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A PRELIMINARY SURVEY
INTO
COFFEE FARMING SYSTEMS
IN WESTERN HIGHLANDS
AND SIMBU PROVINCE
[CARRIED OUT IN APRIL 1980]

MAY 1982

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NOTE TO THIS REPORT

A preliminary survey into Coffee Farming Systems in the Western Highlands and Simbu Provinces was carried out in April 1980 whilst I was working for the Rural Statistics Section of the Department of Primary Industry at Konedobu.

I have since transferred to be Area Economist of Western Province. However, I was asked by Bruce Carrad, Senior Agricultural Economist, who is co-ordinator of the N.P.E.P Coffee Farming Systems Project, to collate all the reports prepared into an overall document.

It is considered that, even though the results are a little out of date, the data could be extremely useful in follow-up exercises and as reference material.

Stuart Hayfield.

SUMMARY

Coffee is Papua New Guinea's major export crop and over 70% is produced by smallholder growers. However very little reliable data is available as to the farming systems of these smallholders.

Hence a research programme was established and this report concerns a survey that was carried out in 1980 in relation to this.

The background and methodology of the survey are described and the results are presented. Some of the results have been tabulated before in brief papers but this report attempts to show all the analysis that has been prepared. The survey took place in Western Highlands at Simbu Provinces, the coverage being as follows:-

	<u>Number of Villages</u>	<u>Number of growers</u>
Western Highlands	60	185
Simbu	<u>101</u>	<u>264</u>
	<u>161</u>	<u>449</u>

Information as to grower characteristics and numbers of gardens is given. Then for one coffee garden per grower, details presented are - crop sequence, date coffee first planted, incidence of dominance of other crops (planted with coffee), tree number distribution, tree number by state, area and density of gardens and percentage of trees affected by diseases.

Cont'...

Little attempt has been made to carry out interpretative analysis - this is intentional as it is considered that this would be done better in the other stages of the research. Essentially this report is a record of the situation that existed at the time of the survey.

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A PRELIMINARY SURVEY INTO COFFEE FARMING SYSTEMS
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1.0 INTRODUCTION :

The Coffee Farming Systems Research Project is a part of the Coffee Industry Development plan which was funded under the National Public Expenditure Plan (N.P.E.P) from 1980 - 1983.

The first stage of the research was conducted in 1980 and included a survey of grower practices and data on the incidence of mixed cropping of food and coffee. This report describes that survey, the problems arising and the results obtained.

The second stage is *being* conducted from 1981 to 1983; it is being co-ordinated by Bruce Carrad, Senior Agricultural Economist. At the time of writing he is in possession of the prime documents and computer print-outs emanating from the above mentioned survey.

2.0 BACKGROUND:

2.1 The following is quoted from the research component of the Coffee Industry Development N.P.E.P submission-

"Coffee is Papua New Guinea's major export crop and over 70% is produced by smallholder growers. Department of Primary Industry (DPI) makes many recommendations on coffee cultivation techniques which have not been widely adopted by smallholder growers. In place of DPI recommendations, growers have developed their own ways of cultivation, to fit their subsistence system. In some areas this means intercropped or mixed food/fuel/coffee gardens. Rotations of various crops

such as sweet potatoe and peanuts to break up fallow areas and to proceed with coffee; bananas, marita pandanus and other crops for food and shade; pumpkins and other vine crops for weed reduction are occurring especially in land short areas. Spacing and shading are also often at variance with recommended practices and may reflect: grower's needs for land use intensity, fuel (casuarina) production, acceptance of what their neighbours are doing, lack of interest of the more popular reasons, ignorance of sound practices."

.2 "The research programme will be divided into two stages.

The first-stage will attempt to identify and, where possible quantify the differences which occur between individual growers and the current DPI recommendations. It will also attempt to establish new definitions of what 'sound practices' are in a smallholding cash crops subsistence framework. While the second-stage will be a more in - depth study concentrating on a smaller area, but will expand, develop and monitor the results of the preliminary study."

"Major social and financial benefits are expected to derive from an improved understanding of current smallholder practices and why they have developed."

The fact-finding for the first stage has been completed and is described below.

3.0 METHODOLOGY

Following a very well attended meeting at H.A.E.S. Aiyura, in November 1979 at which were numerous representatives from various Provinces and other bodies, a draft questionnaire was designed-as it was decided that a questionnaire approach would be the best way to collect information and assess the situation. This questionnaire was circulated and the

resultant comments were incorporated in a pilot survey questionnaire.

3.2 The pilot survey was carried out from the 11th - 15th February 1980 and four growers were surveyed, one near Kainantu, one near Goroka ~~and~~ two near Mt Hagen. so that a "cross-section" of responses could be gained. The pilot survey was extremely useful as it was possible to gain a good idea as to how long the questionnaire should take to present and it also enabled proposals to be made as ^{to} various changes in wordings and lay-out of the questions.

3.3 Based in the results of this survey, a final questionnaire was designed, and this is shown in Appendix A. The questionnaire was attempted to collect information in the following areas:-

- (a) coffee in the farming system
- (b) coffee cultivation practices
- (c) assessment of DPI extension/information inputs

3.4 Operation of the main survey:

Initially it was planned to cover four Highlands provinces namely Western Highlands, Enga, Simbu and Eastern Highlands and one lowland province, namely East Sepik province; it was considered advisable to merely attach an additional ^{for Enga and Eastern Highlands (+E. Sepik)} questionnaire, (slightly amended from the main one) to gain the information relevant to the Coffee Farming Systems Research. Unfortunately, due to various reasons, this never eventuated and, for these latter provinces, information from the Smallholding Crop Survey will have to, at this stage, suffice.

So the Coffee Farming Systems Research survey only took

place in Western Highlands and Simbu. The villages to be visited were initially selected by random sampling-for Western Highlands it was merely simple random sampling,

as no population figures available at the time, but for Simbu it was sampling with probability proportional to size. However, in actual fact, not all the villages selected could be visited for practical reasons and the ones actually visited are summarised in Appendix B.

It can be seen from the lists that several of the villages have extremely similar names and they may, in fact, be the same village - this can only be found out by actually visiting the place concerned. It was decided to use University students from the areas concerned as field enumerators. Thirty students were involved, divided thus:-

- 14 in Western Highlands Province
- 16 in Simbu Province

with four DPI officers acting as field co-ordinators.

The overall cost of the survey (excluding salaries of DPI staff involved) was approximately K7300 - this includes cost of charter (from Moresby to Hagen) plus, allowances and accommodation for the students.

The coverage was as follows:-

<u>Province</u>	<u>Number of villages</u> <u>visited:</u>	<u>Number of growers</u> <u>surveyed:</u>
Western Highlands	60	185
Simbu	101	265
	<u>161</u>	<u>449</u>

It became apparent very early on in the survey that the daily subsistence allowance for each student would not be enough if they were staying with "strangers" so it was decided to base the students as near as possible to their home village and for them to cover the villages in the near vicinity, if possible the 'selected' villages.

Once the enumerators reached the village they were supposed to select the growers to be surveyed randomly by the use of numbered 'raffle' tickets. However in practice they felt nervous about using this technique and just surveyed the first growers they met - so, in a sense, they were randomly chosen but there might be a slight bias.

During the actual survey, there were some difficulties in finding the students (particularly in Western Highlands) so that their forms could be checked and their progress monitored. Hence there were doubts whether some of the enumerators were in fact working. Essentially there were too many enumerators working over too short a time and, hence, making supervision difficult.

3.5 Following some analysis carried out by hand, a brief paper was presented at the Second Papua New Guinea Food Crops Conference held in Goroka in July 1980 - this received some interesting and favourable response.

3.6 Computer analysis:

In liaison with the National Computer Centre, a coding sheet was designed (this is included in Appendix C) and a list of codes and the tables, required, formulated. There were one or two "teething" problems but these were eventually resolved and tables of results prepared.

The initial results were presented in a paper entitled "Very Preliminary Results of The Stage 1 Survey into Coffee Farming Systems" but it was never given wide circulation - much of which was presented is included in the following section entitled "Results of Survey".

3.7 Follow-Up Survey

During the month of December 1980 and January 1981, a U.P.N.G. student was available to carry-out a follow-up survey into some villages in the Western Highlands Province. In the main survey, there was confusion over some of the questions and these were poorly answered. The following were the "areas of confusion":-

- (a) grower's involvement in other activities
(level of involvement needed clarification)
- (b) pruning on the particular garden surveyed
- (c) didiman visit - date of visit and the reasons needed to be recorded
- (d) crop sequence

So a questionnaire was designed -this is included in Appendix D.

The enumerator visited 58 growers in 17 villages and he found out that 10 growers (17%) were actually fictitious, these were in 7 villages (these were mainly by two enumerators who did have a poor performance rate in the main survey) The level of false names is worrying but it does not invalidate the whole survey in any way-it is only a small sample.

4.0 RESULTS OF THE SURVEY

4.1 Preliminary Results:

These were presented at the Second PNG Food Crops Conference in June 1980 and are included in Appendix E.

4.1 This part of the analysis was carried out manually so only the most straight-forward of calculations were made.

The tables give some useful indications. They summarise the following averages per grower (for each District and the Provinces as a whole):-

- age of grower
- total household size
- number of gardens

Also, for the particular coffee garden surveyed (usually the nearest one) the tables give the average:-

- years that land cleared from fallow, coffee planted, banana planted, food crops planted.
- percentage of growers "aware" of, or putting into practice various DPI recommendations as listed (the enumerator either asked or observed)
- number of trees by bearing, immature and senile
- percentage of trees diseased

There are always problems using averages particularly in a survey of this type where numerous enumerators were used, as often the information is not completed - then, when calculating the averages, there are less numbers acting as dividers and hence slightly biasing the results. For example, Kerowagi District, in answer to the question as to the year crops ^{were} planted, there ~~the~~ following number of responses:-

- 30 for when "from fallow"
- 31 for when "coffee planted"
- 18 for when "banana planted"
- 16 for when "food crops planted"

The differences in the level of responses was similar in other Districts.

However, the tables give useful indications as to the pattern of planting and to the average size of garden in the District or Province concerned.

4.2 RESULTS OF THE SURVEY USING COMPUTER ANALYSIS AND EXTRA
MANUAL CALCULATIONS:

The results are given in tabular form in Appendix F but a brief description of these is given below

(a) Grower Characteristics: (see Table 1)

- Age:

The average age of coffee growers surveyed in the Western Highlands was 35.5 years while in the Simbu Province the average age was found to be 41.9 years

- Household size:

Very little difference in household size was discovered between the two Provinces with the average size in the Western Highlands being 5.8 and Simbu 5.9. Nor was there any appreciable difference in household composition.

(b) Other Activities (see Table 2)

A high proportion of respondents appear to be involved in other activities, for example 34% of the respondents in Western Highlands "were involved" in a Trade Store. There may have been a misinterpretation of the words "heavy involvement" especially with regard to commercial activities— as stated, this appears to be particularly the case in Western Highlands.

Hence, this being the case, a slightly reworded question was included in the follow-up survey. Here it was stressed particularly as to whether the respondent actually owned a P.M.V or a Trade Store - and then an impression of his main activities (in order of priority), other than growing

coffee, was gained of the 48 respondents interviewed - only 4 actually owned P.M.V's (8%) and 13 owned trade stores (27%)

However 28 of the respondents (58%) had other commitments that occupy their time as opposed to growing coffee - whereas the remaining 42% said that their main occupation was farming coffee.

Note: It must be stressed that the follow-up survey only took place in Western Highlands where it appears growers do, generally, have other activities.

(c) Gardens per Grower (see Table 3)

It appears from the figures collected, that the average number of gardens per grower, for the two Provinces concerned, are as follows:-

	<u>WHP</u>	<u>SIMBU</u>	<u>AVERAGE (WEIGHTED)</u>
Sole Food Gardens	2.6	2.5	2.5
Sole Coffee Gardens	2.3	2.0	2.1
Mixed food/coffee	0.6	0.7	0.7
gardens			
Other gardens	0.2	0.2	0.2
<u>Total</u>	<u>5.7</u>	<u>5.5</u>	<u>5.6</u>

The question only asked "How many gardens do you have?" and the results give a higher figure than many observers believe correct. Hence it is suspected that respondents may have included gardens in which they have either partial ownership or limited rights. As such, in the follow-up survey, a question was included attempting to differentiate between the gardens that the grower actually owned and those that he shared.

In fact, the suspicion was borne out-for all the 48 respondents interviewed in the follow-up survey. the total number of gardens was as follows:-

	<u>Owned</u>	<u>Shared</u>
Food	2	43
Sale Coffee	2	33
Food/Coffee	0	25
Other	0	2

Thus, showing that the majority of gardens were "shared".

(d) Crop Sequence (see Table 4)

The question was asked as to the sequence of crops grown in the garden and an attempt has been made to analyse the results. However, the question was really too vague and was not well completed by the enumerators. The answers should prove to be more useful when the gardens are revisited in later stages of the research project.

But, as can be seen in Table 4 the sequences given have been grouped into four namely:-

- Sequence 1: Food - Coffee
- Sequence 2: Food - Food/Coffee
- Sequence 3: Food - Food/Coffee - Coffee
- Sequence 4: Food - Bush - Coffee
- and Other : Sequences not starting with 'Food'

All the sequences end in coffee or food/coffee as the questionnaire concerned one of the coffee gardens only ; clearly the sequences do not show cases where gardens have been planted immediately into food/coffee or into pure coffee. But these can be seen as they are the predominant feature of the "other" sequence.

It appears, from the figures presented in the table, that the most common sequence is clearly from a 'food' to a 'coffee' garden - 40% in Western Highlands Province, particularly Hagen North District, and 51% in Simbu Province, particularly Kerowagi and Kundiawa Districts.

However the occurrence of proceeding from fallow straight to coffee or food/coffee must also be taken into account - 29% in Western Highlands Province (particularly Minj and Hagen North Districts) and 17% in Simbu Province (particularly in Gumine and Chuave Districts).

(e) Date Coffee First Planted (Table 5)

The dates given as to when coffee was first planted in the particular coffee garden in question have been grouped as follows:-

- Before 1951
- 1951 to 1960
- 1961 to 1965
- 1966 to 1970
- 1971 to 1975
- 1976 to 1980

As can be seen, from the table, most of the coffee in Western Highlands appears to have been planted in the 1960's with slightly more later on in the decade. Whereas in the Simbu Province most of the coffee appears to have been planted in the 1950's, the only exceptions been in the Sina Sina District where the coffee was, marked^{ly} planted later. (early 1960's) and Kerowagi District where the majority of the coffee was planted in the late 1960's.

However, some care must be taken interpreting these results as the particular coffee garden concerned was usually the nearest coffee garden to where the villager was interviewed, and it may very well be that newer gardens have been planted further away as the "older" gardens have become more crowded or senile.

(f) Other crops present and shade crops (Table 6)

An attempt was made to gain an assessment of the other crops (apart from coffee) growing in the garden. That is, these were the crops that were interplanted with the coffee.

The frequency of the other crops was separated thus:-

Dominant - very common indeed

Less dominant - quite a few present

Subsidiary - present but not very many

It is appreciated that this categorisation is subjective but, after trials, it was found difficult to allocate numbers to the separate categories.

For analytical purposes, the most frequent three crops under each category were enumerated namely:-

Dominant - Banana, Taro, Yar (casuarina)

Less Dominant - Banana, Pit pit, Sugar,

Subsidiary - Banana, Pandanus, Taro.

By observation these were the most frequent crops, others were only mentioned on once or two occasions.

Of the dominant crops growing with coffee, banana was the most frequent in both Western Highlands (31%) and Simbu (16%) and yar (casuarine) the next most frequent; 15% in Western Highlands and 13% in Simbu. These percentages are of the the total number of respondents for the whole survey and not for merely for just those for which the question

was completed - as it was uncertain whether in these cases the question was blank because there were no other crops present with the coffee or whether the enumerator had "forgotten" to complete it. It is estimated that 15-20% of these incomplete questionnaire were because of neglect.

In total, in Western Highlands banana was mentioned as an "other crop present" on 96 occasions (52%), yar 28 (15%) and taro 17 (9%). In Simbu, banana was mentioned on 86 occasions (32%), yar 35 (13%) and taro 16 (6%).

The enumerators were asked to assess which crops were given the most shade to the coffee from the computer analysis. it was found that yar trees was the dominant shade in 72.6% of the gardens surveyed, although in 16.1% the dominant shade was banana. In a further 28.5% of the gardens banana was the second most important shade crop.

(g) Tree Numbers, Area of Garden (and Desity) State of Trees (Tables 7 & 8)

The average number of trees per garden was 243 for Western Highlands Province - this is excluding Kendu village in Minj District which was exceptional is that three of the gardens in this village had between 4,000 and 6,000 trees while another was just over 1,000 trees. The average number of trees per garden was 183 in the Simbu Province.

The ages of the trees were in the following propositions:-

	<u>Western Highlands:</u>	<u>Simbu:</u>	<u>Average:</u>
Bearing	79%	69%	74%
Immature	12%	19%	16%
Sanile	9%	12%	10%

- for the break-up for the separate Districts see Table 8.

Overall, a clearer picture of the total number of trees can be gained from the distribution of tree numbers (Table 7) 32.4% had less than 100 trees per garden and a further 32.9% had between 100 and 200 trees. Thus 65.3% had less than 200 trees per garden.

Area of Garden:- an attempt was made to estimate the area of each garden. This was done by measuring a 10 metre triangle. Then, by relating this to the total number of trees in the garden and, allowing for "missing" trees, the area could be calculated.

The average area in the Western Highlands was 956.87 square metres while in the Simbu it was 464.36 square metres.

Density:

Referring to the average number of trees per garden; the following densities can be estimated:-

Western Highlands	<u>2.540</u> trees per hectare
Simbu	<u>3.941</u> trees per hectare

It seems strange that there should be much difference between the densities in the respective provinces. Full details are given in Table 8B where it can be seen that Sina Sina appears to have a marked high density (this casts doubts as to the validity of those particular results)

(h) Trees affected by pests: (Table 9)

Due probably to most of the enumerators failing to attend briefing sessions, this section of the questionnaire was poorly completed and some doubts are expressed as to the validity of the results. These are shown in Table 9 from which it appears that there is very little evidence of

diseased trees - only 7.6% of the trees in Western Highlands 10.1% of the trees in Simbu were diseased; the most common of the 'named' diseases being Pink Disease while several are included under 'other'. Pink Disease appears to be particularly common in the Gembogl District of the Simbu Province.

(i) Other Results (not shown in tabular form)

- Drainage and Fencing:

32.9% of the gardens in the Western Highlands and 23.9% in Simbu had drains while the percentages which were fenced were 37.5% in the Western Highlands and 48.2% in the Simbu.

- Pruning:

In most gardens more than one method of pruning was employed with the result that although single stem was more popular than multiple-stem both were present in the majority of gardens. Capping was observed in 27.0% of the gardens in the Western Highlands and in 44.0% of the gardens in Simbu. while stumping was observed in 27.7% of the gardens in the Western Highlands and 38.7% of the gardens in Simbu. This could lead one to hypothesise that more rehabilitation has been ~~came~~ out in Simbu than in Western Highlands. No pruning at all was observed in 4.7% of the gardens in the Western Highlands and 5.4% in Simbu.

- Seedlings: 77% of the respondents in the Western Highlands and 55% in the Simbu said that they had used seedlings from underneath existing coffee, although a number of respondents stated that they had more than one source for their seedlings.

5.0 COMMENTS AND CONCLUSION:

Very little attempt has been made to carry out an economic interpretative analysis, only statistical. This is because it is considered that the purpose of the report is to present the results of the survey and ~~hence~~ describing the situation that existed at the time. Even this has been long overdue.

However it is hoped that a further interpretative paper (or papers) may be formulated following this report and using the results contained therein.

It is intended that this report will act as a foundation for further research now that the results have been presented and can thus be circulated to numerous people and bodies concerned with this area of research, in particular, the results could be used in the Coffee Farming System Research Project.

A P P E N D I C E S

- APPENDIX A: QUESTIONNAIRE USED IN MAIN SURVEY
- APPENDIX B: LIST OF VILLAGES, AND NUMBER OF GROWERS
IN MAIN SURVEY
- APPENDIX C: COMPUTER CODING SHEET
- APPENDIX D: QUESTIONNAIRE USED IN FOLLOW-UP SURVEY
- APPENDIX E: PRELIMINARY RESULTS OF SURVEY
- APPENDIX F: RESULTS OF THE SURVEY - USING COMPUTER
ANAYSIS AND EXTRA MANUAL CALCULATIONS

COFFEE FARMING SYSTEMS RESEARCH

QUESTIONNAIRE

Recorder
(block capitals)

Date

Province

District

Village

Clan

Grower
(head of house/
hold)

This questionnaire is in two parts:

PART A: Interviewing the grower/head of household - questions/
answers.

Please obtain answers to the questions as outlined-
you will probably have to translate the questions
into Pidgin.

PART B: Measurements and Observations.

Go to the nearest coffee garden and complete
the sections as detailed.

PART A: INTERVIEWING THE GROWER

1. What is the approximate age of the grower: years.
2. How many people are in the household?
Male (adult) - including the grower.
Male (children)
Female (adult)
Female (children) Total

Note: Children should be regarded as under 15 years old.

3. How many gardens is the grower currently using?
Food
Pure Coffee
Coffee/food
Other
4. Is the grower heavily involved with any of the following activities: (that is, do any of these activities take up a lot of his time?) (Please tick the appropriate box or boxes)
- P.M.V. ☐
Store ☐

Coffee buyer

Counsellor

Other cash: Agricultural

Church

Other cash: Non Agricultural

Magistrate

FOR THE PARTICULAR COFFEE GARDEN TO BE "SURVEYED":-
(CHOOSE THE NEAREST ONE)

5. What is the crop sequence for the garden?

- (i)
- (ii)
- (iii)
- (iv)
- (v)
- (vi)
- (vii)
- (viii)

At what stage is the garden now?

6. (a) When was the land cleared from fallow?

(b) When was yar planted (If at all)

(c) When was coffee planted?

(d) When was banana planted (If at all)

(e) When were other food crops planted?

7. From where do you get your coffee seeds or seedlings:

DPI

Seedling bed

From under
coffee

Other

8. Does your coffee in this garden have any pests or diseases?

Yes

No

If yes, which ones?

9. (a) Has a didiman visited you:

YES

NO.

(b) If so, what was the purpose of the visit.

(c) For which of the following subjects do you know the corresponding DPI recommendation?

Multiple stems

Pruning

Shade

Harvesting

Weeding

PART B: MEASUREMENTS AND OBSERVATIONS

10. Altitude of garden metres
(Use an altimeter or look at a map)

11. Any special features of the garden and the surrounding countryside? (for example, forest/grasslands, near river, flat or hillside land).

12. Name of the garden

13. Sketch of the garden - marketing in the borders; the directions to the various villages/clan groups and the approximate lay - out of the crops grown.

↑
NORTH

14. What is the slope of the garden?

Flat

Gentle

Steep

15. Soil type and texture

Approximate depth of top soil

16. Drains:

Present

Absent

17. Are there fences present (enclosing the coffee completely)?

YES

NO

18. General description:-

(a) Crops Present in whole gardens:-

	Dominant	Less Dominant	Subsidiary
With Coffee			
			
			
			

What other crops are present in the garden (separate from the coffee)?

.....

- (b) Shade crops - list the crops giving shade to coffee in order of "dominance" of the crop (that is, the more frequent ones giving the most shade first)

1st
 2nd
 3rd
 4th
 5th
 6th

19. Pruning:-

Multi-stem

Stumped

Single-stem

Capped

None

20. (a) Are the coffee trees evenly spaced:

Yes

No

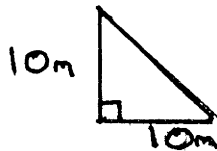
If yes:-

(b) What is the average planting distance?

m.

21. Now locate a right-angled triangle of sides 10m.

This is:



(a) Number of Coffee trees in triangle:

Number of "Missing trees", in triangle:

TOTAL:

(b) Number of 'shade' trees in triangle:

TYPE	NUMBER
(i)	
(ii)	
(iii)	
(iv)	

22. What is the appearance of the garden as a whole (particularly the coffee)?

Excellent		Very Good	
Good		Poor	
Very poor			

23. Any comments about the garden - for example , further explanation of points mentioned above.

24. Number of coffee trees by age (use the red, green and yellow labels provided to help you count them).

Labels	Bearing (Red labels)	Immature (Green labels)	Senile (Yellow Labels)	Total
<u>Finish</u> Number				
<u>Start</u> Number				
Difference = <u>Number of</u> <u>trees</u>				

Note: Start Number = Number of next label in the particular box before the garden has been surveyed.

Finish Number = Number of next label in the particular box after the garden has been surveyed.

25. Number of coffee trees by pests and diseases -

Please 'tally' the trees as you go round the garden (one pest/disease per tree) and also use the white labels to identify those trees which have pests or diseases.

(a) Pest/disease	Tally	Total
Ring Borer		
Green Scale		
Thread Blight		
Pink Disease		
Others (please name)		

(b) White label finish number
(for trees having pest/disease

White label start number

Difference (= Number of trees)

(c) Number of "Missing" trees:

Tally:

Total:

2

APPENDIX B

List of Villages visited in the Main Survey

WESTERN HIGHLANDS PROVINCE

Hagen North District:

<u>Village:</u>	<u>No. of Growers:</u>	<u>Village:</u>	<u>No. of Growers:</u>
Ambuga	3	Mati	5
Epilga	3	Miti	2
Gumanch	1	Mondayande	2
Imbringa	1	Munump	2
Keitebeia	4	Murip	3
Ketip	2	Negil	10
Kiliga	5	Nunga No.2	4
Kinjibi	6	Pataka	8
Kotna	3	Ruti	2
Kumasini	5	Tegone	1
Kuiyalokono	1	Timbi	2
Kulimbu	2	Tronbau	1
Kun	1	Werorung	1
Kundoum	1	Wotaporang	2
Laiyakama	3		
Lumusa	7		
Mabolga	1	<u>31 villages</u>	<u>94</u>

APPENDIX B cont'd

<u>Village:</u>	<u>No. of Growers:</u>	<u>Village:</u>	<u>No. of Growers</u>
Dolba/Bolba	5	Koskala	7
Kabalku	3	Kugmer	4
Kamang	3	Kurumul	2
Kerdu	5	Nyudae-Tsers	4
Kikip	6	Ouilt	2
Kupung	3	Tombil	5
<u>50</u> growers for <u>12</u> villages			

Hagen South District:

<u>Village:</u>	<u>No. of Growers:</u>	<u>Village:</u>	<u>No. of Growers</u>
Anaea	1	Kultumb	2
Ebulga	4	Kilika	2
Katpeng	4	Muglka	1
Koglumul	3	Pondpond	4
Koglpugl	1	Rapila	1
Kogltep	2	Rumb	2
Koim	2	Tepolga	1
Koltem	3	Waipip	6
<u>39</u> growers for <u>16</u> villages			

Tombul District:

<u>Village:</u>	<u>No. of Growers:</u>
Keramong	<u>2</u>

APPENDIX B cont'd

WESTERN HIGHLANDS PROVINCE SUMMARY:

<u>District:</u>	<u>No. of Villages:</u>	<u>Number of Growers:</u>
Hagen North	31	94
Minji	12	50
Hagen South	16	39
Tambul	1	2
	<u>60</u>	<u>185</u>

SIMBU PROVINCE:

Kundiawa District:

<u>Village:</u>	<u>No. of Growers:</u>	<u>Village:</u>	<u>No. of Growers:</u>
Angil	1	Kou	4
Bindekombugo	1	Kurumegl	4
Bongulisgu	1	Mai	5
Dumna	4	Mindima	2
Gainba	1	Mogl(Kakae)	8
Gigemino	1	Munuma	3
Gurye	2	Niglguma	5
Irmul	1	Ombunakru	1
Kagai	1	Pari	5
Kingub	1	Waiye	1
Konkama	1	Wandiu	2

55 growers for 22 villages

APPENDIX B cont'd

Sina Sina District:

<u>Village:</u>	<u>No. of Growers:</u>	<u>Village:</u>	<u>No. of Growers:</u>
Aregol	2	Kamatai	2
Dumun	7	Kage	5
Emai	16	Mu	1
Gui	1	Ninemil	1
Kagugle	6	Yobakolgul	6

47 growers for 10 villages

Gembogl District:

<u>Village:</u>	<u>No. of Growers:</u>	<u>Village:</u>	<u>No. of Growers:</u>
Bogiagi	3	Talpakul	4
Boromil	2	Uleae	2
Minima	1	Yari	2
Mogiage	1	Yombai	4
Oninime	1		

20 growers for 9 villages

Karimui District:

<u>Village:</u>	<u>No. of Growers:</u>	<u>Village:</u>	<u>No. of Growers:</u>
Hwaiyo	6	Kolibari	5
Moiyo	7	Naiyo	4

22 growers for 4 villages

Chuave District:

<u>Village:</u>	<u>No. of Growers:</u>	<u>Village:</u>	<u>No. of Growers:</u>
Keu	4	Namer-Koam	4
Kilopu	3	Pila	4
Kirowari	2	Togoma	4
Kiruar	2		

23 growers for 7 villages

APPENDIX B cont'd

Kerowagi District:

<u>Village:</u>	<u>No. of Growers:</u>	<u>Village:</u>	<u>No. of Growers:</u>
Agagui	2	Kewamuk	1
Amdi	1	Kigamugo	2
Awage	5	Kombuglkande	5
Angangoi	2	Konbi	1
Binegl	1	Kondan	2
Bundunwagl	3	Kunabau	1
Demaige	3	Kuragl	1
Duakunange	1	Kurubawagl	1
Gagl	1	Kurumugl	2
Gogme	1	Mondudua	2
Gokme	2	Mondomina	1
Gogmogl	3	Nek	1
Gonmonbuno	1	NonBowogl	2
Gurumugl	4	Pugar	2
Kambang	2	Singe	2
Kanbil	1	Thoupene	2
Keidene	5	Woker	2
Kewamugl	3		

71 growers for 35 villages

Simbu Province Summary:

<u>District:</u>	<u>No. of Villages:</u>	<u>No. of Growers</u>
Kundiawa	22	55
Sina Sina	10	47
Gembogl	14	26
Gumine	9	20
Karimui	4	22
Chuave	7	23
Kerowagi	<u>35</u>	<u>71</u>
	<u>101</u>	<u>264</u>

RECORDER	PROV.	DIST.	VILLAGE	AGE	MALE ADULTS	MALE CHILDREN	MALE ADULTS	MALE CHILDREN	TOTAL H/H SIZE	FOOD GDNS	COFFEE GDNS								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CROP SEQUENCE																			
COFFEE/FOOD GDNS	OTHER	TOTAL GARDENS	PHV	STORE	COFFEE OTHER	COFFEE	COIN.	OTHER CASH AG.	OTHER CASH NON-AG.	CHURCH	MAG.	UNDER COFFEE	OTHER	PEST/DIS	WHICH ONES	DIAMETER	PURPOSE	N/S	
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
FROM PANON	YAR	PLANTED	COFFEE PLANTED	BANANA PLANTED	FOOD CROPS PLANTED	DPI	SEED BED	SOIL TYPE	STEEP	DEPTH	DOAMS	FENCES	DOH.	LESS DOH.	SUB.	OTHER			
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
PRUNING	SHADE	HARV.	WEED	ALT. T. J. D. E	FLAT	GENUS	STEEP	SOIL TYPE	DEPTH	DOAMS	FENCES	DOH.	LESS DOH.	SUB.	OTHER				
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
SHADE CROPS																			
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
IMMATURE																			
V.G	Good	Poor	N.Poor	BEARING	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115
TOTAL																			
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
RING BORER																			
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136				
TOTAL "MISSING" TREES																			

APPENDIX D

COFFEE FARMING SYSTEMS RESEARCH
FOLLOW-UP SURVEY, WESTERN HIGHLANDS.

RECORDER		DATE	
DISTRICT		VILLAGE	
GROWER		CLAN	

PLEASE TICK THE APPROPRIATE BOXES:-

1. Are questions 1 and 2 on the original questionnaire still correct?

YES

☐

NO

☐

Comments:

(if not correct, what are the changes?)

2. Numbers of Gardens:

How many gardens does the grower:-

	<u>OWN by himself:</u>	<u>SHARE with others</u>	<u>TOTAL</u>
Food	☐	☐	☐
Sole Coffee	☐	☐	☐
Coffee/Food	☐	☐	☐
Other	☐	☐	☐
TOTAL	☐	☐	☐

Comments:

3. (a) Does the grower own a PMV?

Yes

☐

No

☐

Does the grower own a Trade Store?

Yes

☐

No

☐

(b) What are the grower's other main activities other than growing coffee? (for example PMV Owner/driver, store owner, magistrate, church pastor, etc).

1st.....

2nd.....

3rd.....

4. (a) When did a didiman last visit the grower?

Last week

☐

2 to 3 years

☐

Last month

☐

Longer

☐

Last year

☐

Never

☐

(b) How many ^{times} did a didimen visit in the last 12 months?

☐

(c) Why did he visit?

5. Now go to the SAME garden as was surveyed before, and examine the MAIN type of pruning, (for example, multi-stem, single-stem).

	<u>Main Type</u>	<u>Percentage of trees</u> <u>pruned this way</u> <u>(estimate).</u>
(1)		
(2)		
(3)		

General Comments:

COFFEE FARMING SYSTEM SURVEY - PRELIMINARY RESULTS

WESTERN HIGHLANDS

DISTRICT	No. of Vill. vis.	No. of growers surv.	Per grower:			AVERAGES										Per Coffee Garden:									
			Age of grower	Total H/H size	No. of Gardens F C	YEAR		From Fallow	Coffee planted	Banana Planted	Food Crops planted	Recommendations					No. of Trees								
						MS	P					S	H	W	% of growers "aware"										
															BE	IM	SE	TOTAL	% DIS						
Hagen North	31	94	35	6	3	3	1	1967	1968	1968	1967	1968	1968	1967	55	74	68	77	87	198	34	6	238	12	
Minj *	12	50	37	7	3	2	1	1964	1965	1965	1964	1965	1964	1964	58	100	95	84	100	550	73	83	106	60	
Tambul	1	2	50	9	3	5	1	1962	1963	1963	1962	-	1964	1964	-	-	50	-	50	105	2	59	176	20	
Hagen South	16	39	33	5	3	2	1	1963	1967	1967	1963	1967	1967	1966	44	31	36	33	59	132	14	39	184	17	
W.H. Province	60	185	35	6	3	2	1	1955	1967	1967	1955	1967	1967	1966	53	71	69	59	84	278	40	34	352	38	

KEY: F - Food Coffee C - Pure Coffee F/C - Food/Coffee H/H - Household

MS - Multiple Stem P - Pruning S - Shade

W - Weeding H - Harvesting

BE - Bearing Im - Immature Se - Senile

Dis - Diseased

• See: Note

COFFEE FARMING SYSTEMS SURVEY - PRELIMINARY RESULTS

SIMBU PROVINCE

DISTRICT	Per grower:			Per Coffee garden:										No. of Trees			%					
	No. of Vill. vist.	No. of growers surv.	Age of grower size	Total H/H	No of gardens		From Fallow	YEAR Coffee Planted	Banana Planted	Food Crops Planted	Recommendations: % of growers "aware"				BE	IM		SE	TOTAL	DIS		
					F	C					F/C	MS	P	S							H	W
KUNDIAWA	22	55	48	7	3	2	1	1950	1952	1967	1965	67	91	60	35	80	82	69	24	175	9	
SINASINA	10	47	38	5	2	2	-	1960	1962	1959	1961	43	45	68	89	55	100	3	19	122	10	
GENBOGL*	14	26	45	5	2	1	1	1951	1967	1970	1968	50	50	50	50	50	230	39	38	307	27	
GUMINE	9	20	38	7	3	2	1	1954	1956	1975	1976	50	70	90	50	90	155	64	27	246	2	
KARIMUI	4	22	47	8	2	2	-	1955	1966	1966	1965	41	68	71	68	77	67	26	23	116	23	
CHUAVE	7	23	40	5	3	3	-	1957	1959	1959	1964	52	57	70	39	39	78	29	43	150	14	
KEROWAGI	37	71	39	5	3	2	1	1953	1966	1972	1964	56	82	68	54	89	62	31	11	104	22	
SIMBU PROVINCE	101	264	40	6	3	2	1	1951	1964	1970	1965	52	67	65	54	70	94	37	22	153	15	

For Key - See previous table

* See: Note

APPENDIX: E (cont)

NOTES:

(a) For the Minj District in Western Highlands there were three gardens of between 4,000 and 5,000 trees and one of about 1,000 trees - and if these are excluded from the analysis then the average number of trees per garden for Minj District become:-

295 Bearing

41 Immature

61 Senile

397 of which 14% were diseased.

(quite a change from the results presented)

(b) Similarly for the Gembogl District in Simbu, there was one garden of about 3,000 trees and if this is excluded the average number of trees per garden for Gembogl District become:-

134 Bearing

28 Immature

38 Senile

200 of which 39% were diseased

A P P E N D I X : F

RESULTS OF SURVEY - USING COMPUTER ANALYSIS AND EXTRA
MANUAL CALCULATIONS

TABLE 1:	GROWER CHARACTERISTICS
TABLE 2:	OTHER ACTIVITIES
TABLE 3:	GARDENS PER GROWER
TABLE 4:	CROP SEQUENCE
TABLE 5:	DATE COFFEE FIRST PLANTED
TABLE 6:	INCIDENCE OF DOMINANCE OF OTHER CROPS (PLANTED WITH COFFEE)
TABLE 7:	TREE NUMBER DISTRIBUTION
TABLE 8:	A: NUMBERS BY STATE OF TREES PER GARDEN B: AREA AND DENSITY OF GARDENS
TABLE 9:	PERCENTAGES OF TREES AFFECTED BY DISEASES

APPENDIX: F

RESULTS OF SURVEY - USING COMPUTER ANALYSIS AND EXTRA

MANUAL CALCULATIONS

TABLE 1: GROWER CHARACTERISTICS

	<u>Western Highlands</u>	<u>Simbu</u>	<u>Average</u>
Age of			
Grower	<u>35.5</u>	<u>41.9</u>	<u>39.3</u>
<u>Household Size:</u>			
Adults-male	1.6	2.0	1.9
-female	1.6	1.5	1.5
Children-male	1.4	1.4	1.4
-female	<u>1.2</u>	<u>1.0</u>	<u>1.1</u>
	5.8	5.9	5.9

TABLE 2: OTHER ACTIVITIES

	<u>Percentages of Respondents</u>		
	<u>Western Highlands</u>	<u>Simbu</u>	<u>Average</u>
P.M.V	17.6	3.3	9.0
Trade Store	34.2	15.2	23.0
Coffee Buyer	12.9	4.1	7.8
Government	12.4	9.1	10.4
Other Agriculture	26.5	29.6	28.3
Other-Non Agriculture	19.4	15.2	17.0
Church	31.8	19.3	24.5
Magistrate	7.1	6.2	6.5

APPENDIX: F (cont)

TABLE 3: GARDENS PER GROWER

	<u>Sale Food</u> <u>Gardens</u>	<u>Sale Coffee</u> <u>Gardens</u>	<u>Mixed Food/</u> <u>Coffee gardens</u>	<u>Other</u>	<u>Total</u>
<u>Western Highlands:</u>					
Hagen North	2.7	2.3	0.7	0.1	5.8
Minj	2.5	2.0	1.0	0.5	6.0
Tambul	3.0	4.5	1.0	0.0	8.5
Hagen South	2.3	2.4	0.1	0.2	5.0
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u>Average per</u> <u>Province)</u>	2.6	2.3	0.6	0.2	5.7
NOTE: Tambul- only <u>two</u> respondents					
<u>SIMBU:</u>					
Kundiawa	2.6	2.1	0.7	0.1	5.5
Sina Sina	2.4	2.3	0.2	0.0	4.9
Gembogl	2.4	1.3	1.1	0.0	4.8
Gumine	2.6	1.7	1.0	0.0	5.3
Karimui	1.6	2.4	0.2	0.7	5.3
Oruave	3.2	2.8	0.4	0.1	6.5
Kerowagi	2.7	1.7	1.0	0.2	5.6
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u>Average per</u> <u>Province)</u>	2.5	2.0	0.7	0.2	5.4

TABLE 4:

CROP SEQUENCE

Number of 'Incidences' of Particular Sequence growth in
the Garden Survey

WESTERN HIGHLANDS:

	<u>Sequence 1</u>	<u>Sequence 2</u>	<u>Sequence 3</u>	<u>Sequence 4</u>	<u>Other</u>
Hagen North(94)	46	6	18	6	18
Minj(50)	7	4	15	-	24
Tambul(2)	1	-	-	-	1
Hagen South(39)	20	5	3	-	11
<u>Total</u>	<u>74</u>	<u>15</u>	<u>36</u>	<u>6</u>	<u>54</u>
	40%	9%	19%	3%	29%

SIMBU:

Kundiawa(45)	30	9	10	1	5
Sina Sina(47)	23	1	9	11	3
Gembogl (17)	10	5	-	-	2
Gumine(20)	6	1	1	-	12
Kerimui(22)	18	2	-	1	1
Chuave(23)	7	1	1	2	12
Kerowagi(69)	35	13	12	2	7
<u>Total</u>	<u>129</u>	<u>32</u>	<u>33</u>	<u>17</u>	<u>42</u>
	51%	12%	13%	7%	17%

KEY:

Sequence 1: Food - Coffee

Sequence 2: Food - Food/Coffee

Sequence 3: Food - Food/Coffee - Coffee

Sequence 4: Food - Bush - Coffee

Other: Sequences not stating with "Food"

(): Total number of respondents for each District

TABLE 5:

DATE COFFEE FIRST PLANTED

Number of gardens coffee first planted, by date

WESTERN HIGHLANDS:

	<u>Before 1951</u>	<u>1951/60</u>	<u>61/65</u>	<u>66/70</u>	<u>71/75</u>	<u>76/80</u>
Hagen North(93)	1	7	22	26	23	14
Minj (50)	2	14	11	14	2	7
Tambul(2)	-	1	-	1	-	-
Hagen South(39)	<u>2</u>	<u>6</u>	<u>11</u>	<u>10</u>	<u>5</u>	<u>5</u>
<u>Total:</u>	<u>5</u>	<u>28</u>	<u>44</u>	<u>51</u>	<u>30</u>	<u>26</u>
	3%	15%	24%	28%	16%	14%

SIMBU:

Kundiawa(42)	2	21	6	5	4	4
Sina Sina(46)	-	12	28	5	-	1
Gembogl(25)	2	5	2	6	6	4
Gumine (20)	1	3	6	4	4	2
Karimui(17)	-	4	5	2	6	-
Chuave(23)	2	13	5	2	-	1
Kerowagi(56)	<u>4</u>	<u>7</u>	<u>9</u>	<u>24</u>	<u>7</u>	<u>5</u>
<u>Total:</u>	11	75	61	48	27	17
	5%	31%	26%	20%	11%	7%

Note: This question was not completed for all respondents.

The number in brackets, (), is the total number of respondents for this question for each District

TABLE 6:

INCIDENCE OF DOMINANCE OF OTHER CROPS (PLANTED WITH COFFEE)

- note for only the major crops mentioned specifically

<u>DISTRICT</u>	<u>TOTAL</u>	<u>DOMINANT</u>			<u>LESS DOMINANT</u>			<u>SUBSIDIARY</u>		
		Banana	Taro	Yar	Banana	Pitpit	Sugar	Banana	Pandanus	Taro
<u>Western Highlands</u>										
Hagen North	94	31	8	8	8	2	2	6	2	2
Minj	50	16	-	11	9	-	7	8	7	5
Tambul	2	-	-	-	-	-	-	-	-	-
Hagen South	39	11	-	9	7	-	-	-	1	2
<u>Total</u>	<u>185</u>	<u>58</u> 31%	<u>8</u> 41%	<u>28</u> 15%	<u>24</u> 13%	<u>2</u> 1%	<u>9</u> 5%	<u>14</u> 8%	<u>10</u> 5%	<u>9</u> 5%
<u>Simbu::</u>										
Kundiawa	55	14	1	23	6	2	2	4	1	4
Sina Sina	47	8	2	2	2	-	2	-	-	-
Gembogl	26	2	2	-	4	-	1	5	2	1
Gumine	20	4	1	1	3	1	-	-	-	1
Karimuli	22	3	-	8	1	1	-	2	-	-
Chuave	23	2	-	1	1	-	-	1	-	-
Kerowagi	71	9	2	-	8	-	2	7	1	2
<u>Total:</u>	<u>264</u>	<u>42</u> 16%	<u>8</u> 3%	<u>35</u> 13%	<u>25</u> 9%	<u>4</u> 2%	<u>7</u> 3%	<u>19</u> 7%	<u>4</u> 2%	<u>8</u> 3%

NOTE: This question was not answered on all forms (only about 50%)

TABLE 7:

TREE NUMBER DISTRIBUTION

<u>Number of Trees</u>	<u>Number of Respondents</u>	<u>Percentage</u>
Less than 100	134	32.4%
100 to 199	136	32.9
200 to 299	63	15.2
300 to 399	43	10.4
400 to 499	14	3.4
500 to 599	6	1.6
600 to 699	6	1.6
700 to 799	1	0.2
800 to 899	2	0.4
900 to 999	1	0.2
Over 1000	7	1.7
	<u>413*</u>	<u>100.0</u>

* The "count" was not carried out for all respondents

TABLE 8A:

NUMBERS, BY STATE, OF TREES PER GARDENS:-

WESTERN HIGHLANDS:

	<u>Bearing</u>	<u>Immature</u>	<u>Senile</u>	<u>Total</u>
Hagen North	196 83%	34 14%	6 3%	236
Minj	239 77%	33 11%	38 12%	310
Tambul	105 59%	2 1%	70 40%	177
Hagen South	135 75%	17 9%	29 16%	181
Average (per Prov)	193 79%	30 12%	20 9%	243

SIMBU:

Kundiawa	80 49%	60 37%	23 14%	163
Sina Sina	325 15%	2 1%	14 4%	342
Gembogl	130 63%	39 19%	38 18%	207
Gumine	140 60%	67 29%	27 11%	234
Karimui	67 58%	26 22%	23 20%	116
Chuave	83 56%	20 14%	44 30%	147
Kerowagi	60 59%	31 30%	11 11%	102
Average (per prov.)	127 69%	34 19%	22 12%	183

NOTICE: Results slightly different from Appendix E due probably to computational errors; in particular for Sina Sina District

TABLE 8B:

AREA AND DENSITY OF GARDENS

WESTERN HIGHLANDS:

	<u>Area:</u> (sq metres)	<u>Number of Trees:</u>	<u>Density:</u> (trees/he.)
Hagen North	733.51	236	3.217
Minj	1668.17	310	1.858
Tambul	621.00	177	2.850
Hagen South	<u>517.00</u>	<u>181</u>	<u>3.501</u>
<u>Overall for Prov.</u>	956.87	243	2.540

SIMBU:

Kundiawa	578.28	163	2.819
Sina Sina	332.55	342	10.284
Gembogl	530.65	207	3.901
Gumine	466.25	234	5.019
Karimui	269.64	116	4.302
Chuave	493.50	147	2.979
Kerowagi	<u>279.88</u>	<u>102</u>	<u>3.644</u>
<u>Overall for</u>	464.36	183	3.941

Province

TABLE 9:

PERCENTAGES OF TREES AFFECTED BY DISEASES

Western Highlands:

	<u>Ring Borer</u>	<u>Green Scale</u>	<u>Pink Disease</u>	<u>Other Disease</u>	<u>Weighted Average</u>
Hagen North	4.1	1.6	8.6	9.1	5.0
Minj	8.9	3.6	16.7	7.3	9.1
Tambul	1.0	8.0	17.5	8.0	8.6
Hagen South	2.7	1.7	14.5	8.9	6.9
Average (for Province)	<u>4.8</u>	<u>2.1</u>	<u>11.6</u>	<u>8.6</u>	<u>7.6</u>

Simbu:

Kundiawa	3.8	2.2	7.2	0.6	3.5
Sina Sina	0.3	0.3	8.8	2.6	3.0
Gembogl	2.2	12.4	25.1	21.5	15.3
Gumine	0.4	0.8	5.6	2.3	2.3
Kerimari	5.9	5.1	8.7	1.7	5.4
Chuave	2.9	0.8	13.1	3.1	4.9
Kerowagi	4.3	1.4	8.3	7.7	5.4
Average (for Province)	<u>3.1</u>	<u>2.8</u>	<u>10.2</u>	<u>5.6</u>	<u>10.1</u>

