

Appraisal of Two Land Settlement Schemes in the Gazelle Peninsula—New Britain.⁽¹⁾

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INTRODUCTION

Little is known of the course and methods of development associated with indigenous land settlement schemes in the Territory of Papua and New Guinea. Practically no systematic study of any of the schemes already in operation has been undertaken.⁽²⁾ This has given rise to a great many opinions which are based on vague impressions and influenced by preconceived ideas on the desirability or otherwise of land settlement and of a certain size of individual holding. None has been the subject of these opinions more than the two schemes in the Gazelle Peninsula which are discussed in this article.

For this reason an examination of development that has been achieved to date was made in order to determine whether or not land settlement in these two areas might reasonably be regarded as a success or a failure. The survey necessary for this was then extended in an attempt to isolate the principal factor or factors influencing block development. At the same time the existence of future development plans and the motives for taking up settlement leases were investigated. Finally an attempt was made to compare costs of establishment in the settlement schemes up to about the end of Year 4 with those published for large-scale estate planting of cacao.

The Two Land Settlement Schemes.

The two schemes, both planted with cacao, are located in the Gazelle Peninsula of New

Britain approximately 25 miles from the township of Rabaul. Land comprising them was subdivided on the basis of at least 15 acres per holding of land suitable for cacao.

The Peninsula has a good network of roads and the local indigenous people are adequately supplied with their own transport. The area is heavily populated to the extent that isolation of reasonably large areas of "village" land for cash cropping purposes by an individual is now generally impossible. With the present high rate of population increase, this situation is likely to deteriorate unless there are fairly immediate and radical changes in the present economic and social organisation of the Tolai people.

(i) *The Warangoi Land Settlement Scheme* (3)

This scheme, subsequently referred to here as the Warangoi, consists of 33 agricultural blocks of an average size of 16 acres. Individual block areas range from 15 to 18 acres. The majority of lessees moved onto their blocks during the latter half of 1959.

Data were collected from a sample of 17 settlers. Details of the sampling method are given in the Appendix. Eight of the 17 were from the same village, approximately five miles from the settlement blocks. Except for one settler from Pomio, most of the other settlers selected were from villages no more than five miles away.

(ii) *The Ilugi Land Settlement Scheme*

This scheme, called hereafter the Ilugi, contains 48 blocks having an average area of 17 acres. The individual blocks range from 15 to 23 acres. About half of the settlers moved onto their blocks during the first half of 1961.

(3) *The Warangoi is not to be confused with the Vunamami Local Government Plantation.*

(1) The 'Warangoi' and Ilugi' schemes.

(2) This excludes the long term study being undertaken by R. J. Cheetham, Agricultural Officer, of land settlement near Popondetta in the Northern District of Papua. The New Guinea Research Unit of the Australian National University is also examining various land settlement schemes in the Territory.

Twenty four of the settlers were selected, and the same information as for the Warangoi, collected. There was no predominant home village in this sample although two villages within ten miles of the settlement blocks were each represented by four settlers. There were also two settlers from outside New Britain, one being from Finschhafen and one from Kavieng. Of the settlers from the Gazelle Peninsula, home villages on the average were further from allocated blocks than was the case with the Warangoi.

RATES OF BLOCK DEVELOPMENT

Development on individual blocks could be traced from maps prepared at six-monthly intervals by agricultural officers associated with the schemes. Aerial photographs taken in 1961 were used to check these maps which were found to be accurate.

KEY

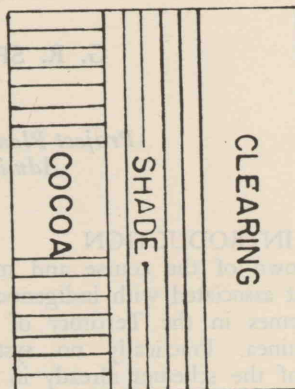


Fig. 1a.
WARANGOI

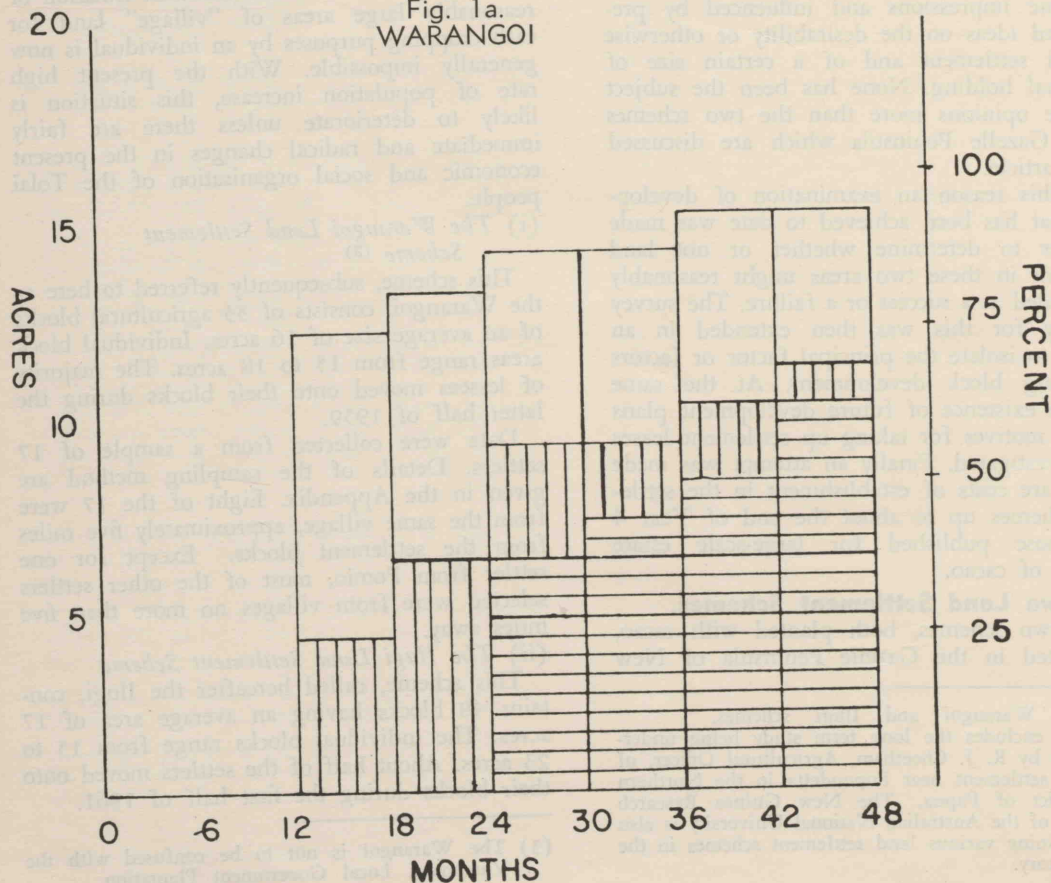
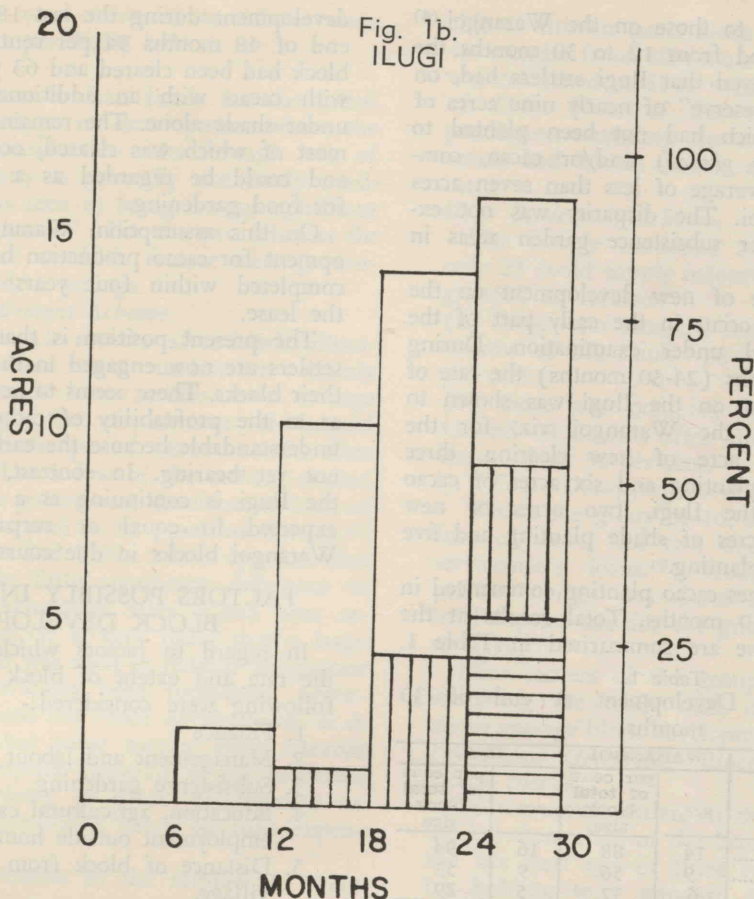


Fig. 1b.
ILUGI

Area rates of block development are shown in Figs. 1a and 1b. The dates of block allocation have been used as histogram origins so that both settlement schemes are graphed from a similar datum for ease of comparison.

Because records for the Warangoi are inadequate for the first 12 months after block allocation, development achieved in this time has not been shown. For the Ilugi, no developmental work during the first six months after allocation was undertaken, but measurable development was evident in both schemes in the period 12-18 months.

The period following allocation during which occupancy of blocks took place varied considerably between the two schemes. In the survey sample taken of the Warangoi all settlers reported being on their blocks within

six months after allocation. However, on the Ilugi, this movement was much more protracted. Only 50 per cent. of the settlers in the sample taken of this scheme were on their blocks within six months of allocation; 21 per cent. in 6-12 months, and the remaining 29 per cent. in the period 12-18 months. The slower movement could have been caused by a reduction in government encouragement to settlers and/or by the poor condition of the only access road to the Ilugi blocks. These factors might also account for the lower degree of development on the Ilugi up to about the end of the first 18 months.

Figures 1a and 1b indicate that up to 30 months after allocation (after which time comparison of the two schemes ceases) absolute levels of new development on the Ilugi blocks

were comparable to those on the Warangoi.⁽⁴⁾ During the period from 12 to 30 months the investigation showed that Ilugi settlers had, on the average, a "reserve" of nearly nine acres of cleared land which had not been planted to shade (*Leucaena glauca*) and/or cacao, compared with an average of less than seven acres on the Warangoi. The disparity was not explained by larger subsistence garden areas in the Ilugi.

A slower rate of new development on the Ilugi tended to occur in the early part of the 30-month period under examination. During the last six months (24-30 months) the rate of new development on the Ilugi was shown to exceed that on the Warangoi viz. for the Warangoi, one acre of new clearing, three acres of shade planting and six acres of cacao planting; for the Ilugi, two acres of new clearing, four acres of shade planting and five acres of cacao planting.

In both schemes cacao planting commenced in the period 24-30 months. Total results at the end of this time are summarised in Table 1.

Table 1.
Average Block Development at end of 30 months.

SCHEME	WARANGOI		ILUGI	
	Development	per cent of total block size	Development	per cent of total block size
	acs.		acs.	
Clearing	14	88	16	94
Shade planting	9	56	9	53
Cacao planting	6	37	5	29

After 30 months from allocation of blocks, rates of new development assessed for six-monthly periods for the Warangoi slowed down considerably. In terms of additional clearing, shade planting and cacao planting, only one acre of cacao was planted, for instance, in the period 30-36 months; only one acre each of clearing, shade planting and cacao planting was undertaken in the next six months; and in the last six months possible in this review, only one acre of shade and two acres of cacao were planted. Of course, previous plantings required maintenance. Even with a reduced rate of new

(4) While there was on the average one more acre per holding planted with cacao on the Warangoi, two additional acres had been cleared and was ready for planting on the Ilugi. On the basis of labour inputs per operation given in Table 2 actual development on the Ilugi at 30 months in fact exceeded that on the Warangoi.

development during the last 18 months, at the end of 48 months 94 per cent. of the average block had been cleared and 63 per cent. planted with cacao with an additional six per cent. under shade alone. The remaining 31 per cent, most of which was cleared, occupied five acres and could be regarded as a reserve required for food gardening.

On this assumption, Warangoi block development for cacao production had virtually been completed within four years of allocation of the lease.

The present position is that most Warangoi settlers are now engaged in the maintenance of their blocks. There seems to be some uncertainty as to the profitability of cacao, though this is understandable because the earliest plantings are not yet bearing. In contrast, development on the Ilugi is continuing at a rapid pace. It is expected to equal or surpass that on the Warangoi blocks in due course.

FACTORS POSSIBLY INFLUENCING BLOCK DEVELOPMENT

In regard to factors which might influence the rate and extent of block development, the following were considered:-

1. Finance
2. Management and labour
3. Subsistence gardening
4. Education, agricultural experience, previous employment outside home district
5. Distance of block from the lessee's home village.

For the sake of comparison, all block devel-

Table 2.
Labour Inputs per Operation (a).

Year	Operation	Labour Inputs (man-days)
	1. Felling and rough clearing.	60
	Lining and holing, planting shade, and clearing for one year.	30
	Cacao planting and nursery.	20
	2. Shade control, cacao replanting and cleaning for one year.	18
	3. Shade control, cleaning, pruning, pest and disease control.	24
	4. Shade control, cleaning, pruning, pest and disease control.	30

(a) Modified from Table No. 26, Page 35 of 'Cocoa in Papua and New Guinea,' Department of Territories, Canberra, 1958, because of higher planting densities and by the inclusion of land clearing in Year 1.

(b) These labour inputs have been broken down into two parts corresponding to data mapped for the settlement schemes. Dissection was based on advice of experienced Agricultural Officers.

opment work was converted to labour units (man-days) as per Table 2.(5)

1. Finance.

Because access to loan funds for the initial stages of this type of development where the lender runs considerable risks through lack of adequate security is generally not freely available, finance is seen as being a very significant factor for analysis.(6) For the two schemes the main sources of available finance were government loans and/or savings.

Warangoi Settlement Scheme.

For the first 12 months after block allocation, development was undertaken mainly through purchases from settlers' own savings and/or through the employment of unpaid labour. Within the period 18-24 months after allocation, all but a few of the settlers availed themselves of a government development loan of £144 which was paid in 12 equal instalments.(7)

From Fig. 1a and Table 2 it is apparent that this loan made little significant difference to the rate of development after it had been received. However, it is very likely that a large part of the loan was used to redeem obligations which had previously been contracted, particularly labour used for block development. It is also possible that some money went towards personal consumption spending or for purchases not directly related to block development as there was no prescribed check on loan expenditure.

Of the 17 settlers in the sample, 13 were

able to estimate gross block expenditure for the 48 months from allocation. Modal expenditure was calculated at £340 which included the loan of £144. Nine of the 13 settlers had expenditures exceeding the mode and, of these, seven had blocks above average in development.

Ilugi Settlement Scheme.

The sample contained 24 settlers. Of these only 23 could supply information and they were grouped as follows:-

(a) those who occupied their blocks within 12 months of allocation—16 settlers or about 70 per cent.

(b) those who occupied their blocks between 12 and 18 months after allocation—seven settlers or about 30 per cent.

(a) Those Occupying Blocks within 12 Months.

Within the group of 16, six had received the loan of £144, and two were in receipt of ex-servicemen's loans.(8) Modal expenditure of private savings was about £35; the mode of total expenditure for the group was determined at £140.

Nine settlers of the group had expenditures exceeding the mode and, of these, five had above average block development.

(b) Those Occupying Blocks in the period 12-18 Months.

Of the seven settlers in the group, two had availed themselves of the loan of £144. Despite the late start one of these two had developed his holding to a standard above the average for the sample of the entire scheme whilst the other had above-average development for this particular group of seven.

The mode of private expenditure was not calculated because of the small number in this group sample, but it was considerably higher than that for group (a) above. Six of the seven had block development lower than the average for the Ilugi although rates of development were generally very high.

Data for both schemes combined.

It was possible to examine detailed written records of expenditure in two cases only in the whole survey. While these records were not complete for the whole period of block development they did indicate for the two settlers that loan funds were largely used for actual development of the holding, and that there were

(8) At the time of the survey, one had received £72, the other £319.

(5) Development was confined to land clearing (including felling) nursery work, planting of shade and cacao, pest and disease control, pruning and other maintenance. Because labour units used in this table have been derived from data compiled for 'average' forest clearing and other conditions, and for average quality of work for each operation, labour inputs are not necessarily accurate for individual holdings. However, they are very convenient for comparison.

(6) It is not implied that adequate credit was not available for the two schemes in question. The important thing is the assessment of the possible effect on development of the levels of finance actually used by settlers in the Warangoi and Ilugi.

(7) The survey showed that of the 17 settlers selected, 16 had availed themselves of the loan granted by the Native Loans Board. The other settler had access to adequate private finance from his employer. The instalments were paid generally at monthly intervals, i.e., total loan money was received over the period of a year.

comparable levels of expenditure on broad categories of purchases. Payment of wages was the largest single item in both cases. The high proportion of expenditure devoted to transport confirmed the contention of agricultural officers that this form of outlay was often excessive.

In summary, details of gross expenditure were collected from 36 of the 41 settlers sampled. Of these, 20 reported above modal expenditure for their particular settlement area. Thirteen of these had above average block development. While there is some indication of a connection between expenditure and block development, the existence of unredeemed obligations and the quality of the data were not such as to justify pursuing investigation of the relationship further.

The number of Ilugi settlers not financed by loans enabled block development achieved without loan assistance to be compared with that achieved with loans in this particular scheme. It also enabled a similar comparison to be made between Ilugi development without loans and development on the Warangoi where 16 out of the 17 settlers in the sample had received a loan of £144 and the other had access to adequate private finance.⁽⁹⁾

Table 3 gives the average and range of block development per £1 spent for each scheme, with and without loan finance, expressed as man-days.⁽¹⁰⁾ Labour inputs were calculated from Table 2.

(9) Apart from the fact that development on the Ilugi is at an earlier stage than on the Warangoi, failure of many of the Ilugi settlers to take up loans is more likely to be explained by lesser publicity of the availability of credit rather than a reduced need for that credit. At the time of the survey a number of Ilugi settlers had applied for loans from the Native Loans Board. This type of loan is discussed by R. J. Cheetham in "The Development of Indigenous Agriculture, Land Settlement, and Rural Credit Facilities in Papua and New Guinea," *Papua and New Guinea Agric. J.*, 15: 67-78.

(10) No attempt was made to determine the possible extent of expenditure by lessees on anything that could not be related fairly directly to block development.

Table 3.

Block Development Expressed as Man-Days per £1 Spent.

		Without Loans	With Loans	
		ILUGI	ILUGI	WARANGOI
Average		25	7	4
Range		5(b)-98(c)	5-10	3-4

- (a) Recorded to the nearest whole number of units.
 (b) Lessee has undertaken development solely by hiring labour.
 (c) Block development undertaken largely by lessee himself. Minor wage employment in Year 1 only, for burning.

Using the average figures in Table 3 it is apparent that £1 has secured more development on the Ilugi blocks than on the Warangoi, and that in the Ilugi scheme, £1 has secured more development by those without loans compared with those who have had access to loan finance. Explanation of the difference is to be found largely in the extent to which block development has been carried out by the lessee himself, the very high figure of 98 man-days per £1 for one settler on the Ilugi serving as an indication of levels that can be achieved in cases where there is little or no wage employment. By contrast it was estimated that £1 spent on large cacao plantations secured less than two man-days of development up to the end of Year 4 of establishment.⁽¹¹⁾

The ability to secure optimum output from labour employed is also a factor relevant to the ratio between development achieved and money outlaid. However, it is one that is likely to vary only by chance between these two schemes and between settlers who have loans and those who do not. Of greater significance to results contained in Table 3 is the existence of obligations contracted during development of blocks which normally must be redeemed in money or honoured in some other way in the future. Accurate data on obligations that have been contracted and are still outstanding are very difficult to secure, but it is thought probable that the later Ilugi settlers, particularly those without loans, would have much greater

(11) This estimate was derived from data given in "Cocoa in Papua and New Guinea"—Department of Territories, Canberra, 1958, Page 35, with adjustment for higher planting densities applicable to the settlement schemes. The comparison is of obvious significance where capital is in short supply and/or its cost is very high.

Table 4.
Management and Labour Employed.

SCHEME		WARANGOI				ILUGI				BOTH SCHEMES			
Management		Number of Managers	Labour			Number of Managers	Labour			Number of Managers	Labour		
			Casual	Full Time	Unpaid		Casual	Full Time	Unpaid		Casual	Full Time	Unpaid
FULL TIME	...	2	2	—	1	13	13	1	1	15	15	1	2
PART TIME	...	3	3	—	2	6	6	—	1	9	9	—	3
A Village	...	7	7	—	4	—	—	—	—	7	7	—	4
B													
S													
E													
N Business or Wages													
T													
E													
E													
Total		17	17	4	8	24	24	4	2	41	41	8	10

future commitments in this regard. For this reason particularly, Table 3 should be used with caution.

It could be conceived that the relative 'age' of the two schemes is likely to influence development achieved for each £1 spent. As previously indicated, the Warangoi scheme is now at the maintenance stage where labour inputs per holding are on the average considerably less than on the Ilugi. On the assumption that spending to maintain a family does not change much according to the stage of block development, less development per £1 spent will occur during the maintenance stage. However, the survey found that family maintenance expenditure was generally a small proportion of total expenditure and that many of the Warangoi settlers have returned to their villages where living would normally be at the subsistence level. For these reasons 'age' is not likely to influence the figures of Table 3 to any great extent.

The Ilugi settler to which (b) of Table 3 refers, provides an interesting example of development that can be achieved without loan finance and without active participation by the lessee himself in work on his block. While the settler in question is regarded as being enterprising (he has a high earning rate in outside employment) the development he has achieved expressed as a labour input rate per £1 spent, i.e. five man-days, compares more than favourably with any settler included in the sample of the Warangoi scheme where all

lessees themselves engaged in block development.⁽¹²⁾

It should be noted that Table 3 incorporates nothing concerning absolute levels of development reached or expenditure undertaken. This is another reason for caution being exercised in its use.

2. Management and Labour.

The Warangoi and Ilugi schemes are frequently criticised on the grounds that lessees are often absent from their blocks. The opinion is expressed that active participation in work being undertaken is an obvious corollary to successful development. This question is now examined.

Of the Warangoi settlers, 12 or about 70 per cent. of the sample taken were 'absentees' most of whom were residing in their villages at the time of the survey. In the Ilugi, all of the five absentee managers were in full-time wage employment or were conducting their own business.

Those lessees with residences on their holdings were classified as either 'full-time' or 'part-time' managers. ⁽¹³⁾ All settlers of both

(12) The question of unpaid obligations should also be considered, but it is thought that the Ilugi settler was virtually free of these at the time the assessment was made. In any case it is the extent of his outstanding obligations relative to the Warangoi settlers that is significant in the comparison.

(13) The basis of classification was a fairly loose assessment of 'full-time' managership, those not 'full-time' being logged as 'part-time'.

Table 5.
Management and Block Development.

SCHEME		WARANGOI		ILUGI		BOTH SCHEMES	
Management		Number in class	Development above average	Number in class	Development above average	Number in class	Development above average
FULL TIME		2(a)	—	13	7	15	7
PART TIME		3	1	6	2	9	3
A							
B	Village	7	3	—	—	7	3
S							
E							
N	Business						
T	or						
E	Wages	5	5	5(b)	3	10	8
E							
Total		17	9	24	12	41	21

(a) One manager in this group has a trade store on his block.

(b) One manager in this group has visited his block only twice and will probably lose his block because of lack of development.

schemes had employed casual labour to a greater or lesser degree.⁽¹⁴⁾ The three main sources of this labour were nearby plantations, villages and neighbouring districts.⁽¹⁵⁾

Permanent or 'full-time' labour had also been employed, particularly by those absentee managers in full-time wage employment or in business.⁽¹⁶⁾ None of the resident managers had employed permanent labour except for one full-time manager in the Ilugi.

Management and labour employed is summarized in Table 4. The data for unpaid labour refer to non-family labour and are probably very conservative estimates.

Table 5 relates types of management to block development. The data for full-time management do not indicate a connection between this

and absolute levels of development. While part-time management seems to be associated with less than average block development, the number in this class is too small for any significant conclusion to be drawn.

The interesting point to emerge from Table 5 is the apparent connection in these two schemes between levels of development and lessees' full-time wage employment or involvement in some kind of business unrelated to cacao growing. For both schemes combined, eight of the ten settlers in this class achieved development above average for their particular scheme.

The inference from the data of Table 5 is that, for the Warangoi and Ilugi schemes at least, full-time management is not a determinant of development but that development may be assisted greatly through wage employment and/or other business activity of the lessee. This assistance is most likely to act through the availability of additional finance, although some connection between outside employment and/or business and ability to manage labour efficiently, planning and decision making, enterprise and initiative etc. should not be discounted entirely. These attributes warrant further investigation as to their possible importance to successful cash-

(14) Estimates of casual labour could not be obtained.

(15) In some cases, to help develop a fellow villager's block, villagers combined, forming what is called a work "bung". Payment for work "bungs" is made not to individuals but to the village account. This type of labour is used mainly in the initial stage of bush felling and burning when large numbers are required for short periods. Labour from neighbouring districts is obtained mainly from the Baining Census Division.

(16) Of the ten in this category, eight had employed full-time labour.

Fig. 2a
WARANGOI

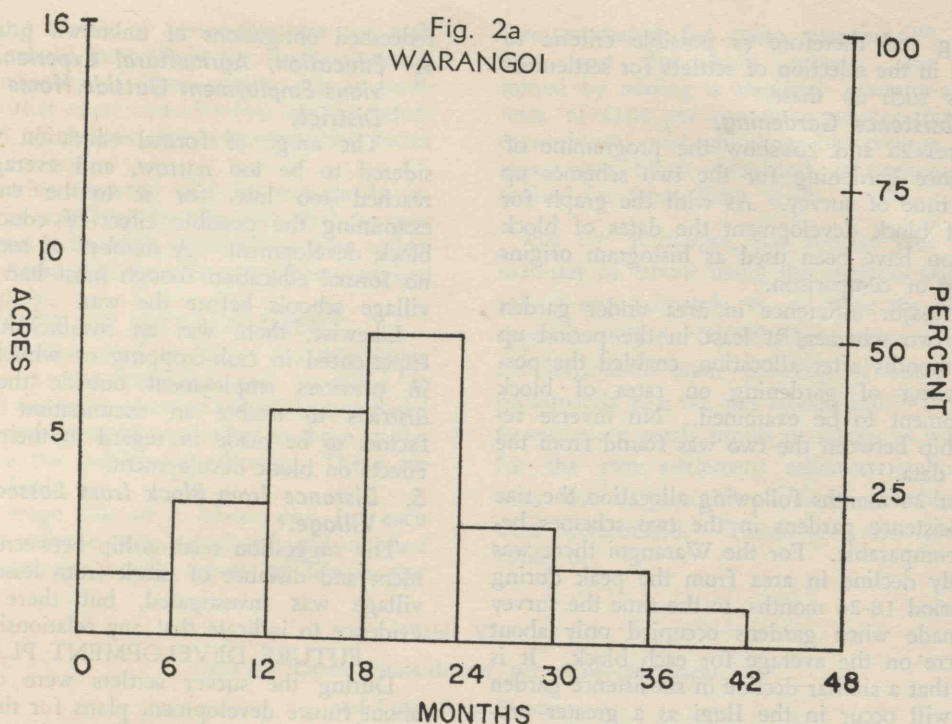
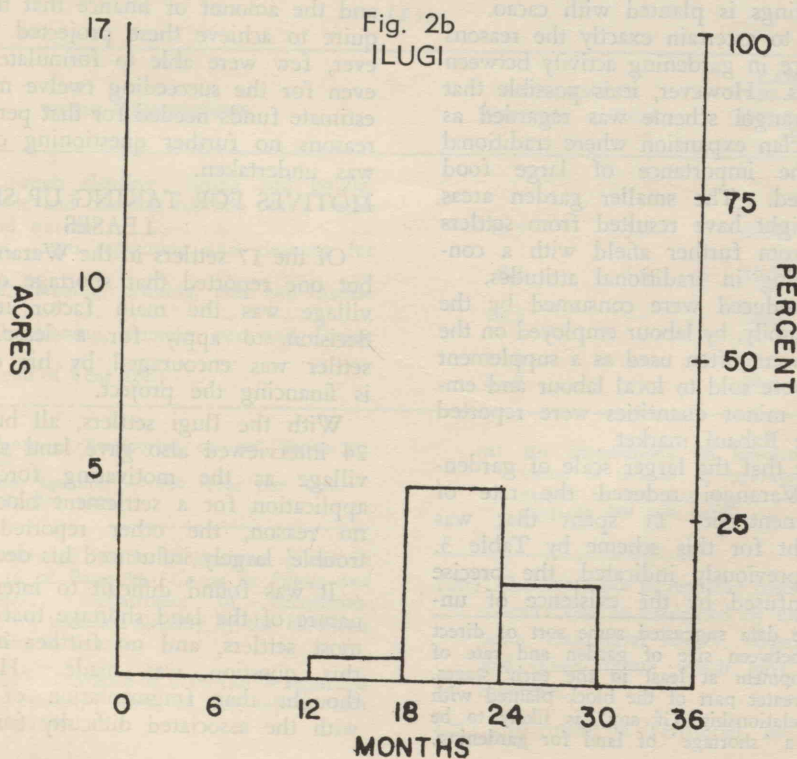


Fig. 2b
ILUGI



cropping and therefore as possible criteria to be used in the selection of settlers for settlement schemes such as these.

3. *Subsistence Gardening.*

Figures 2a and 2b show the programme of subsistence gardening for the two schemes up to the time of survey. As with the graph for rates of block development the dates of block allocation have been used as histogram origins for ease of comparison.

The major difference in area under garden in the two schemes, at least in the period up to 24 months after allocation, enabled the possible effect of gardening on rates of block development to be examined. No inverse relationship between the two was found from the survey data.⁽¹⁷⁾

After 24 months following allocation the size of subsistence gardens in the two schemes became comparable. For the Warangoi there was a steady decline in area from the peak during the period 18-24 months, to the time the survey was made when gardens occupied only about one acre on the average for each block. It is likely that a similar decline in subsistence garden areas will occur in the Ilugi as a greater proportion of holdings is planted with cacao.

It is difficult to ascertain exactly the reasons for the difference in gardening activity between the two schemes. However, it is possible that the earlier Warangoi scheme was regarded as an instance of clan expansion where traditional attitudes to the importance of large food gardens prevailed. The smaller garden areas in the Ilugi might have resulted from settlers being drawn from further afield with a consequent weakening in traditional attitudes.

Foodstuffs produced were consumed by the lessee and his family, by labour employed on the holding (they were often used as a supplement to wages) or were sold to local labour and employers. Only minor quantities were reported as sold in the Rabaul market.

It is possible that the larger scale of gardening in the Warangoi reduced the rate of block development per £1 spent that was brought to light for this scheme by Table 3. However, as previously indicated, the precise position is confused by the existence of un-

(17) In fact the data suggested some sort of direct connection between size of garden and rate of block development at least in the early stages. With the greater part of the block planted with cacao the relationship (if any) is likely to be affected by a 'shortage' of land for gardening.

redeemed obligations of unknown proportions.

4. *Education, Agricultural Experience, Previous Employment Outside Home District.*

The range of formal education was considered to be too narrow, and average levels reached too low, for it to be worthwhile examining the possible effect of education on block development. A number of settlers had no formal education though most had attended village schools before the war.

Likewise, there was an insufficient number experienced in cash-cropping or who had been in previous employment outside their home districts to enable an examination of these factors to be made in regard to their possible effects on block development.

5. *Distance from Block from Lessee's Home Village.*

The suggestion relationship between development and distance of block from lessee's home village was investigated, but there was no evidence to indicate that any relationship exists.

FUTURE DEVELOPMENT PLANS

During the survey settlers were questioned about future development plans for their blocks and the amount of finance that they might require to achieve these projected targets. However, few were able to formulate future plans even for the succeeding twelve months and to estimate funds needed for that period. For these reasons no further questioning of this nature was undertaken.

MOTIVES FOR TAKING UP SETTLEMENT LEASES

Of the 17 settlers in the Warangoi sample all but one reported that shortage of land in his village was the main factor influencing his decision to apply for a lease. The other settler was encouraged by his employer who is financing the project.

With the Ilugi settlers, all but two of the 24 interviewed also gave land shortage in his village as the motivating force behind his application for a settlement block. One gave no reason, the other reported that 'family trouble' largely influenced his decision to apply.

It was found difficult to interpret the exact nature of the land shortage that had motivated most settlers, and no further investigation of this question was made. However, it is thought that fragmentation of village lands with the associated difficulty for an individual

of isolating blocks of reasonable size for cash cropping would most likely describe the situation for the majority of these settlers. It is probable also that some consideration of the future livelihood of children was a contributing factor in their decision.

One settler reported that he was partly influenced in applying by the fact that he was unemployed at the time applications were called. Another stated that government officers advised him to apply.

COSTS OF ESTABLISHMENT

The technique used to derive the data given in Table 3 was extended and modified to determine the costs of cacao establishment based on work arrangements equivalent to those applying to the two settlement schemes. These are given in Table 4.

The average cost of a labour unit for each settlement scheme was calculated and applied to the successive yearly inputs of labour per

acre estimated for cacao planting.⁽¹⁸⁾ Labour unit cost for each scheme was determined by adding a standard 'operator's allowance' of £100 per annum to average total block expenditure, and dividing by average labour inputs per block calculated as previously described i.e. from Table 2.⁽¹⁹⁾

For the Warangoi, the average cost of one man-day of labour using this method was assessed at approximately 9s. od.; for the Ilugi, at approximately 6s. Od.⁽²⁰⁾ The comparative figure for large-scale estate planting of cacao is approximately 11s. Od. per labour unit.⁽²¹⁾ Applied to successive yearly inputs of labour as was done for the two settlement schemes, comparative costs for large-scale plantation establishment were determined. These are also given in Table 6.

Table VI.
Costs of Cacao Establishment per Acre—Settlement
and Large Scale Planting.

(£'s)

YEAR	WORK PROGRAMME	SETTLEMENT		LARGE-SCALE PLANTING (a)	
		Warangoi	Ilugi	Modified (b)	Actual (c)
1.	Felling and rough clearing; lining and holing, planting shade and cleaning for one year; cacao planting and nursery	49.5	33.0	60.0	54.3
2.	Shade control, cacao replanting and cleaning for one year	8.1	5.4	10.0	8.2
3.	Shade control, cleaning, pruning, pest and disease control	13.5	—	16.0	13.6
4.	Shade control, cleaning, pruning, pest and disease control	10.8	—	13.0	10.9
Total cost up to end of Year 4(d)		81.9	—	99.0	87.0

(a) Department of Territories, *op. cit.*, Table No. 26, P. 35.

(b) For closer spacing — 350 trees per acre.

(c) 225 trees per acre.

(d) No adjustment on account of change in value of money. If operator's allowance reduced to £50 per year, costs for Warangoi drop to £64 per acre.

(18) According to the work programme given in Table No. 26 of Page 35 'Cocoa in Papua and New Guinea'. Department of Territories. Canberra, 1958, modified slightly by the inclusion of land clearing in Year 1.

(19) The operator's allowance of £100 can be regarded as the 'opportunity' cost of his labour and managerial capacity.

(20) The difference in man-day costs between the two schemes can be explained by unredeemed obligations, managerial ability, stage of development and other factors which have been previously discussed.

(21) Department of Territories, *op. cit.*, Page 34.

The table suggests that cacao establishment can be undertaken more cheaply in small-scale indigenous settlement schemes than through the large-scale estate-type of planting. This contention would be reinforced if account were taken of the diminishing purchasing power of money between the (earlier) period when data were collected for the latter, and the period of development of the settlement blocks. However, the figures of Table 6 are by no means authoritative and should be used with caution. The Table also has nothing to say about other non-monetary aspects of small-scale versus large-scale type of development.

On the basis of levels of development achieved, the efficacy of every £1 spent by settlers, and the costs of establishment compared to large-scale estate planting of cacao, the Warangoi and Ilugi schemes up to their present stage of development must be regarded as successful.

APPENDIX SAMPLING METHOD

Within each settlement scheme a 100 per cent. random sample of settlers was drawn, with the first 50 per cent. comprising the actual sample. The remaining settlers became reserves

about which data were to be collected if required in the order of selection. Only where the settler could not be interviewed without undue delay and cost, or where his whereabouts could not be discovered after three attempts to locate him, were reserves to be used.

Only three reserves were called on. One settler was away on holiday in New Ireland, one could not be interviewed without undue delay village and block, and the third had died and his widow could not trace the development of the block.

Each settler was interviewed in relation to his place of origin, date of occupying the block, development per year, labour employed, cost of labour if any, extent of own savings invested, loans if any, type of management, future development plans, etc.

In each case, settlers were very willing to discuss their blocks and it seems that the answers were given in good faith. In fact, practically all had firm estimates of the amount of money expended on their blocks but none had any clear conception of plans for future development.

(Received March, 1964)



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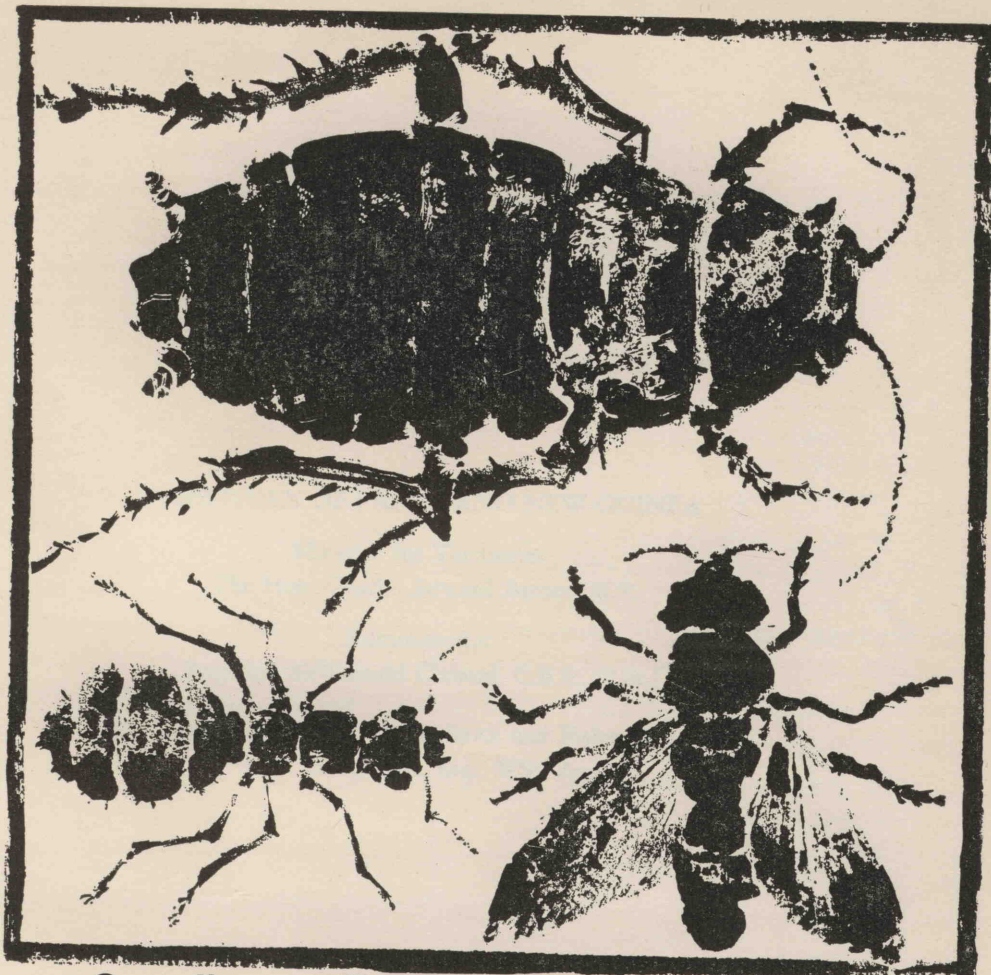
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