method of deratisation; this will be discussed in Part II.

Harvest:

The rice is harvested by hand using a sickle, then threshed and winnowed in the field. It is then placed out to dry in front of the houses on concrete drying platforms or on mats. Once dry, the paddy is either stored as is or husked and sold to the local rice mill.

At Tolai, the harvest is always carried out through the "Bawon" system. Anyone may take place in the harvest, with 1/7th of the yield going to the workers. Quite often up to 20 people will work together for the harvest, which is finished in an average 2 days. For a yield of 33 hw/ha, each worker receives 25 kg of "gabah" (unhusked rice), which represents a monetary value of Rp. 3,750.

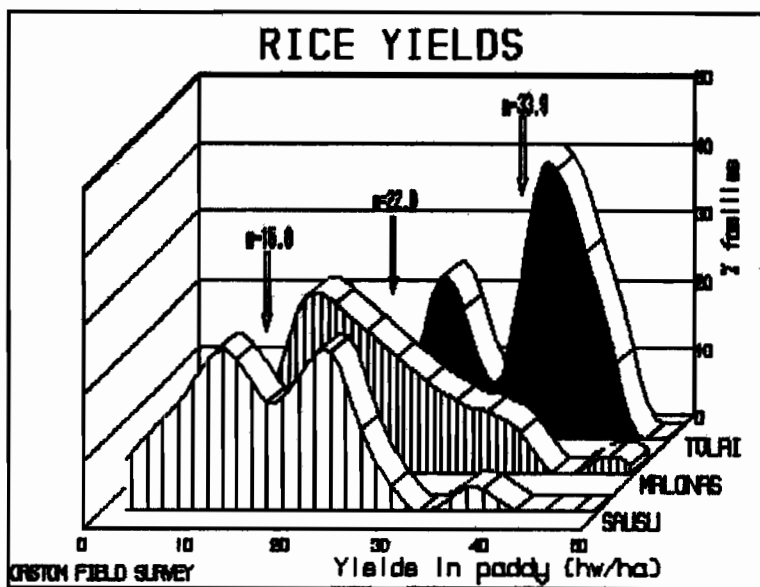
At Sausu and Malonas, the cultivated surfaces are not as large as at Tolai, and the harvest is usually done by the family alone or through the "Gotong Royong" system.

For all three centers, the average amount of labor required for the harvest comes to 39 man-days/ha.

Yields:

Due to the damage caused by the rats, the yields at Sausu in 1984 were extremely low: 15.6 hw/ha on the average. At Malonas and Tolai they were somewhat better: 22.9 and 33.9 hw/ha, respectively. (The yields given here are the gross yields in paddy)

GRAPH 9



Soybeans

For many transmigrants, soybean is the second most important crop, after rice.

This is particularly true at Sausu, where 56 transmigrants out of 85 questioned grew soybeans, to wit 66% of the sample group. On the other hand, only 18% of the farmers surveyed at Malonas, and none at Tolai, raised soybeans.

Of the 56 farmers at Sausu, 21 grew soybeans only, the others alternating the crop with maize, peanuts, or "Kacang Ijo" (Phaseolus radiatus).

The average area set aside for soybeans comes to 60 ares. When the soybeans are grown as a single crop, up to three harvests are brought in per year. Should other crops raised in the "Palawija" (yearly upland crops) be alternated with soybeans, there is no precise rule as to how this is done; the transmigrants often decide at the last moment in function of the available seed and the given market rates for the crops.

Soil preparation:

A large proportion of the transmigrants use draught traction to prepare the fields.

TABLE No 12
SOIL PREPARATION: SOYBEANS
(SAUSU)

Method used:	BB	BG	BC	B	GC	C	TOTAL
% families	7	29	28	11	4	21	100

(B = plough, G = harrow, C = hoe).

Plowing a one-hectare plot for the first passage requires an average 47 hours' work. Since the team can only work 5 hours/day on dry soil, the operation therefore takes 9 or 10 days in all.

If the soil is prepared using a hoe, an average 520 hours are necessary for one hectare, which corresponds to a total of 74 7-hour days.

For many transmigrants, the task of laboring the soil is combined with the opening of drainage trenches spaced 3 meters apart. Others, though only a few, rafter their fields to form ridges on which the seed may be sown. Setting up the trenches takes 40 hours of work/hectare.

Whenever the hoe is used to prepare the soil on a large field, the farmer often has help from a relative or neighbor. This allows for a considerable reduction in the amount of time needed for soil preparation, as the plot can be hoed in less than one month.

Sowing:

The sowing dates are relatively close together; the transmigrants usually wait for the end of the heavy rains period to carry out this operation. The first crop in 1984 was sown between January and February. Those who raise 3 crops per year sowed a second time in March-April, then again in August-September.

The farmers used the seed varieties "Orba", "Kimanti", "Frey", and "Megrati".

The seed is planted with a dibbling stick, in pockets of 3 to 5 seeds spaced 30 to 50 cms apart and covered over with a push of the foot. In Blocks C and D, this task is done in "Gotong Royong", in groups of 15 to 30 persons per plot. In this way, for 85% of the cases, one day's work is sufficient to complete the operation.

Crop maintenance:

In most cases, each plot is weeded twice. The first passage begins 20 to 30 days after the seed has been sown. This is a very tedious task, done with a hoe, which requires 65 man-days (7

hours/day) per hectare. But in reality it usually takes only 11 days to complete, given the available labor force and the surfaces cultivated. The second passage begins just before the plants bloom and lasts 10 days.

Fertilisation:

Soybean is not usually fertilised, except in a few rare cases, as at present the soils' fertility level is such that fertilisers are not needed. However, soybean being a crop that demands a great deal of phosphore, the use of phosphate fertilisers will be necessary in the very near future.

Phyto-sanitary treatments:

Up to now, the greatest damage appears to be due to the invasions of wild pigs and above all of rats, though the results are less catastrophic than in the case of rice. The other pests are sufficiently controlled through the use of phyto-sanitary products.

However, as with the rice, many transmigrants do not follow the recommended amounts and tend to multiply the number of treatments using doses that are insufficient.

TABLE No 13
PHYTO-SANITARY TREATMENTS - SOYBEANS
(SAUSU)

Doses used	very small	small	correct	too high	Total
% families	6	21	61	12	100

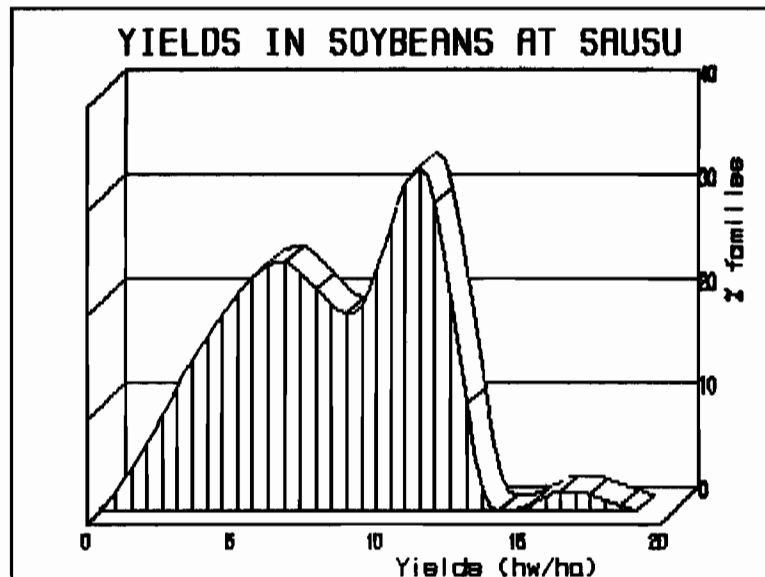
Harvesting the soybeans:

- Harvest: This is a manual task. Each plant is cut with a sickle and left on the plot to dry for a few days. The plants are then gathered and threshed in small huts set up on the plot, in order to separate the seed from the pods.

The harvest is often organised in "Gotong Royong" in groups of 15 to 20 persons on the average. Thus it takes one day to scythe one hectare and two half-days for threshing, which is only done in the afternoon when the pods are dry.

- Yields: The farmers bring in 7.6 hw/ha, in spite of the infestations of rats. The maximum yields recorded before the rats arrived came to an average 11.3 hw/ha.

GRAPH 10



Compared incomes: rice and soybeans:

The following analysis was made from representative examples chosen from among the families in the study group. The income from rice farming was calculated for three different methods of soil preparation: with a hoe (Malonas), using draught traction (Sausu) and with machinery (Tolai). For the soybeans, as the soil preparation is much less varied, only one example was retained. In each case, two situations were considered: whether or not there had been infestations of rats.

The farmer at Tolai stands out quite clearly from the others (see Tables 14 and 15). Indeed, he is the only one to obtain a positive net income (net margin: 2) in spite of the rats: Yields are higher at Tolai for similar expenditures.

However, if one considers the income from family labor (net margin 1), the difference is no longer as great for these three types of cultivation. The manual method of soil preparation is in this case superior to the use of machinery.

One must also take into account the risks encountered by the transmigrant at Tolai whose expenditures are always greater than his net income. Should there be a poor harvest (crops devastated by rats, for example), the net income from the crop is desultory: only Rp. 16,600. The Rp. 350,000 invested in the crop does not pay off.

Soybeans bring in incomes that are similar to those for rice at Sausu and Malonas: Rp. 223,000 (income from family labor).

Table 14 : INCOME FROM RICE AND SOYBEAN CROPS : CENTRAL SULAWESI

(figures in Rp. / ha)

	RICE						SOYBEANS	
	(1) : before rat infestations		(2) : after rat infestations					
	HARTOYO (SAUSU)	SIRTO (MALONAS)	SUDIARSO (TOLAI)	ZAMSURI (SAUSU)	(1)	(2)	(1)	(2)
PROPORTIONAL COSTS								
seed	4300	4300	8000	8000	10500	10500	5800	5800
fertiliser	11000	11000			10000	10000		
phyto-san. treatments	14700	14700	1400	1400	26000	26000	4000	4000
other					6900	6900		
total input	30000	30000	9400	9400	53400	53400	9600	9600
outside laborers								
manual					185000	155000		
draught tr. / tractor					80000	80000	7500	7500
rice mill cost	25500		36000	23000	60000	40000		
TOTAL COSTS 1	55500	30000	45400	32400	378400	328400	17100	17100
remuneration								
family labor	250000	250000	402500	402500			260000	260000
TOTAL COSTS 2	305500	280000	447900	434900	378400	328400	277100	277100
CROP VALUE	255000	135000	360000	225000	675000	345000	240000	60000
GROSS MARGIN *	225000	105000	350600	215600	621600	291600	230400	50400
NET MARGIN 1 **	199500	105000	314600	192600	296600	16600	222900	42900
NET MARGIN 2 ***	-50500	-145000	-87900	-209900	296600	16600	-37100	-217100

* Gross margin : Crop value less proportional costs

** Net margin 1 : crop value less TOTAL costs 1

*** Net margin 2 : crop value less TOTAL costs 2

Table 15 : INCOME FROM THE FAMILY WORKDAY

(figures in Rp./ha)

	RICE						SOYBEAN	
	HARTOYO (SAUSU)		SIRTO (MALONAS)		SUDIARSO (TOLAI)		ZAMSURI (SAUSU)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
NET MARGIN 1	199500	105000	314600	192600	296600	16600	22900	42900
TOTAL LABOR TIME (M-days)	100	100	161	161	85	85	115	115
INCOME FOR THE FAMILY DAY	1995	1050	1954	1196	3489	195	1938	373

Daily salary for an agricultural laborer : Rp. 2,000.

Table 16 : AMOUNTS OF TIME SPENT AT LABOR (hours/ha)

	RICE			SOYBEAN
	HARTOYO (SAUSU)	SIRTO (MALONAS)	SUDIARSO (TOLAI)	ZAMSURI (SAUSU)
Soil preparation	60	560	17	76
Sowing / Transpl.	92	120	120	112
Treatments	42	6	138	60
Weeding	260	250	80	300
Harvest	246	196	240	258
TOTAL Hours / ha	700	1132	595	806
TOTAL Man-days /ha (*)	100	162	85	115

(*) : 1 day = 7 hours

The expenditures for this crop are very limited due to the absence of fertilisation. Moreover, a large part of the expenditures for rice comes from the cost of husking: 10% of the milled rice is paid to the mill. However, this cost pays off nicely through the extra income it represents: unhusked rice sells at Rp 125/kg ("gabah") while husked rice brings in Rp 260/kg ("beras").

On the whole, the conclusion of this analysis is that the income for one day's work of a farmer who raises rice or soybeans at Sausu and Malonas is inferior, even under normal conditions, to the salary of an agricultural day-laborer (Table No 15).

The other annual crops

The crops which are briefly presented hereafter are never as important to the transmigrants as rice or soybeans.

- Kacang Ijo (Phaseolus radiatus): this plant is grown in the same manner as soybeans, using the same methods of cultivation, the same treatments, The harvest is always sold. This crop and soybeans are the two most often-sold products of the "Palawija".

- Maize: this crop is grown alternately or sometimes planted along with the other "palawija" crops. It is grown in a much less intensive manner; few farmers fertilise it or treat it with insecticides. Very often it only receives whatever is not used for soybeans or rice. The harvest is often devoted to self-consumption.

- Cassava: this plant is often considered as food that can be used in case of a poor harvest in the other crops. It is planted in the household garden or along the edges of the plots. No particular tasks are associated with this crop other than planting and harvesting. The production is strictly reserved for family consumption and has no market value.

- Vegetables: None of the farmers grow vegetables on a large scale. The soils at these centers would do well under truck crops but anyone who decided to try this type of farming would have trouble selling the production, since at the center each family has its own small garden that serves its needs, and the urban centers of Palu or Poso are too far away and already sufficiently supplied by the truck farmers in the nearby villages.

The "pekarangan"

In these orchard-gardens set up around their houses, the transmigrants have set out a large variety of trees: jackfruit, orange, rambutan (Nephelium lappaceum), durian (Durio zibetinus), papayas, kapoks, and coffee shrubs, as well as banana trees and coconut palms One also finds vegetables, cassava, and sweet potatoes.

Most of the production from these species is used by the family itself, due to the problems in marketing and the low commercial value of these fruits and vegetables. For example, in the transmigration centers, the price of a bunch of bananas is rarely more than Rp. 100; a papaya will cost only Rp. 20.

Small-scale animal husbandry

At these three centers, no transmigrant can really be called a "breeder". All own a few farmyard animals: hens, ducks, geese. The entire "flock" rarely has more than 10 fowls.

In the transmigrants' eyes, these animals are more a "capital" than a food source, since they can rapidly be sold to be able to pay the doctor in case of illness or to reimburse a debt.

Aside from fowls, the Balinese transmigrants very often raise pigs that are to be sold at the market or eaten during a religious festival.

NON-AGRICULTURAL ACTIVITIES AND OTHER SOURCES OF INCOME

As shown in Graph 11, the transmigrants at Tolai are farmers only. Indeed, the agricultural percentage of their total monetary incomes comes to 93%. Only a few among them very occasionally hire themselves out as farm laborers, while others receive small amounts of money for their administrative functions within the village.

At Sausu, the amount of income obtained from farming is relatively high: 56% of the total monetary income. However, it must be mentioned that 16% of the income comes from outside jobs as agricultural workers (T.E. on the graph). Many householders or other family members (71% of the sample group) seek work at Tolai or Parigi where labor is in high demand during transplanting, weeding, or harvesting.

The Sausu transmigrants are fortunate in that they have many job possibilities, and the Tolai farmers benefit from a source of labor which is absolutely necessary to properly carry out the operations in their ricefields. These two centers thus fully complement each other.

This complement is primordial for the Sausu transmigrants who often have no other solution than to find work in Tolai or Parigi in order to meet their needs, since several times their crops were completely destroyed by the rats. Nevertheless, this solution should only be a temporary one, given that it is in the householders' interest to devote themselves entirely to working their own fields.

At Malonas, the transmigrants lack both land and nearby job possibilities due to the isolation of the center. For this reason, many of them do artisanal work (51% of the study group). The income from such activities represents, on the average, nearly 1/4th of the total cash income. The income from farming

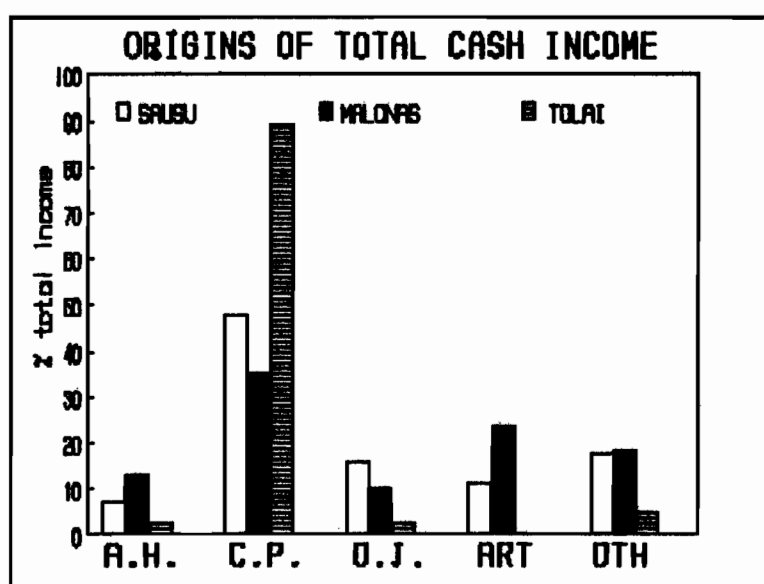
comes to 48% of which 12% comes from animal husbandry, leaving a small proportion to the crops (rice in particular).

TABLE No 17
NON-AGRICULTURAL ACTIVITIES (*)

	SAUSU	MALONAS	TOLAI
Commerce	16%	22%	11%
Farm laborer	71%	36%	29%
Craftsmen	24%	51%	-
Processing farm products	-	2%	-
Rattan	16%	9%	-
Schoolteacher	1%	-	-
Pension	1%	-	-

(*) Figures expressed in % of the study group. The total for each group is superior to 100% as some transmigrants have several occupations.

GRAPH 11



A.H.: animal husbandry C.P.: crop production O.J.: outside jobs
ART.: artisanal work OTH.: other

AUTO-CONSUMPTION

The actual monthly consumption of rice was estimated over a period of 9 months through a daily survey of 20 families chosen in the Sausu and Malonas centers. The figures thus obtained closely resemble the standard amounts established by ORSTOM in other Transmigration zones (see Tables 18 and 19).

TABLE No 18
STANDARD AMOUNTS OF RICE USED
BY A FAMILY OF TRANSMIGRANTS
 (ORSTOM figures)

Age	Men	Women
0 - 15 years	7.5 kg/month	7.5 kg/month
15 + years	15 kg/month	12.5 kg/month

The analysis of the rice yields obtained by the families shows that on the average the farmers produce enough to cover their food requirements (Table 19). At Sausu, only two families had a negative balance due to the poor yields that resulted from the swarms of rats.

As rice is the only important subsistence crop (the products of the household garden have practically no market value), the amount eaten per family in the overall study group has therefore been calculated using the standards given in Table 18 and thus only concerns the rice farmers; an auto-consumption of 0 has been attributed to those who are not rice farmers.

Thus, the equivalent in Rp. of the yearly auto-consumption of the rice farmers comes to an average Rp. 165,000 at Sausu, Rp. 150,000 at Malonas, and Rp. 210,000 at Tolai.

TABLE No 19
FAMILY CONSUMPTION OF RICE VS. AMOUNT PRODUCED
 (kg paddy/year)

SAUSU

	Ik	Pa	Mu	Ci	Bu	Ha	Average
Consumption :							
actual	936	720	264	672	1128	954	779
standard	912	780	420	780	1080	930	817
Production :							
	6500	681	292	662	3200	1080	2069

MALONAS

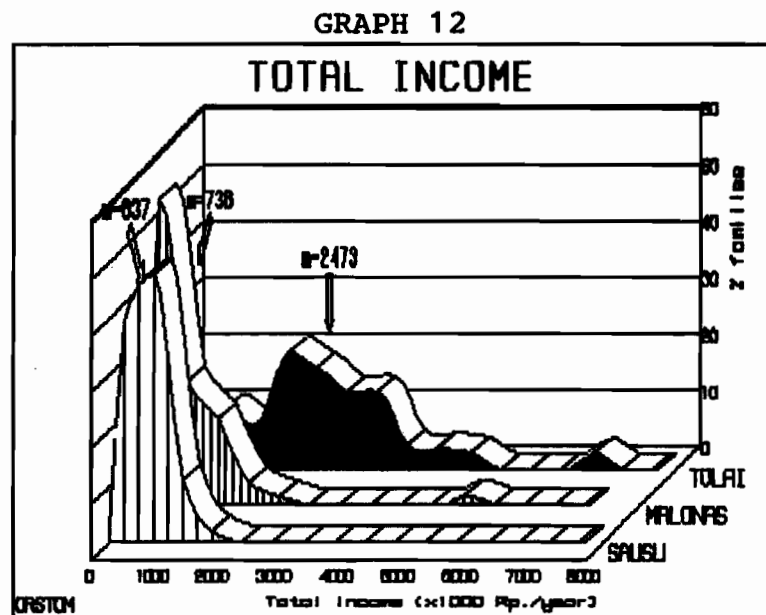
	Du	Su	Da	To	Mu	Sut	Ma	Si	Avg
Consumption :									
actual	1620	780	588	528	1164	912	1020	582	899
standard	1200	810	510	870	1260	900	930	510	874
Production :									
	4066	918	4788	1683	1397	2336	3288	1468	2493

THE FAMILY'S TOTAL INCOME

In these three centers, there is a great deal of variability in the incomes (Graph No 12). The averages for each center therefore have little significance, although they do show that the incomes at Tolai are 3 to 4 times greater than at Sausu and Malonas:

Sausu	: Rp.	637,000/year
Malonas	: Rp.	736,000/year
Tolai	: Rp.	2,473,000/year

A non-negligeable percentage of the transmigrants at Sausu and Malonas have an income that is inferior to the minimum subsistence level that has been set at Rp. 360,000/year, to wit a daily income of Rp. 1,000 (☆). Indeed, in these two centers, 1/4 of the families in the study group have a total yearly income below this level.



☆. This threshold was established from the 9-month, daily survey of the expenditures of 20 families on Sumatra (Batumarta) and Kalimantan (Sebamban) Transmigration centers.

EXPENDITURES AND THE FAMILY'S STANDARD OF LIVING

The comparison of the living standards for the families surveyed at the three centers once again stresses the privileged situation of the transmigrants at Tolai. The families at this center have a standard of living that is much higher than that of the families living at Sausu and Malonas (see Table 20).

The reader will remember that at Tolai, 30% of the families own a tractor (either alone or in co-ownership). On the other hand, given the families' high income level, the proportion of persons who have taken a trip to Bali may seem small. Yet in fact, many of the transmigrants, particularly those of the second generation, no longer have family ties in their province of origin.

At Sausu and Malonas, even if the number of permanent houses (brick walls, cement floors) and semi-permanent ones is smaller than at Tolai, many transmigrants have already made improvements: adding on to the basic transmigration-type house, replacing the sheet metal with a tile roof. The costs of such improvements come to an average Rp. 225,000 at Sausu and Rp.380,000 at Malonas.

The rather high percentage of families at Tolai with at least one child attending the University at Palu can only reassure the Sausu transmigrants in their hopes of providing satisfactory education to their own children.

The more precise data obtained from the 9-month, daily survey of 20 families chosen at Sausu and Malonas allows one to complete the results of this study (see Table 21).

As these families were chosen in function of their willingness to cooperate and not at random, the results cannot be considered as representative at the level of the center as a

whole. Nevertheless, they do indicate the way the expenditures of these families tend to be broken down. In this respect, it appears that more than a third of the family budget is reserved for food (47% at Sausu, 33% at Malonas). At Malonas, 19.3% of the family budget is spent on home improvements, as opposed to only 2% at Sausu. Costs relative to agricultural activities are limited in comparison to other items such as tobacco, cigarettes, presents, or leisure activities.

TABLE No 20
THE FAMILY'S WEALTH
 (% families)

Item	SAUSU	MALONAS	TOLAI
Bicycle	36%	46%	90%
Motorcycle	-	-	34%
Radio	33%	45%	83%
Television	-	-	17%
House:			
semi-permanent	12%	36%	50%
permanent	1%	10%	50%
Trips to Province of origin	21%	36%	60%
Child in school in the			
provincial capital	5%	11%	20%
Land purchases	13%	71%	36%

Table 21 : EXPENDITURES
(Rp. / year)

	SAUSU	MALONAS
Food	300000	492000
Tobacco	34000	55000
Lamp oil	21000	66000
Soap	8000	12000
SUB-TOTAL	363000	625000
Clothing	35000	44000
Cooking utensils	10000	10000
Education	56000	66000
Health	7000	33000
Transport	28000	10000
Leisure time - presents	26000	32000
Home improvements	12000	285000
Other	15000	117000
SUB-TOTAL	189000	597000
Tools	6000	3000
Seed	1000	24000
Fertiliser	1000	32000
Pesticides	14000	9000
Animal husbandry	27000	28000
Laborers	31000	158000
SUB-TOTAL	80000	254000
TOTAL	632000	1478000

Note : the figures above are averages taken from a limited sample of 10 families in each center.

TYOLOGY

In function of the transmigrants' activities and income levels, several homogenous types of farmers can be clearly indicated.

The most pertinent typology was obtained by plotting the families' total income and the percentage obtained from farming with respect to the global income. Three main groups of transmigrant families stand out on the following graph:

- those who are not farmers, whose percentage of agricultural income is less than 30% of the total income (types I, IV, and VII);

- those who are full-time farmers, whose agricultural income represents more than 70% of the total income (types III, VI, VIII, IX, and X);

- and those who have various activities, whose agricultural income amounts to between 30 and 70% of the total income (types II and V).

(See Table No 22)

Those who are not farmers:

At Malonas, the transmigrants in this category have preferred to turn to artisanal work (carpenters, masons, woodcutters, cabinetmakers, ...) rather than to invest in land. This type of occupation is increasing significantly due to the priority that the large majority of families give to home improvements.

At Sausu, the level of agricultural income obtained by the transmigrants in Type I is insufficient due to the damage caused by the rats. While waiting for better times, these farmers earn a completely income by hiring themselves out as farm workers at Tolai or Parigi. It will be hoped that the desire to work on their own behalf will win out over the temptation to earn easy, regular incomes from outside jobs. The priority given to artisanal work or to commerce by the transmigrants of Type IV at Sausu is due mainly to personal reasons. In fact, some of these transmigrants have already sold part of their land.

Due to their high level of education, the transmigrants in Type VIII have been able to profit from the favorable opportunities for commerce and craftsmanship that are to be found in a pioneer area. The benefits that were made during the first years were reinvested in the purchase of real estate. This land, bought at a low price, is rapidly increasing in value and is to be resold or sharecropped. These transmigrants have proven themselves to be much more dynamic and business minded than the others.

The transmigrants with various activities:

At Sausu and Malonas, the transmigrants in Types II and V have a stronger desire to obtain food self-sufficiency and to get the most out of their own plots, or at least from an agricultural activity, than the transmigrants of Types I and IV. They are for the most part rice farmers who earn extra income as farm laborers.

The difference between Types I and II at Sausu can only be explained by the types of crops grown and by the origins of the transmigrants. To the non-rice-growing Javanese in Type I is opposed a large proportion of young Balinese rice farmers in Type

II. The Balinese, because of their greater desire for independence, always give priority to their own plots.

At Malonas, Types I and II differ only in terms of the transmigrants' ages: Type I is made up of young people, on the average, (32 years) while the transmigrants in Type II are older (40 years). Being younger often means having a greater adaptability, but also having a smaller family labor force and less agricultural experience. The Type II transmigrants at this center are farmers and farm workers who, despite the lack of land, have no wish to turn to non-agricultural activities.

Types IV and V are different for the same reasons as I and II. However, the transmigrants in Type V have, on the average, a larger labor force than Type II, which allows the farmer to earn a larger income from agricultural work.

The farmers:

At Sausu and Malonas, the transmigrants in Types III, VI, and VIII all have more agricultural experience and a greater labor force than the other types of transmigrants. All were farmers in their home provinces. Their large family labor force allows them to make the most of the agricultural potential that is offered them. This potential varies from one group to the next: at Malonas, the area cultivated and the income evolve in the same way, to wit, the transmigrants with the most land earn the most money, whereas at Sausu the rice farmers who were most hurt by the swarms of rats have lower incomes than the other farmers, for the same amounts of land.

GRAPH No. 13

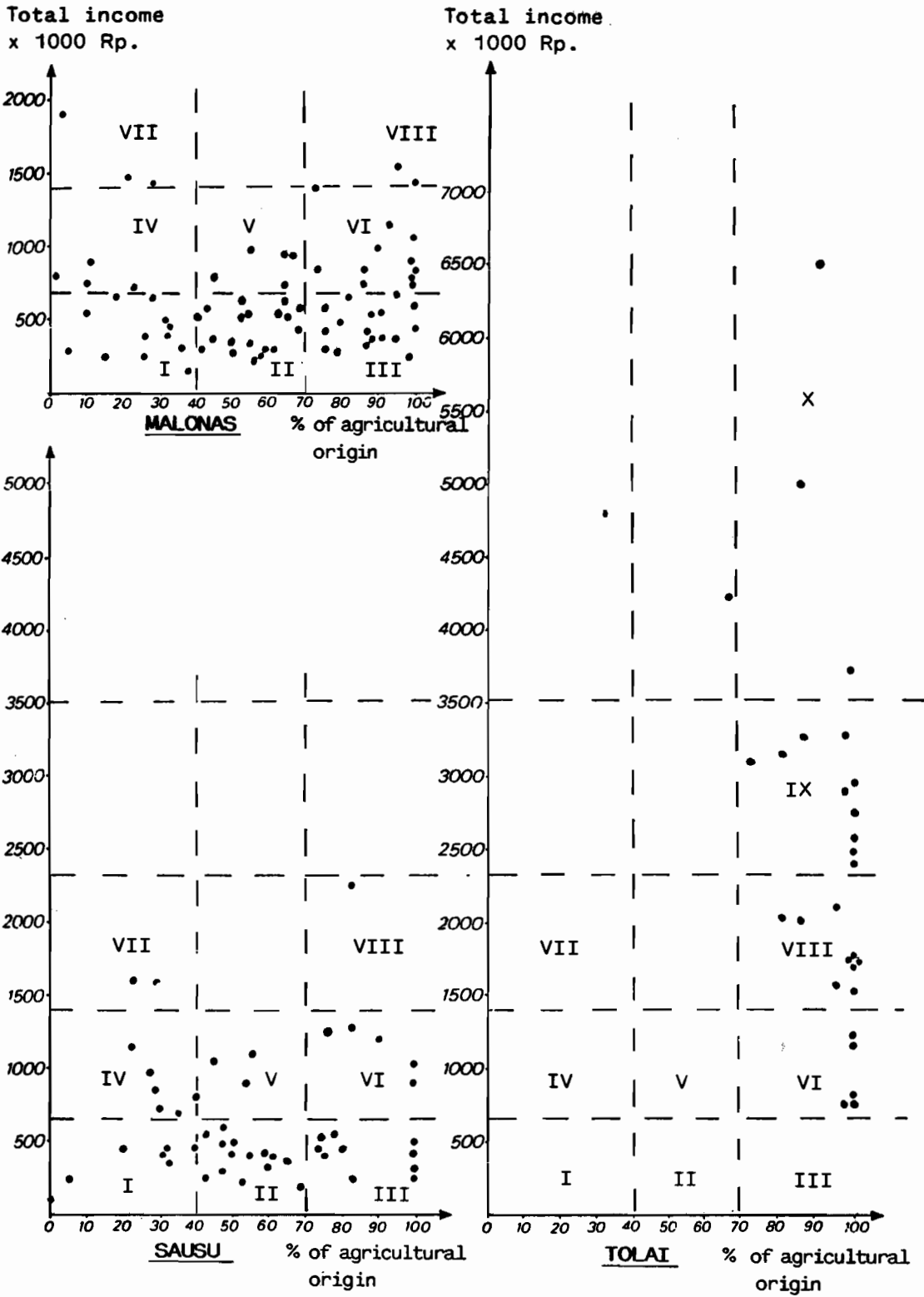


TABLE 22
TYOLOGY OF THE EXPLOITATIONS

Total Income	Type	% agricult.	SAUSU		MANORAS		TRAI	
0.000 Rp.								
	I	0-40	Low agri. exp. Large labor force. Javanese	Form worker	Small labor force. Small ricefield. Young.	Crafts	-	-
	II	40-70	Small labor force. Little agri. exp. Young	Form worker Rice farmer	Small rice plot. Little input. Older.	Rice farmer. Farm worker. Crafts.	-	-
	III	70-100	High agri. exp. Avg. labor force. Little input.	Farmers : rice & dryland crop.	Avg. labor force. Avg. agri. exp. Little input.	Farmers	-	-
650.000 Rp.								
	IV	0-40	Small labor force. Small plots. Young.	Small trade. Small crafts. Teacher.	Small rice plot. Little education. Older. Javanese.	Crafts. Farm workers.	-	-
	V	40-70	High labor force. Little input. Balinese.	Rice farmers. Farm workers.	Large labor force. Much input. Young. Balinese.	Rice farmers. Small trade.	-	-
	VI	70-100	Large labor force. Average surface. Javanese.	Farmers : dryland crop.	High educ., Balinese Much farm exp. Lg surface Small labor force	Rice farmers.	Rice field : 1.5 ha Yield : 22.5 ha/ha Fert. : 60 kg/ha	Rice farmers
11.400.000 Rp.								
	VII	0-40	High farm exp. High education. Large surface. Javanese. Small labor force.	Large-scale commerce. Crafts.	High farm exp. High education. Balinese. Small labor force.	Large-scale commerce. Crafts.	-	-
	VIII	70-100	High farm exp. Little education. Small labor force. Large surface.	Farmers : dryland crops.	Little agri. exp. Little education. Large surface. Much input. Large labor force.	Farmers	Rice field : 1.7 ha. Yield : 33 ha/ha. Fert. : 120 kg/ha.	Rice farmers
12.300.000 Rp.								
	IX	70-100	-	-	-	-	Rice field : 2.5 ha. Yield : 35.2 ha/ha. Fert. : 120 kg/ha.	Rice farmers
13.500.000 Rp.								
	X	70-100	-	-	-	-	Rice field : 3.5 ha. Yield : 39 ha/ha. Fert. : 125 kg/ha.	Rice farmers

There is a great deal of homogeneity in the surface areas, the level of input, and the yields between the transmigrants in Type VI at Malonas: the size of the ricefields ranges from 1.2 to 1.5 ha; 60 to 70 kgs of urea is spread; and yields are from 22 to 27 hw/ha.

It is also interesting to follow the evolution in the use of fertilisers in function of the income level for Types III, VI, and VIII at Sausu and Malonas: the greater the total income, the more fertiliser is applied. Due to the swarms of rats, this did not change the yields. But this reinvestment of part of the income in the purchase of agricultural input is most encouraging and stresses the wish of these transmigrants to improve their yields.

At Tolai, all the transmigrants are full-time farmers. The difference in income is due only to the size of the cultivated areas. From Type VI, in which the transmigrants cultivate an average 1.5 ha of ricefields, one moves progressively to Type X with an average cultivated surface of 3.5 ha. The other factors of production are, on the average, very similar: use of a tractor for soil preparation, similar amounts of fertiliser, little agricultural experience. These Balinese settlers show remarkable desire for economic and technical development.

	X	30-400	
	V	30-400	
	VI		
	VI		
	VII		
	VIII		
	IX		
	X		
	X		
	X		
	X		
	X		

PART II

The preceding chapters have presented the characteristics of the three centers chosen for this study. The reader has seen that the Tolai center is in a favorable position compared to Sausu and Malonas, due to the family income (more than 2,000,000 Rupiah per year), the quality of the housing (predominately permanent houses) and the efficient system of rice cultivation (use of the tractor, high inputs). Such an advance can be explained by the center's age, Tolai being 10 years older than the other two centers. Yet how, in such a short time, (15 years after the arrival of the first families) has this center managed to reach such a high level of economic success? Can the families at Sausu and Malonas hope to rapidly obtain levels of income, yields, and a standard of living similar to those of Tolai?

Answering these questions will be the object of this second part of the study, in which a synthesis of the characteristics presented in Part I will allow one to sort out the constraints and the development perspectives of each of these centers.

MALONAS: A MISSED SUCCESS.

At Malonas, the pedologic and climatic conditions are most favorable for all crops, but this center is burdened by land problems and its isolation, which could considerably hold back its development.

Turning towards cash crops:

The number of families installed at Malonas was too great for the amount of land that could be developed into ricefields. Moreover, many transmigrants rejected the plots located on the surrounding hillsides. This is why the amounts of land stated by each family are smaller than at Sausu and Tolai.

However, perennial crops would allow the farmers to develop the sloping and mainly sandy fields in the Malonas area. In this respect, some farmers have already set up clove plantations. The clove tree is, compared to the coffee shrub and the banana tree, the plant that brings in the most money, given the high prices paid for cloves in Indonesia.

But as a general rule, this substitute solution does not correspond well to the mentality of these transmigrants, whose primary goal is to be able to grow rice, and thus many of the householders in this center are dissatisfied.

Towards a more rapid division of landholdings:

The transmigrants at Malonas own amounts of land that are smaller than the average for the other two centers and have only a few possibilities to acquire property outside the limits of the center. The arrival of the second generation will lead to a rapid division in the landholdings.

At Tolai, this phenomenon has not yet been observed because the children of the first settlers have been able to set up housekeeping at Sausu where there is still land available for the creation of ricefields.

But at Malonas the second generation will not be so fortunate: either they will have to settle for smaller fields obtained through inheritance and which will not allow them a very high standard of living, or they will have to move some distance from the center due to its isolation.

Thus, without being a failure, Malonas is a typical "missed success": the installation of 500 families on 1000 ha, of which only three-fourths can actually be cultivated, is an error that could have been easily avoided. The Authorities concerned should have given priority to the conditions in which the families were to be resettled rather than seeking to install a maximum number.

This problem could have been avoided if more attention had been given to the preliminary studies carried out before the center was created.

SAUSU: A FUTURE TOLAI?

Sausu can only evolve along the same lines as Tolai. The transmigrants at Sausu will reach a standard of living equivalent to that of the neighboring center, and this for several reasons:

Sausu-Tolai: Identical site conditions.

Sausu and Tolai both have the same extraordinarily good conditions of soil and climate. Once the rats are brought under control and the production techniques mastered, the yields at Sausu should equal those presently obtained at Tolai.

Tolai as a model:

Sausu has the enormous advantage of being located near Tolai, which plays the role of a model farm or else a pilot project. To begin with, by comparing their yields, the new transmigrants can appreciate the usefulness of one or the other technique and be encouraged to adopt it. Thus it appears quite probable that in a few years the use of weedkillers will be commonplace among the transmigrants at the center. Furthermore, the good results obtained by the Tolai farmers will reassure the Sausu transmigrants in their hopes for success and reinforce their motivations.

In terms of shared experience, the transmigrants at Sausu also profit from the installation of farmers from Tolai at the Sausu center itself.

However, in spite of all these favorable factors, Sausu will, in its progression towards success, face a few obstacles that will have to be overcome.

Rats

As there was no assistance from the Authorities in dealing with this plague, the transmigrants have to handle the problem by themselves.

All the transmigrants must work together if the eradication is to be efficient, otherwise, the rats will continue to destroy the crops in the untreated areas. The transmigrants should get together to set aside stocks of rat poisons and decide upon the dates of treatment, which will have to be respected by all. Simple methods of controlling the rat population can be set up to predict future infestations and to be able to intervene before the rats pose an irreversible danger to the crops. This implies that buffer supplies of poisons be permanently available so that the farmers may act immediately without having to await supplies.

This type of preventive measure is not specific to rats alone but can also be applied to all the other pests that damage crops: insects, etc.

In a recent center such as Sausu where there is no real unity within the village due to the diversity in the origins of the families and to the fact that the center is still under the administration of the Transmigration authorities, the transmigrants have little incentive to set up this sort of system. Too often they tend to expect the Authorities to provide a solution to all their problems. This is a typical attitude

among "governmental transmigrants" who, upon their arrival, receive assistance from the Authorities and who end up losing all personal initiative.

At Tolai, where all the settlers are spontaneous ones and have only been partially aided, this kind of initiative appeared early on when the fields were being cleared. Thus in a very natural manner, they managed to organise themselves at the level of the entire village in order to solve their later problems.

At Sausu, the Authorities, even though they cannot participate financially in a rat control program, should at least encourage the transmigrants to set up this sort of collective operation, via the P.P.L.

Working for oneself

Due to the swarms of rats and the poor yields, there are many farmers for whom temporary outside jobs are the primary source of income. This is fully justified by the fact that at the time of this study, one day's labor at an outside job was better paid than the family work-day.

Therefore many neglect their own field, which allows the rats to proliferate and only makes the situation worse.

If the farmers want to equal Tolai both technically and financially, they will have to concentrate all their efforts on their own plots, and like their counterparts at Tolai, try to earn more than 70% of their income from working their farms.

TOLAI: AN EXEMPLARY SUCCESS

One can sum up the situation at Tolai in the following terms: fertile land, high yields and large incomes, and an enviable level of family wealth.

Transmigration at Tolai is a very model of success.

This success falls altogether in the typical agricultural production diagram shown on the next page.

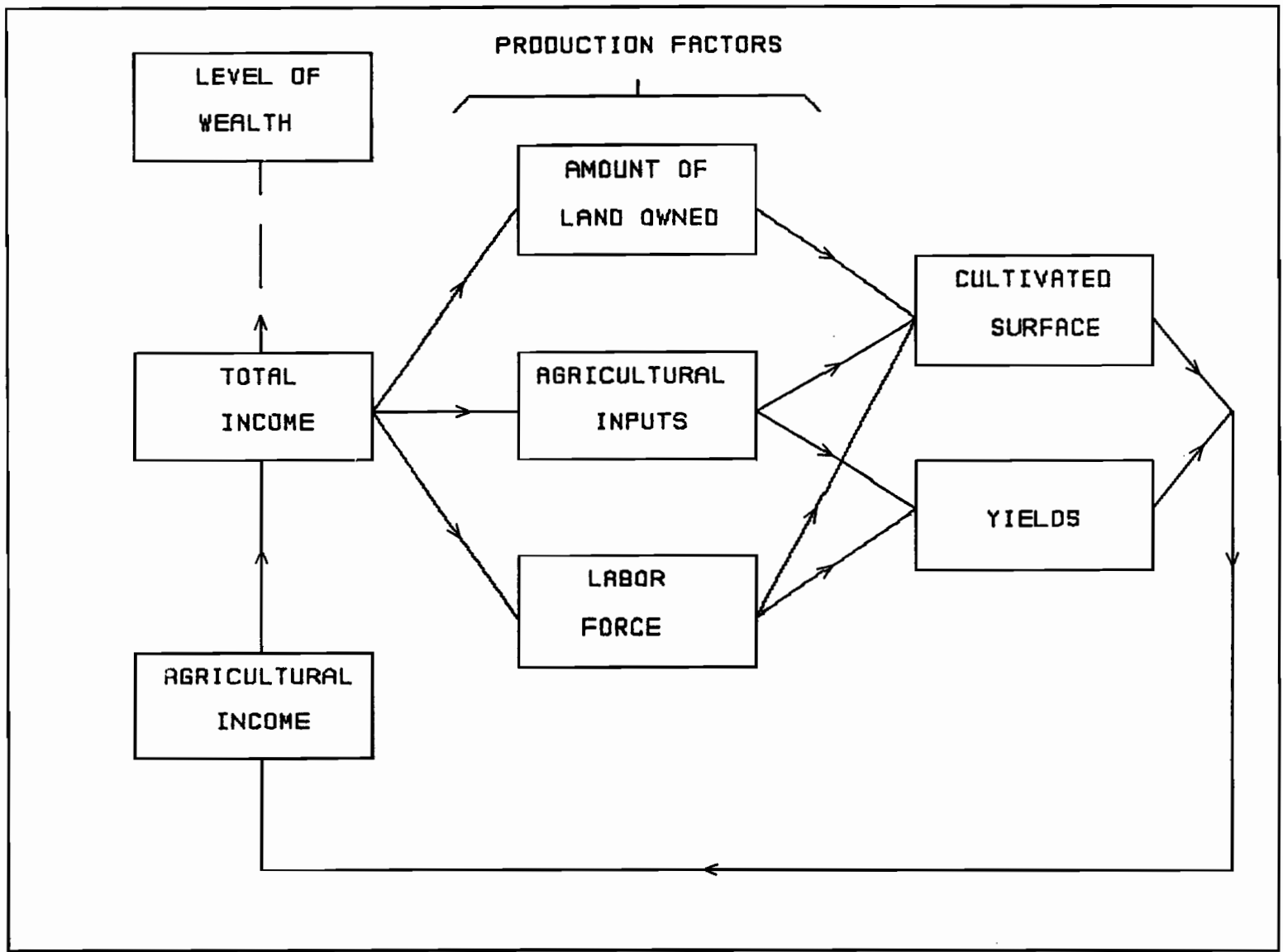
Any increase in one of the three factors of production will necessarily lead to an increase in agricultural income. For example, the adoption of motorised equipment allows the farmer to exploit a larger amount of land and thus increase productivity while decreasing the amount of time needed for labor per surface unit. The result is an increase in agricultural income and therefore the family's total income.

Two primary conditions must be verified in order to make this system work: the first brings about the onset of the process and the second ensures its continuation.

Setting the process in motion

This only occurs if the crop yields are potentially high. In other words, the soil must be fertile and climatic conditions must correspond to the type of crops considered. Indeed, at the outset, the transmigrants only have their labor force for wealth. If, after the first harvests, the yields are poor or uncertain, the farmers' efforts have not paid off. They lose their incentive to invest in farming and in doing so, turn to other types of activities.

The motivations and expectations of the transmigrants must be preserved, even surpassed, from the very start.



In this, Tolai regrouped all the necessary conditions: rich soil, and satisfactory climate for irrigated rice cultivation. Moreover, the nearby zones that had already been developed and were prosperous (Parigi) reassured the newcomers of their chances for success. The process was able to rapidly take hold.

Such is not the case for Sausu, where the repeated infestations of rats have led the transmigrants to prefer to invest their labor in temporary outside jobs as farm workers rather than on their own fields. The farmers are no longer motivated, and the process cannot develop itself. But this is a transitory phenomenon at Sausu. As soon as the rats can be brought under control, and also because of the example provided by Tolai, the process will soon be set in motion.

Continuing the system

This can only be ensured by a permanent reinvestment of part of the transmigrants' income in improvements in the production factors. Not only can they try to increase their exploitations by purchasing or clearing new fields, but they can also try to improve their methods of controlling their environment.

The transmigrants at Tolai have fully understood this: they use the tractor to prepare their numerous plots in a short time, phyto-sanitary treatments to limit the risk of losses to pests, weedkillers to keep weeds down and limit the labor costs, and fertilisers to keep the soils rich.

Tolai is an ideal location since the transmigrants have not faced any major obstacles to their desires to improve the production factors:

- Easy access conditions: the road to Tolai is in sufficiently good condition to allow agricultural material to be brought in from the provincial capital of Palu with relatively

little delay. The transmigrants can thus obtain year-round supplies of phyto-sanitary products, weedkillers, and parts for their tractors.

- Available labor: since the opening of the Sausu center, the transmigrants at Tolai have had a valuable source of labor which allows them to correctly cultivate large areas with a high degree of intensification. The demand for temporary workers could not be met by the sole population of the center itself.

- Possibility of extending the surface area: Tolai has also profited from considerable possibilities of increasing the size of the cultivated areas. Many potentially arable zones were able to be cleared and put to plow. Moreover, the original number of families was not too great and did not saturate the land. Thus the average surface area per family comes to 3.2 ha whereas it was 2.5 ha at the start.

The creation of the neighboring center of Sausu allows the children of the Tolai families to set up housekeeping in the region without causing a division of the family landholdings. This will delay, at least for a generation, the inevitable division of property.

- A young, motivated population: at Tolai, the only settlers were migrants of Balinese origin who were able to rapidly organize themselves in a "subak"-type system. In this way, there was no delay in the valorisation of the fields during the first few years.

This remarkable dynamism can be explained by their young age upon arrival and the distance from Bali. Freed of the weight of the traditions that prevail in their home province, and ready to take every risk in order to succeed, these young people have not hesitated to adopt new techniques and to borrow money to buy costly material such as the tractor.

REGIONAL IMPLICATIONS

The increase in agricultural income foreseen for each family at Sausu and Malonas will lead to these centers' specialisation in farming. This will be beneficial to the region as a whole and will meet the objectives of Transmigration which are, among others, to increase national production and develop the Outer Provinces. Such specialisation will necessarily be accompanied by a modernization of the agricultural techniques, which cannot be done and made efficient unless the management and supply systems are improved. The transmigrants cannot do this alone.

Both at Sausu and Malonas, the agricultural counselors (P.P.L.) and the other persons in charge of managing the center are inexperienced and do not carry out their roles satisfactorily. If there is to be a generalization in the use of fertilisers, pesticides, and weedkillers, and the adoption of new material such as the tractor or the seed-hopper, the transmigrants must be efficiently instructed. At all times, the staff must be able to correctly answer the questions that will be asked. In this manner, the farmers will use the material better and get the maximum return on their investments.

It is not enough to recommend the use of new products; the methods of correct useage must also be taught. This second step is all too often neglected by the Authorities in charge. The Ministry of Transmigration should work with all the other Regional Services to ensure that efficient assistance be made available to the Transmigrants.

Equally over-frequent is a deficient supply of pesticides, fertilisers, and most of all, selected seed. The transmigrants do not receive the products until it is too late: the rice has matured before the first shipment of fertiliser arrives at the center; the fields are sown while the seed is still in the

warehouses in the provincial capital. The development and use of these products presumes that they be available at the right time.

To do this, it is necessary that the supply services be properly managed and the access roads to the centers must be in good condition. The Malonas center suffers a great deal from its isolation, and this is due only to the disastrous condition of the road that links this center to Palu; the merchants do not want to risk losing a truck on such a road, so the agricultural productions are only transported in very small quantities, and always with long delays and high costs of transport. Therefore it is vital that the access roads to the centers be improved.

Better roads would encourage spontaneous transmigrants to move to these centers. A center with easy access is much more attractive than a center that is completely cut off from the rest of the province. The flow of spontaneous migrants in the Sausu area is not only due to the environmental conditions and chances for success, but also to the fact that the families who are looking for land can easily come and see for themselves what the center has to offer, even before they decide to settle definitively.

In sum, the development of the agricultural production in the region must coincide with the development of road networks and supply services.

CONCLUSION

The present study has shown that the Transmigration operations at Tolai, Sausu, and Malonas are, on the whole, successful. But could it be otherwise in such favorable agricultural conditions?

In all these centers, the transmigrants have the same attitude: all are motivated by the same desire to succeed. This leads one to believe that a great many of the problems that were encountered are the result of negligence or error on the part of the Authorities involved: preliminary studies that were not sufficient or whose recommendations have not been followed (for example at Malonas where too many families were installed with respect to the surface actually available); or personnel that is too limited or incompetent to be able to help the transmigrants master new techniques. The result is, for example, a poor usage of phyto-sanitary products as noted in Sausu and Malonas. The deplorable access conditions to the centers influence the quality of the supply system and explain why at Malonas the transmigrants complain of not receiving fertilisers, pesticides, or seeds at the right moment...

Resettling populations must not be only the tally of departures and arrivals. This type of service is of no help to the families involved.

And yet this is quite often the unique role of the management staff. The transmigrants are only given administrative assistance while this should be above all technical aid. It is terms of improving the quality of the management (recruiting and formation), the preliminary studies (correct evaluation of the potential of the chosen areas), and the infrastructures (access to the centers) that the Ministry of Transmigration should devote all its efforts.

Furthermore, given the success of the Tolai center and the considerable amount of spontaneous migration that is attracted to the region, one might question the necessity of creating "organized transmigration". Of course, the creation of the Sausu center has speeded up the phenomenon, but this would have happened anyway. Why accelerate an already-existing migration to the very detriment of its quality? In fertile regions like Central Sulawesi, and in the light of the budgetary problems with which the Ministry of Transmigration is faced, would it not be better to develop spontaneous migration and devote the available money to improving the quality of the infrastructures and the technical staff?

LAMPIRAN FOTO



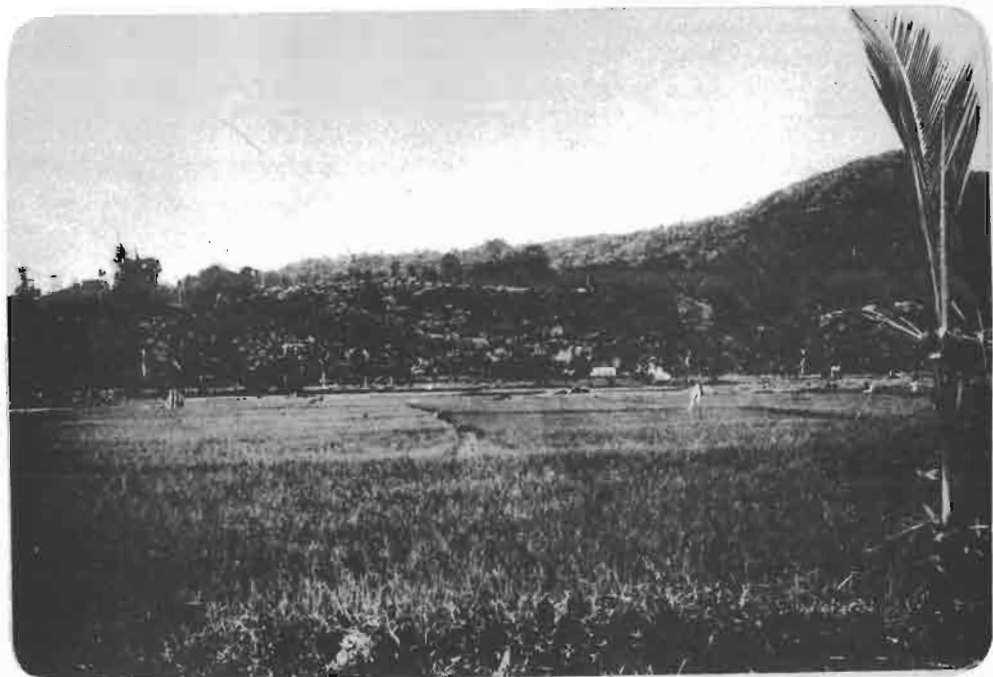
1. MALONAS : very poor access, 160 kms from Palu
the provincial capital.



2. Fifteen rivers to ford . . .



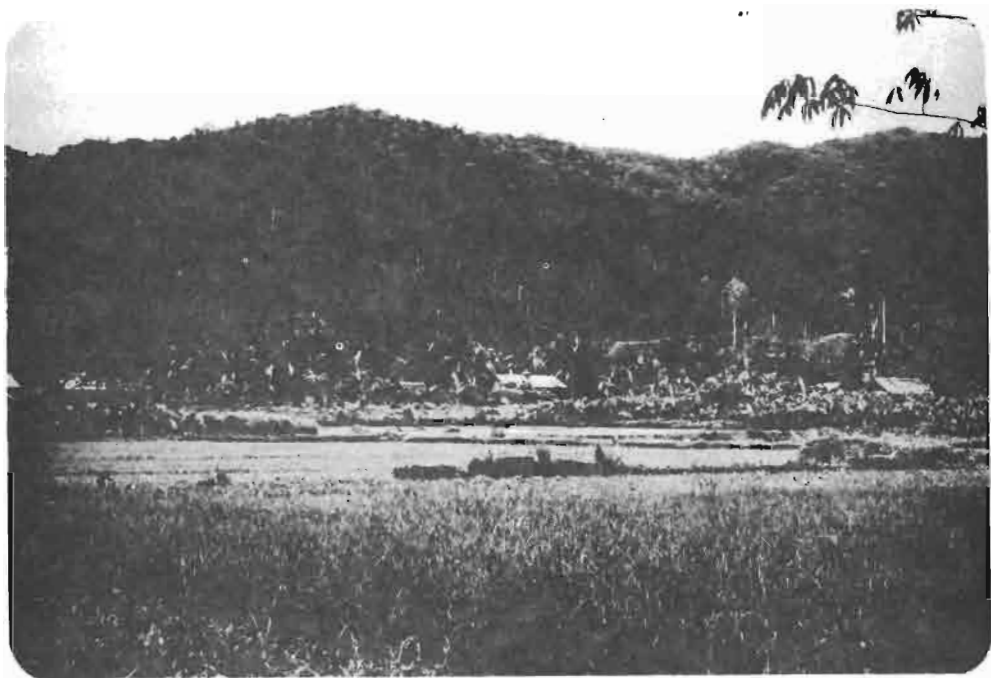
3. From 8 hours to 2 days to reach Malonas from Palu.



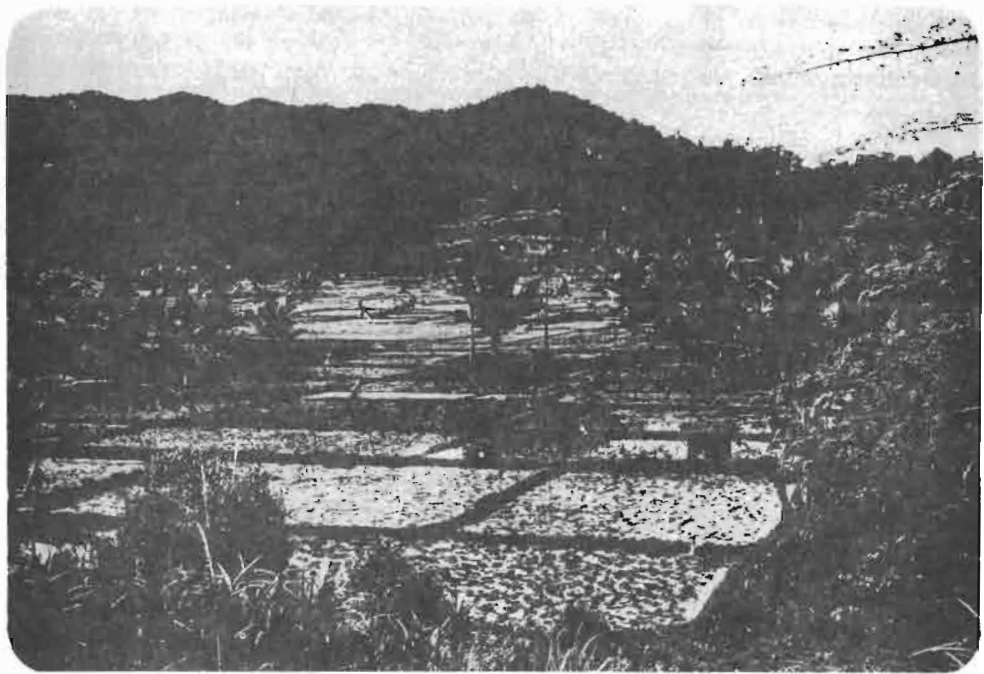
4. Nearly 600 families in a narrow valley.



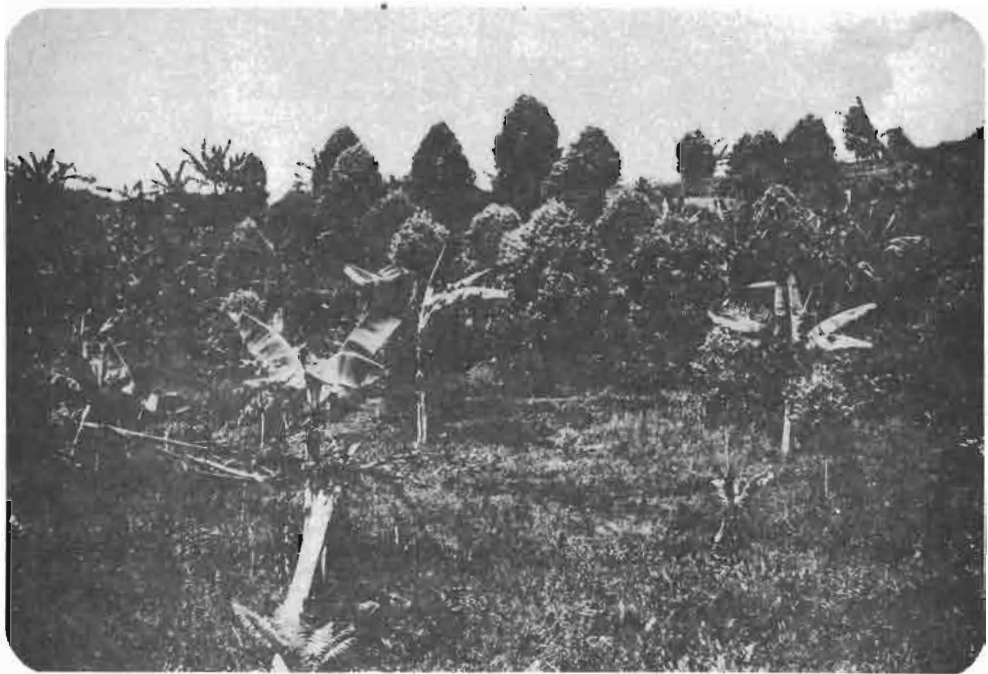
5. House lots and rice paddies.



6. Malonas is surrounded by steep hills.



7. Rice fields in the low-lands.



8. Clove tree plantations on the less steep hills.



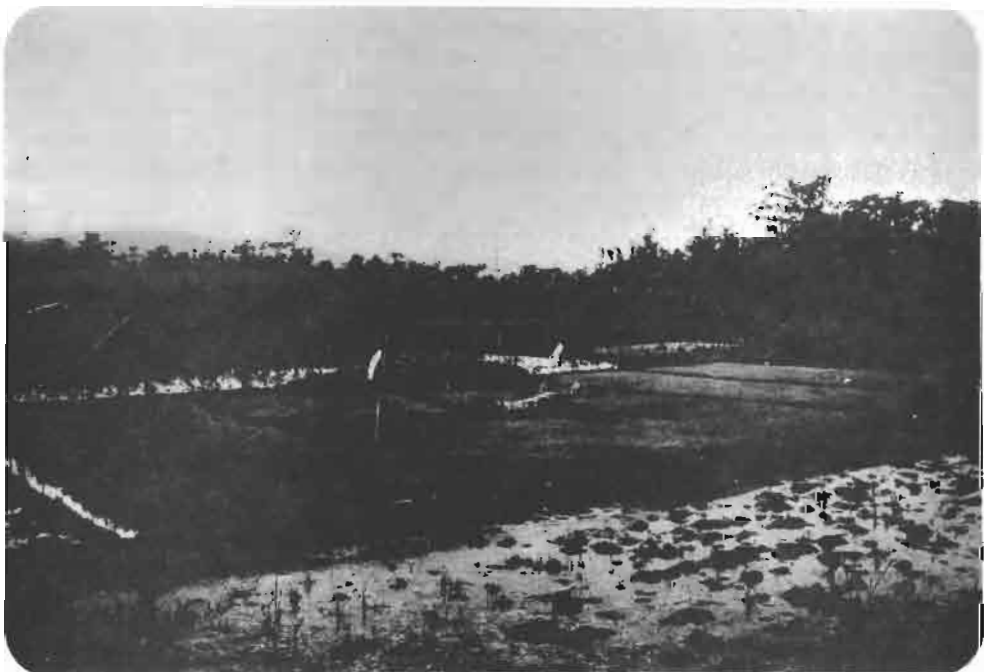
9. Expert at work. 160 families inquired during a whole agricultural year.



10. Five years after arrival. A successful Transmigrant.



11. SAUSU : 140 kms away from Palu, 4 to 5 hours of good-condition road.



12. Three years after arrival, most low-lands are already developed.



13. Some plots are still under clearing.



14. Spontaneous migrants are attracted by the very fertile soils of the Sausu area.



15. Luxuriant vegetation grows on newly cleared house lots.



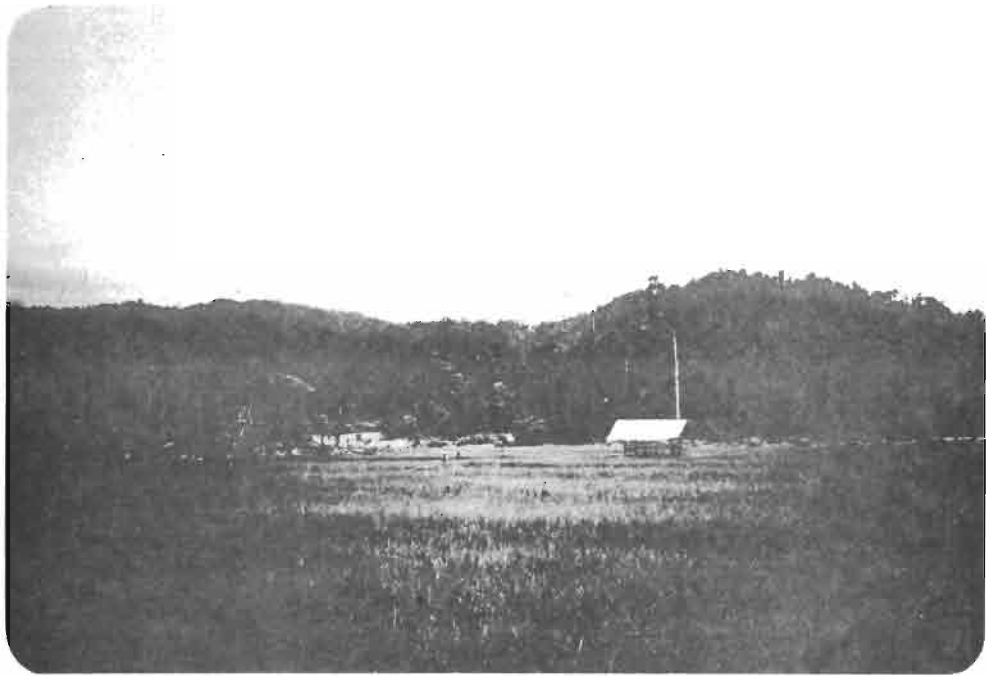
16. Upland areas are destined to soybeans and tree crops.



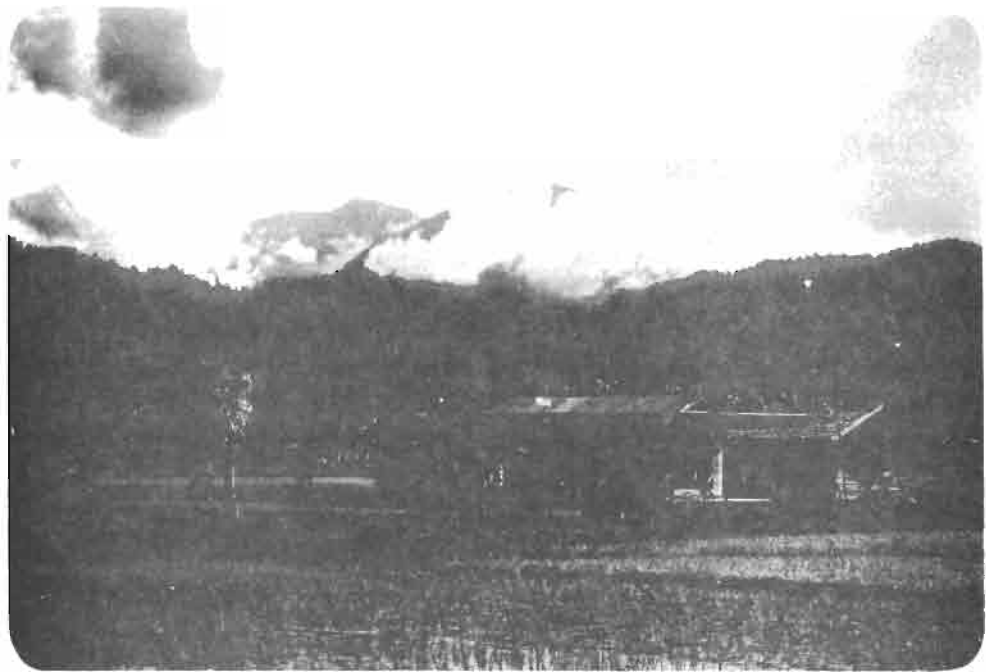
17. High-yielding soybeans without fertilizers.



18. Sausu's great plague : rats . . .



19. TOLAI : large irrigated and high-yielding rice fields.



20. Wealthy farmers . . .



21. Active family labor.

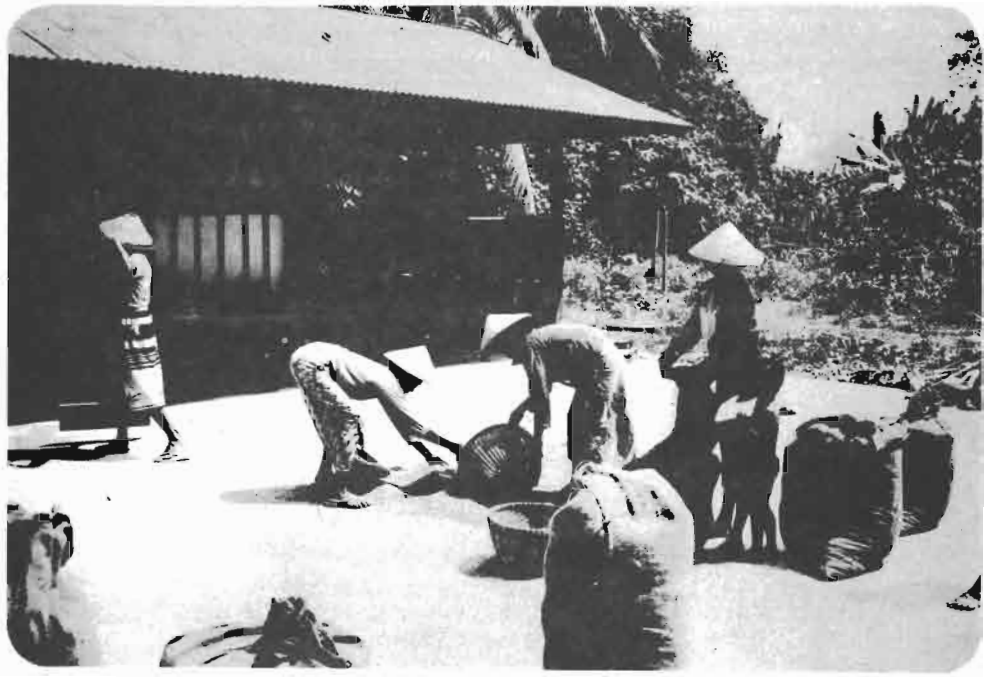


22. Agricultural laborers from the nearby Sausu.



23 - 24. A quick spreading of modern techniques :
herbicides and pest-control.





25. Regularly high-yielding rice fields turned Tolai into one of the most successful Transmigration center of Indonesia.

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