

SUSTAINING PRODUCTION AND LIVELIHOODS AMONG OIL PALM SMALLHOLDERS

A Socio-Economic Study of the Bialla Smallholder Sector

Gina Koczberski and George N. Curry
Department of Social Sciences
Curtin University of Technology
GPO Box U1987
Perth, W.A. 6845

g.koczberski@exchange.curtin.edu.au
g.curry@curtin.edu.au

May, 2003.

The research was a collaborative project between the Australian National University (Professor Katherine Gibson, Department of Human Geography), Curtin University of Technology and Papua New Guinea Oil Palm Association (Ian Orrell). Research funding was provided by the Australian Centre for Agricultural Research (ACIAR).

This work is copyright. Apart from those uses which may be permitted under the *Copyright Act 1968*, as amended, no part may be reproduced by any process without written permission from the authors.

ISBN 0-9750943-0-0

Title: Sustaining Production and Livelihoods Among Oil Palm Smallholders: a Socio-Economic Study of the Bialla Smallholder Sector

Author: Koczberski, Gina; Curry, George

Date of Publication: 01 May 2003

Publisher: Research Unit for the Study of Societies in Change, Curtin University of Technology, Perth, Western Australia.

Printed by: Daytone Printing Pty Ltd.



ACKNOWLEDGEMENTS

Special thanks to the Bialla smallholders and representatives of the Bialla Oil Palm Growers Association for participating in the project. We also wish to acknowledge OPIC-Bialla for their support and assistance during fieldwork. In particular we wish to thank Alu Vegoa, Steven Kamis and the OPIC extension officers and area managers who participated in the initial research workshop, and assisted the research team with smallholder surveys and interviews. We express our gratitude to the General Manager of HOPL, David Mather for his support and interest in the study and to Francis Manuka, Luke Makissa and Col Campbell for their insights into the smallholder sector.

Research and field assistance were provided by Norma Konimor and Pauline Hore from the Papua New Guinea Oil Palm Research Association (PNGOPRA). We also acknowledge Dr Paul Nelson (Senior agronomist at PNGOPRA) for input on fertiliser, and Thomas Betitus (PNGPOPRA) for helpful discussions of the smallholder sector.

CONTENTS

Acknowledgements	iv
List of Tables	viii
List of Figures	ix
List of Boxes	x
List of Plates	xi
List of Appendices	xii
List of Abbreviations	xiii

CHAPTER ONE

INTRODUCTION.....	1
Project Background.....	1
Research Objectives At Bialla	2
Structure of the Report.....	3
Endnotes.....	5

CHAPTER TWO

THE BIALLA OIL PALM SCHEME	6
Bialla Scheme	6
Hargy Oil Palm Ltd.....	8
Smallholders	12
OPIC	14
Endnotes.....	18

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY	19
Research Objectives.....	19
Formulation of Research Objectives.....	19
Research Design.....	23
Smallholder Survey.....	25
Interviews.....	25
Community Meeting	27

Secondary Data	27
Endnotes.....	28
CHAPTER FOUR	
SMALLHOLDER LIVELIHOOD STRATEGIES	29
Introduction.....	29
Livelihood Strategies	29
Commodity Production.....	30
Other Income Sources.....	32
Off-farm Employment	35
Population & Income Sources	36
Subsistence Production	37
Customary Economy.....	39
Summary	41
Endnotes.....	43
CHAPTER FIVE	
SMALLHOLDER OIL PALM PRODUCTION: HOUSEHOLD LABOUR	
ISSUES.....	44
Smallholder Production	44
Smallholder Householder Production Units	45
Population and Harvesting.....	50
Impact on Oil Palm	52
Under-Harvesting.....	54
OPIC Late Pickup Survey	55
Post-harvest Survey	56
Household Labour Issues.....	59
Limited Resources of Household Labour	60
Under-Utilisation of Available Labour	61
Minimal Use of Hired Labour.....	63
Summary	65
Endnotes.....	68

CHAPTER SIX

SMALLHOLDER OIL PALM PRODUCTION: AGRONOMIC AND FARM MANAGEMENT ISSUES..... 69

Introduction.....	69
Low Replanting Rates.....	69
Farm Management Practices.....	77
Low Fertiliser Use.....	77
Negative Experiences with the Company.....	78
Growers' Lack of Knowledge of Fertiliser Use and Potential Benefits of Fertiliser Application.....	79
Questionable Economic Benefits of Fertiliser?.....	80
Poor Block Maintenance.....	84
Smallholder Motivation.....	87
Summary.....	90
Endnotes.....	92

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATIONS..... 94

Introduction.....	94
Change and Smallholder Households.....	96
Finding Solutions to Improve Smallholder Production.....	102
Under- Harvesting.....	102
Harvesting Edge-effects.....	102
Labour Supply Issues.....	103
Replanting.....	107
Fertiliser.....	112
Low Levels of Block Maintenance.....	113
Roads.....	114
Endnotes.....	117
REFERENCES.....	118

LIST OF TABLES

2.1	Total FFB production (tonnes) for the Bialla project area between 1997 and 2002.	9
2.2	Bialla Smallholder Production (tonnes) as a share of total HOPL production from 1997 to 2001.	11
2.3	Total FFB (tonnes) sold to NBPOL and HOPL by Bialla smallholders from 1997 to 2002.	11
2.4	Numbers and areas of LSS and VOP blocks in the Bialla scheme in 2002.	13
3.1	Factors identified by OPIC officers to explain high and low production among Bialla smallholders.	21
4.1	Percentages of LSS and VOP blockholders with export cash crops other than oil palm.	31
4.2	Numbers of non-oil palm income sources by mean block population for Bialla and Hoskins LSS schemes.	36
5.1	Bialla smallholder production (tonnes) from 1997 to 2002.	45
5.2	Percentages of Bialla LSS and VOP blocks using different harvesting strategies.	47
5.3	Labour and labour remuneration characteristics by household and harvesting type.	49
5.4	Mean numbers of households per LSS and VOP block at Bialla using different harvesting strategies.	51
5.5	Mean population per block using different harvesting strategies at the Bialla and Hoskins oil palm schemes.	51
5.6	Expected and actual numbers of nets of fruit collected in a harvest pickup round in November 2002 when harvest truck was late.	55
6.1	Hectares replanted from 1999 to 2002.	70
6.2	Net income gain per hectare for Bialla and Hoskins smallholders using different FFB prices and harvesting rates.	83
6.3	Oil palm areas in West New Britain that required chemical treatment for economically significant levels of Sexava infestation in 2001.	86

LIST OF FIGURES

2.1	Oil palm regions in Papua New Guinea.	7
4.1	Non oil palm income sources for LSS smallholders.	33
4.2	Non oil-palm income sources for VOP smallholders.	34
5.1	Per cent of phases fully harvested for Hoskins and Bialla LSS and VOP schemes.	57
5.2	Flow chart of factors contributing to low smallholder productivity.	59
6.1	Year of most recent fertiliser application on the Bialla scheme	78
6.2	Break even FFB price plotted against rate of harvesting for Hoskins (K39.05/bag) and Bialla (K29/bag).	81

LIST OF BOXES

3.1	Socio-agronomic factors affecting smallholder production common to the Bialla, Hoskins and Popondetta Schemes (identified by OPIC Officers).	20
5.1	<i>Wok Bung</i> household production units and oil palm production.	52
5.2	<i>Markim Mun</i> household production units and oil palm production.	53
7.1	Smallholder criteria for assessing new innovations.	95

LIST OF PLATES

4.1	Betel nut sales.	35
6.1	Young palms burnt at Bialla in 2002.	72
6.2	Underplanted palms at Tiaru LSS subdivision.	72

LIST OF APPENDICES

- | | | |
|----|---|-----|
| 1. | Factors identified by OPIC officers to explain high and low production among Hoskins smallholders. | 119 |
| 2. | Factors identified by OPIC officers to explain high and low production among Popondetta smallholders. | 120 |

ABBREVIATIONS

ACIAR	Australian Centre for International Agricultural Research
COPED	Community Oil Palm Estate Development
FFB	Fresh Fruit Bunch
HOPL	Hargy Oil Palms Ltd
ILG	Incorporated Land Group
LPC	Local Planning Committee
LSS	Land Settlement Scheme
MLFS	Mama Lus Frut Scheme
NBPOL	New Britain Palm Oil Limited
OPIC	Oil Palm Industry Corporation
OPRA	Oil Palm Research Association.
PNGDB	Papua New Guinea Development Bank
RDB	Rural Development Bank
VOP	Village Oil Palm
WNB	West New Britain

CHAPTER ONE

INTRODUCTION

Project Background

This study of Bialla smallholders was undertaken in 2002 as the final component of a larger project on smallholder production in Papua New Guinea. Funding was approved by ACIAR in August 1999 for a joint Australian National University, Curtin University of Technology and Papua New Guinea Oil Palm Research Association one-year study to examine the socio-economic constraints on smallholder productivity in Hoskins and Popondetta¹. Smallholder productivity per hectare is much lower than that of the estate plantations, and village oil palm (VOP) productivity is below that of the land settlement schemes (LSS) (except in Popondetta).

The primary aim of the original one-year project was to help improve smallholder oil palm productivity on LSS and VOP blocks. The main objectives of the original project were to:

- gain an understanding of the socio-economic constraints on smallholder production;
- evaluate the Mama Lus Frut Scheme;
- develop strategies for more effective extension interventions;
- make recommendations for change that might result in further increases in smallholder productivity, and
- produce a work manual for extension officers.

The Bialla oil palm scheme was omitted from the original project because at the time, Hargy Oil Palm Limited (HOPL) had withdrawn

financial support for key industry organisations such as OPIC, and their support of the research could not be guaranteed.

At the beginning of 2001 ACIAR extended funding of the project for a further 12 months with the main objective of implementing some of the recommendations of the study (see Koczberski *et al.*, 2001). At the request of the new HOPL General Manager and the Project Manager of OPIC-Bialla, the project objectives were amended to include a baseline socio-economic survey of Bialla smallholders.

**Research
Objectives
At Bialla**

In consultation with senior management of OPIC-Bialla and HOPL, it was agreed that the research objectives would be similar to the 1999/2000 study conducted among Hoskins and Popondetta smallholders. Thus the two main objectives of the study were to:

- gain an understanding of the socio-economic constraints on smallholder production; and
- make recommendations for change that might result in increased smallholder productivity.

Fieldwork was conducted over a five-week period in May/June 2002 by the authors and two OPRA research assistants (Norma Konimor and Pauline Hore). The focus of fieldwork and data collection was smallholders. Drawing principally on interviews, meetings and surveys with smallholders, the study examined the factors operating at the household level that influence oil palm production. We focused on the household in our analysis because it is at the household level where decisions are made regarding production, labour allocation and income distribution.

Structure of the Report

This report identifies some of the main constraints on smallholder production in the Bialla scheme and recommends ways to increase smallholder productivity. The structure and approach of this report follows closely our earlier study of Hoskins and Popondetta smallholders carried out in 2001 (Koczberski *et al.*, 2001). This is to allow some level of comparison between the different smallholder schemes. However, due to the more limited time available for fieldwork in the Bialla area, this report lacks the breadth of analysis conducted in the earlier Hoskins-Popondetta smallholder study.

Chapter 2 provides a background to the Bialla oil palm scheme and Chapter 3 discusses the research design and methods employed in this study. Chapter 4 describes the main livelihood strategies pursued by Bialla smallholders. Bialla smallholders, like Hoskins and Popondetta smallholders, are pursuing a range of livelihood strategies that are influenced by demographic factors, resource access, economic and social pressures and customary obligations. Sometimes these livelihood strategies facilitate smallholder productivity while at other times they disrupt oil palm production. In Chapter 5 the discussion moves to consider the range of smallholder household types and how these shape smallholder production strategies through their influence on the supply of labour for block maintenance and oil palm harvesting. It is argued here that certain factors such as payment uncertainty for labour and social conflict act to constrain the supply of labour which results in much under-utilised labour and hence lost production and lower productivity.

Chapter 6 discusses broader agronomic and farm management practices affecting smallholder productivity such as the low propensity to replant on the older subdivisions, the reluctance of smallholders to purchase fertiliser, and the factors influencing smallholder motivation and commitment to oil palm. Finally,

Chapter 7 draws out the main conclusions of the study and makes some recommendations to improve smallholder productivity and incomes.

While the report is largely concerned with the Bialla scheme (with comparisons with other oil palm regions of PNG), many sections of the report are relevant to the other oil palm project areas in PNG. For example, household labour issues and under-harvesting discussed in Chapter 5, and the sections in Chapter 6 on smallholder fertiliser use, replanting, and transport schedules and roads have relevance for the broader industry in PNG. Further, the recommendations made in Chapter 7 provide possible interventions and ideas for increasing smallholder production in other schemes where household labour issues, poor replanting rates, low fertiliser use and under-harvesting are also constraints on smallholder production.

ENDNOTES

1. Because of the requirement to include both LSS and VOP smallholders in the research, fieldwork was limited to the Hoskins and Popondetta oil palm projects. New Ireland and Milne Bay do not have oil palm LSSs and were therefore unsuitable for investigation in this study.

CHAPTER TWO

THE BIALLA OIL PALM SCHEME

Bialla Scheme The Bialla oil palm project occupies 18,182 hectares of the central and east Nakanai areas of West New Britain, with 12,182 hectares under smallholder oil palm cultivation (OPIC data, n.d.). Oil palm extends over the volcanic slopes and the alluvial plains between the Nakanai mountain ranges and the Bismarck Sea. Natural disasters such as flooding, volcanic activity and extended dry periods have adversely affected production in recent years. To the east, the project borders the Pomio district of East New Britain and to the west adjoins the Hoskins oil palm project (Figure 2.1). Total oil palm production for 2002 was 236,366 tonnes, 54% of which was produced by smallholders.

The Bialla project was established in 1972 following a joint agreement between the government and a Japanese milling company. A disagreement between the government and the company delayed the commencement of the project, and in 1977 a new agreement was signed with SIPEF (Belgium) and Warrens (United Kingdom) (Christensen 1986). A joint government and SIPEF-Warrens venture company, Hargy Oil Palms Ltd (HOPL) was formed and the company partners developed a nucleus estate of oil palm and a processing mill. The government opened alienated land adjacent to the estate for smallholders to plant oil palm and supply fruit to the company mill. In 2002 the government began negotiations to sell its shares in Hargy Oil Palms Ltd. This sale was delayed due to a change of Government in mid 2002 and will now be completed in 2003.

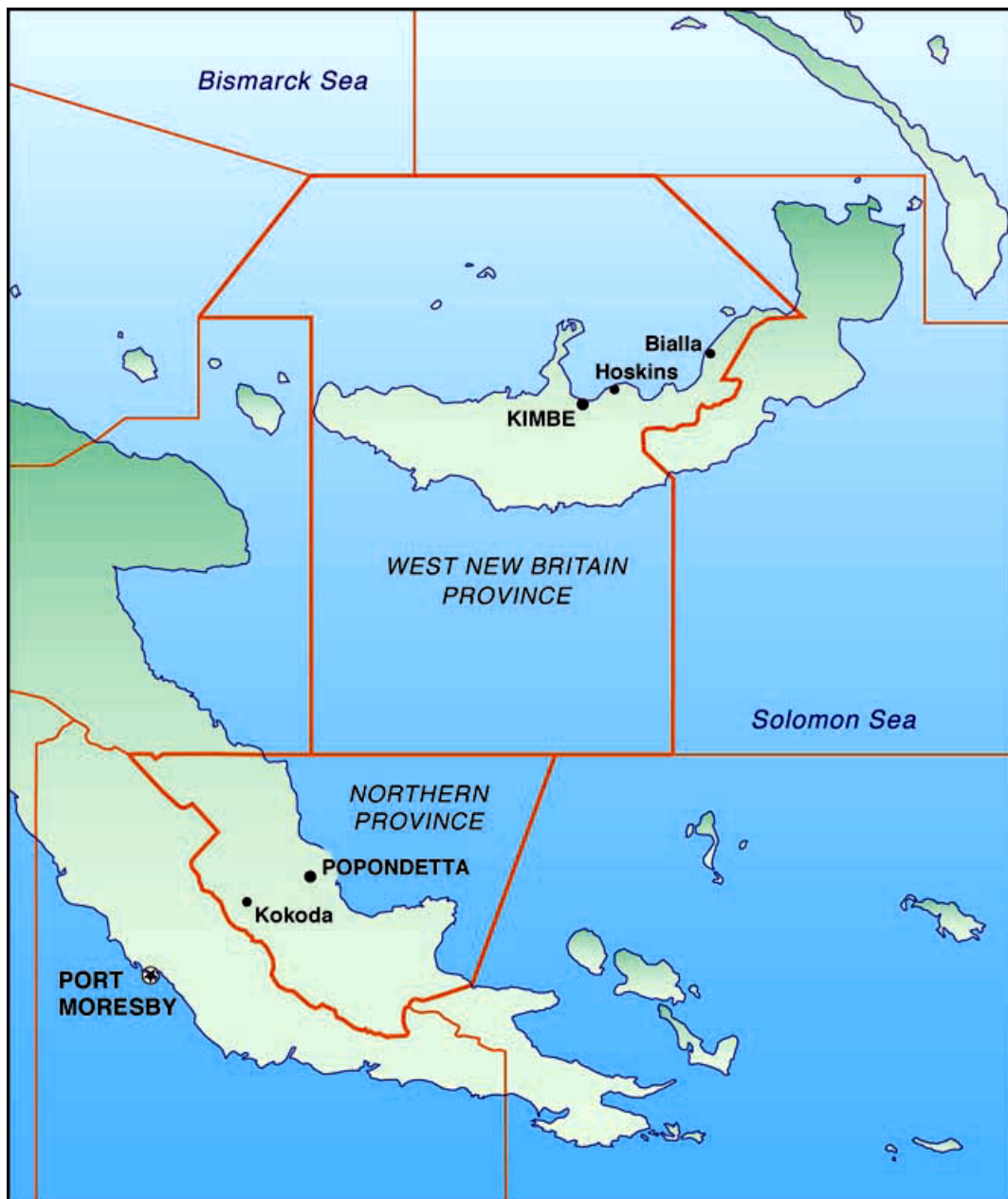


Figure 2.1. Oil palm regions in Papua New Guinea.

The Bialla project area, which includes Central Nakanai, was originally formed to provide fruit to the Hargy mill. However, in 1995 New Britain Palm Oil Limited (NBPOL) began buying fruit from Central Nakanai smallholders. In 2002 NBPOL collected 37,121 tonnes from Central Nakanai growers which accounted for 22% of total smallholder production in the Bialla scheme.

**Hargy Oil
Palm Ltd**

The three key stakeholders in the Bialla project are the nucleus estate company (HOPL), smallholders and the Oil Palm Industry Corporation (OPIC)¹.

HOPL has a total of 5,110 mature hectares in estate production, which in 2002 produced 104,075 tonnes or 20.36 tonnes/hectare.

Over the last decade the company made substantial investments in the Bialla project including:

- expanding plantings at Navo plantations to a total of 3,853 hectares;
- replanting over 2,100 hectares of the original Hargy plantation;
- refurbishing and improving the capacity of the Bialla mill to 45Mt-FFB/hr; and
- constructing a new mill at Navo with a processing capacity of 30Mt-FFB/hr (upgradeable to 45 Mt-FFB/hr).

The Navo mill was commissioned in late October 2002. The upgrading of the original mill together with the new mill at Navo will overcome the inadequate milling capacity that has been a constraint on estate and smallholder production over the last decade.

The plantation yields of 20.36 tonnes per hectare in 2002 reflect the high proportion of young palms in the estates. HOPL undertook an extensive replanting program between 1994 and 2001 (most of which was carried out in 1999), and has recently expanded its Navo plantation.

Over the last five years estate production has steadily increased as palms mature. Table 2.1 shows estate, smallholder and community estate production for the period 1997 to 2002.

Table 2.1. Total FFB production (tonnes) for the Bialla project area between 1997 and 2002.

YEAR	PLANTATION PRODUCTION	SMALHOLDER Production	COMMUNITY ESTATES**	TOTAL FFB PRODUCTION
1997	64,100	59,582	885	124,567
1998	66,276	74,648	739	141,663
1999	61,983	98,964	767	161,714
2000	82,495	117,260	2,470	202,225
2001	92,747	118,080	3,708	214,535
2002	104,075	127,319	4,972	236,366

(Data supplied by HOPL)

* Tonnage for fruit processed at the Hargy Mill. See Table 2.3 for total smallholder production for the Bialla scheme.

** Community estates are holdings of oil palm over 20 hectares which are managed by customary land owners.

With the restrictions and difficulties of alienating further land for estate development, HOPL, since the late 1990s, has encouraged local landowners to form incorporated business groups or incorporated landowning groups (ILGs) to develop and manage large holdings of oil palm, ranging in size from 20 ha to over 600 ha. Most are developed on portions of unused state land. The scheme, known as the Community Oil Palm Estate Development (COPED) model², emerged at around the same time as the Navo mill was being planned. The main feature of the COPED model is that the ‘community’ develops and manages their own oil palm estate with technical and credit support provided by the company. Presently, there are 25 community estates, with three in production. Over the last five years production has been increasing and in 2002 total COPED production reached 4,972 tonnes (Table 2.1). The largest community estate is Gilo with a total area of 639 hectares, 313 hectares of which have been planted. In 2002 the Gilo estate yield was 13 tonnes/hectare, which was lower than the smallholder yield of 13.6 tonnes/hectare for the

same year. Problems with transporting the crop to the mill were the main reason for the low yields.

The community estates provide an alternative model to the lease, lease-back model adopted by other oil palm companies in PNG, whereby the ILG sub-leases registered customary land to the company on a 20 or 40 year lease. In the lease, lease-back model the milling company manages the estate, and the landowning group receives annual land rental fees and monthly royalty payments of 10% of the farmgate price of the harvested oil palm. Under the COPED model, the management and control of the estate remain with the landowning group and the company buys directly from landowners.

Smallholders' contribution to total FFB processed at the HOPL mill is high, and in most years has exceeded 50% of the total FFB processed by the company mill (Table 2.2). The Bialla mill processes the highest ratio of smallholder to company fruit in PNG, and in 2002 smallholders contributed 56% to total HOPL production. Thus, the smallholder sector is much more important for HOPL's palm oil production than for other oil palm companies operating in PNG.

Table 2.2. Bialla Smallholder Production (tonnes) as a share of total HOPL production from 1997 to 2001.

YEAR	TOTAL HOPL FFB PRODUCTION	SMALHOLDER PRODUCTION	SMALLHOLDER SHARE OF TOTAL HOPL PRODUCTION (%)
1997	124,567	60,467	48.5
1998	141,663	75,387	53.2
1999	161,714	99,731	61.7
2000	202,225	119,730	59.2
2001	214,535	121,788	56.8
2002	236,366	127,319	53.8

(Data supplied by HOPL)

* Figures based on smallholder fruit sold to HOPL.

The smallholder proportion would be higher if some Bialla smallholder fruit was not collected and processed by NBPOL's Kapiura mill (Table 2.3). Over the last five years, approximately thirty-two per cent of the total smallholder fruit from the Bialla scheme has been processed by NBPOL.

Table 2.3. Total FFB (tonnes) sold to NBPOL and HOPL by Bialla smallholders from 1997 to 2002.

YEAR	SOLD TO NBPOL	SOLD TO HOPL	TOTAL SMALLHOLDER PRODUCTION
1997	38,707	60,467	99,174
1998	41,280	75,387	116,667
1999	34,060	99,731	133,791
2000	31,629	119,730	151,359
2001	37,100	121,788	158,888
2002	37,922	127,319	165,241

(Data supplied by HOPL and OPIC- Bialla)

Presently, HOPL provides limited credit facilities to smallholders for poisoning, seedlings, tools and fertiliser. To overcome the lack of credit facilities available to smallholders, OPIC has established a

new ‘growers fund’ financed by smallholder contributions (see below). This assists smallholders to purchase tools from the company or local tradestores.

The company’s relationship with smallholders has been strained in recent years and can be attributed to transport and fruit collection related problems, replanting delays (see Chapter 6), limited milling capacity, credit deduction mishaps, and disputes with NBPOL over fruit collection. A change of HOPL management in January 2002 has resulted in many of these problems now being addressed.

Smallholders Smallholder production is located on Land Settlement Schemes (LSS) (state leased land) and on Village Oil Palm schemes (VOPs), and extends over 12,182 hectares. In 2002, Bialla smallholders produced 165,241 tonnes of fruit with an average yield per hectare of 13.6 tonnes. This report identifies some of the main constraints on smallholder.

The land settlement scheme at Bialla is the second oldest oil palm scheme in PNG. It formed part of the colonial administration’s land settlement policies of the 1950s and 1960s whereby the government obtained large tracts of land along the north coast of New Britain for agricultural and economic development (Hulme 1984). Much of this land was considered suitable for the development of oil palm. The first smallholder LSS in the province was developed at nearby Hoskins in 1968 and its perceived success led the administration to establish similar oil palm nucleus estate-smallholder schemes at Bialla and Popondetta (Hulme 1984).

The Bialla LSS followed that of the Hoskins scheme. Leaseholders acquired 99-year leases over land holdings of approximately 6.0-6.5 hectares in size. It was expected that 4 hectares would be planted to oil palm, and the remaining area reserved for food gardens. Leaseholders were provided with loans from the Papua New Guinea

Development Bank (PNGDB) for housing, oil palm seedlings, tools, land rent and to cover living expenses while waiting for the first harvest (Jonas 1972; Hulme 1984). Settlement occurred on the newly developed subdivisions at Wilelo, Tiaru and Balima, and on redeveloped cocoa/coconut blocks at Sale, Sege, Malasi, Uasilau and Selanga. Settler selection on the original subdivisions followed that of the Hoskins scheme with blocks publicly advertised and priority given to applicants from land-short areas of Papua New Guinea. The majority of oil palm blocks on the redeveloped cocoa/coconut subdivisions were occupied by local landowners.

By 1980 attention had turned to establishing VOP holdings and plantings steadily increased throughout the decade. By 1986, 244 VOP blocks had been established (OPIC data). The numbers of LSS and VOP smallholder blocks have increased substantially over the last two decades and there are now 2,052 LSS and 1,409 VOP blocks (Table 2.4).

Table 2.4. Numbers and areas of LSS and VOP blocks in the Bialla scheme in 2002.

SMALLHOLDER	NUMBER OF BLOCKS	HECTARES
LSS	2,194	9,164
VOP	1,290	3,018
TOTAL	3,484	12,182

(Data supplied by OPIC-Bialla)

An ADB loan in 1986 funded a major expansion of LSS and VOP blocks during the late 1980s and early 1990s. Also, in the early 1990s, two new LSS subdivisions, Soi and Kabaiya, were opened for settlement with more than 600 blocks planted within the last ten years.

Settler selection for Soi and Kabaiya differed from earlier LSSs, with priority given to East and West New Britain applicants and the sons of the original oil palm settlers born in West New Britain. The latter has meant that Soi and Kabaiya have strong ties with the Hoskins scheme and the older LSS subdivisions in the Bialla scheme. Soi and Kabaiya visibly differ from the original LSS schemes: physically (better housing and water supplies); demographically (younger and smaller households); and, better farm management practices. Smallholder yields are consistently higher at Soi and Kabaiya than the older LSS subdivisions (A. Vegoa, pers. comm.).

With the opening up of the Soi and Kabaiya subdivisions and the construction of the Navo mill nearby, there has been renewed interest in oil palm by local landowners with both VOP and community estate plantings expanding. For the Bialla scheme as a whole, there is potential for a further 13,000 hectares of smallholder oil palm to be developed (A. Vegoa, pers. comm.). This will be through expansion and infill of VOP areas (mainly in the Central and East Nakanai areas) and Third Phase planting on existing LSS blocks (Vegoa 2002).

Despite similar growing conditions at Bialla and Hoskins, Bialla smallholders have lower yields than Hoskins smallholders but favourable yields when compared with other smallholder oil palm schemes. Over the next five years, OPIC-Bialla aims to increase smallholder yields to 20 tonnes/hectare. Thus, increasing smallholder production and productivity is a major aim of the company and OPIC.

OPIC

Agricultural extension services to smallholders were initially under the management of the Department of Agriculture and Livestock (DAL). In 1992, as part of the government's corporatisation and agricultural reform policies, OPIC was established as a quasi

government agency. OPIC is financed by a smallholder crop levy of K3.50/tonne which is matched by the oil palm companies. International aid funding also provides significant financial support for the organisation.

The central role of OPIC is to provide extension services to smallholders and to:

- increase smallholder productivity;
- promote improved farm management techniques;
- provide advice and education regarding oil palm production methods;
- enhance the well-being of smallholders.

OPIC is also responsible for liaising with government, oil palm companies, grower representatives and other organisations involved in the industry. A Local Planning Committee (LPC) comprising representatives from OPIC, HOPL, the Bialla Oil Palm Growers Association, OPRA and the Rural Development Bank meets monthly to discuss smallholder and OPIC issues and policies.

The capacity of OPIC-Bialla to provide effective extension services to smallholders was curtailed over the five years to mid 2002 due to severe financial constraints. From 1997 to May 2002 HOPL did not match the K3.50 OPIC levy paid by smallholders (paid by all the other milling companies operating in PNG). For instance, in 2000, OPIC's operational expenses were K871,580; yet the organisation raised only K660,570 from smallholder levies and NBPOL's contribution (ADS [PNG], 2001). Funding shortfalls resulted in OPIC reducing its staff to 13 extension officers, which is approximately 50% below expected staffing levels. In 2002 the staff to smallholder ratio was 1:268 (A. Vegoa, pers. comm.). While the extension officer to smallholder ratio has been decreasing at all oil

palm projects in PNG, OPIC-Bialla has been in a particularly difficult situation due to the non-payment of the OPIC levy by HOPL. Following the appointment of a new HOPL General Manager in January 2002, payment of the OPIC levy by the company was renewed in June 2002, and the relationship between the company and OPIC has improved considerably. Both organisations are now working together to improve the quality and effectiveness of OPIC extension services.

A further factor limiting the effectiveness of OPIC is the lack of provincial government funds allocated to roads and social infrastructure in Bialla. Roads and social services such as health facilities have deteriorated over the last five years (S. Kamis, pers. comm.).

Over the past few years OPIC has adopted several initiatives to improve smallholder productivity. The most significant is the 'Mama Loose Fruit' Scheme which began in 1998; by the end of 2002 there were 2,125 women registered in the scheme. In 2001, 23,974 tonnes of loose fruit were harvested, representing approximately 15% of total production.

In 2002 a new 'growers trust fund' was established by OPIC-Bialla. The fund is financed by a smallholder levy of K1 per tonne and is held in a trust account managed by OPIC and HOPL. The fund is administered by a board made up of smallholder representatives and OPIC. HOPL provides some accounting assistance. At August 2002 there was K240,000 in the fund. The fund is a strategy by OPIC to reduce smallholder debt with the company through accumulating smallholder funds in a managed trust fund to be made available for farm management needs. The current priority of the fund is to finance tools and sexava treatment. In the future, as funds accumulate, money may be available for fertiliser, block

development and replanting. The scheme appears popular with smallholders and some would like to see the levy raised. It is possible that the levy may increase in the near future if oil palm prices remain high (A. Vegoa, pers. comm.).

ENDNOTES

1. Although NBPOL buys fruit from Central Nakanai growers it is not included here as a key stakeholder in the Bialla project.
2. A forthcoming report by the authors discusses oil palm mini-estates, including Bialla's COPED model.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

Research Objectives

The main objectives of the Bialla study were to:

- gain an understanding of the socio-economic constraints on smallholder production; and
- make recommendations for change that might result in increased smallholder productivity.

Formulation of Research Objectives

The research, where possible, adopted the methodology employed in the earlier Hoskins and Popondetta study so that comparisons could be made between study sites. Like the Hoskins and Popondetta research, fieldwork at Bialla began with a workshop with OPIC extension officers to draw on their knowledge and understanding of the main factors influencing smallholder production. The main socio-agronomic issues identified by extension officers are presented in Table 3.1, and these formed the basis of discussion and helped formulate the research design.

The workshop also allowed us to assess the similarities and differences amongst the Bialla, Hoskins and Popondetta schemes. This information was necessary to help structure the research design and questions, and to locate Bialla smallholder issues and production constraints into the wider context of smallholder production in PNG.

The workshop discussion raised issues similar to those identified by OPIC officers at Hoskins and Popondetta (Appendices 1 and 2). The

key variables identified in all three oil palm schemes as affecting production are shown in Box 3.1.

BOX 3.1
SOCIO-AGRONOMIC FACTORS AFFECTING SMALLHOLDER PRODUCTION COMMON TO THE BIALLA, HOSKINS AND POPONDETTA SCHEMES. (IDENTIFIED BY OPIC EXTENTION OFFICERS)
<ul style="list-style-type: none">• Physical factors• Agronomic and farm management practices.• Intra-household relations and decision-making.• Household income distribution• Time and cash management skills• Tenure security• Economic necessity to harvest• Level of interest in oil palm harvesting• Company management

Bialla extension officers emphasised the following four important issues. First, smallholders frequently shift between high and low production through time depending on health status, tenure disputes, household or inter-block conflicts and/or other socio-cultural factors such as customary obligations¹.

Table 3.1. Factors identified by OPIC officers to explain high and low production among Bialla smallholders

	HIGH PRODUCTION	LOW PRODUCTION
PHYSICAL FEATURES	Good soils. Good terrain conditions and drainage.	Poor soils (especially a problem when combined with lack of fertilizer application) Poor terrain conditions and poor drainage.
AGRONOMIC AND FARM MANAGEMENT PRACTICES	Regular harvesting Regular and correct use of fertiliser. Well maintained tools regularly available for harvesting. Well maintained block. Readily listens to extension advice. Poison and replants when oil palm is at appropriate age	Irregular and partial harvesting. Fertiliser use poor or irregular. Harvesting tools often unavailable for harvesting or broken and not repaired promptly. Poor block maintenance. Farmer rarely follows extension advice Resists poisoning and replanting block. Old palms on block. Grower tends to harvest only the younger and shorter palms.
LABOUR CHARACTERISTICS	Adequate supply of labour. Health problems rarely disrupt family labour supply. Co-operation of all family members in production.	Labour shortages due to illness, age or family disputes Household absent from block.
INTRA-HOUSEHOLD RELATIONS AND DECISION-MAKING INCOME DISTRIBUTION	Family unity and cohesiveness. All the family benefits from income earned on block. Fair distribution of income. Fair allocation of harvest and income rounds in rotation production strategy. Caretaker blocks – remuneration for labour is reasonable and share of block income fair.	Family conflict. Reluctance to share income. One person controls the money and thus little incentive for other family members to harvest. Family disputes over the distribution of the income Unfair allocation of harvest and income rounds in rotation production system leading to dispute Caretaker blocks – remuneration for labour poor and share of block income unfair.
TIME AND CASH MANAGEMENT SKILLS	Good cash management. Community type distractions limited. Good time management. Limited demands on their time from customary obligations.	Poor cash management. More time spent in the village than working on the block. Labour diverted to gardening or customary obligations.
TENURE SECURITY	Land tenure secure. No family disputes over title of block.	Block inheritance disputes within the family acts as a disincentive as ownership uncertain. Land ownership disputes on CLUA blocks, tenure insecure. Disputes over ownership on caretaker blocks can reduce production
COMMITMENT TO OIL PALM	Farmer lives permanently on the block.	Farmer lives off-block (e.g. in the village) and therefore not present to receive OPIC advice or p up toksave. Commitment limited due to tenure insecurity.
ECONOMIC MOTIVATION	Fall in oil palm prices has only limited impact on production. Customary obligations may increase production in the short-term	Fall in oil palm prices acts as disincentive. Some stop harvesting and maintaining the block.
MILLING COMPANY	Good Management Sufficient milling capacity Smallholder support good – e.g. tool supply, fertilizer, credit	Poor Management Limited milling capacity Smallholder support limited.
INFRASTRUCTURE AND TRANSPORT	Good roads Regular and reliable harvest pick-ups	Poor roads. Irregular and unreliable harvest pick-ups Monthly pick-ups restricts production

Source: data collected from workshop with OPIC officers at Bialla, 15th

Second, intra-household factors are central to understanding block productivity. For example, family cohesion, how labour and payment of labour are organised within and between households on a block, household decision-making processes and gender relations all affect the availability and utilisation of labour for oil palm production.

Third, poor cash and time management can be major impediments to higher production. Poor cash management affects production through causing conflicts over income distribution within and between households, acts as a disincentive to the purchase of farm inputs such as fertiliser and tools, and can result in high debt levels on blocks. Finally, ethnic tensions can have short and long-term impacts on production. At Bialla, long-standing tensions between Highlanders and Sepiks occasionally erupt in violence to cause periodic disruption of oil palm production. Also, like at Hoskins and Popondetta, conflicts between leaseholders and customary landowners at Bialla can serve as disincentives to financial and labour investments in oil palm production.

The workshop discussions with OPIC officers highlighted the following research questions requiring further investigation:

***In what ways do intra-household factors affect labour utilisation in oil palm production?**

***Do the types of smallholder production units identified at Hoskins and Popondetta also apply at Bialla and, if so, how do they impact on oil palm production?**

***How do time and cash management issues affect oil palm production?**

***Are land tenure problems affecting smallholder production?**

Other factors identified by OPIC officers to explain low smallholder production at Bialla included:

- Delayed replanting. Palms more than 20 years old (past the age when they should be replanted) tend to be partially harvested or abandoned by growers.
- The institutional context of the Bialla Scheme. Here reference was made to the management capacity of the milling company and the effectiveness of extension services.
- Infrastructure and transport problems. Poor roads and on-going fruit transport problems were identified as affecting smallholder production and commitment to oil palm.

The study therefore also addressed the following research questions.

- *What factors explain the poor replanting rates by smallholders?**
- *Are constraints on credit facilities limiting smallholder productivity?**
- *What is the nature of the relationship between smallholders and the milling company?**

The above research questions were incorporated into our interviews with smallholders, OPIC extension officers, and company smallholder officers.

Research Design

In the initial stages of fieldwork OPIC officers accompanied the research team to the small holder blocks to help the team establish links with smallholders and create an awareness among smallholders of the study. OPIC also provided transport support throughout the fieldwork period and assisted with arranging community meetings.

All three OPIC Divisions were included in the study, with most of the qualitative data collected from Divisions 2 and 3. Fieldwork was concentrated in the latter Divisions for two reasons. First, most smallholders in Division 1 sell their fruit to NBPOL, and the research was more concerned with those smallholders selling fruit to the Bialla milling company – Hargy Oil Palms. Second, logistical and time constraints made it impossible to spend equal periods in all three divisions.

The research employed a multi-method approach. This was considered most appropriate because the study examined the interaction and links between the various social, economic, demographic and institutional factors affecting smallholder production. Hence, a combination of methods involving semi-structured interviews, household case studies, questionnaire surveys and community group discussions were employed. Secondary data sources were also used.

Further, a mix of qualitative and quantitative techniques was considered preferable to relying solely on a standardised questionnaire where larger numbers of people are surveyed. The latter technique assumes that the researchers already have a detailed understanding of the economic and social situations in the sample population. Where little is known about the everyday lives of a population, qualitative assessments together with formal surveys enable the researcher to develop a more accurate and in-depth picture of the situation of the study population.

Key stakeholder groups that participated in the research included:

1. Smallholders (men and women).
2. HOPL.
3. OPIC.

4. Smallholder representative groups, such as the Bialla Oil Palm Growers Associations, and the Board of Trustees of the Bialla Growers Fund.

Smallholder Survey

Data collection began with a smallholder socio-economic and farm management survey of 100 growers, proportionally representative of the VOP and LSS smallholders in the Bialla scheme (25 VOP and 75 LSS blocks). Smallholders were randomly selected from Divisions 1, 2 and 3.

The survey design was based on the growers' survey conducted in Hoskins and Popondetta in 2000-2001 (Koczberski *et al.*, 2001) to allow comparisons to be made between all three schemes. The survey gathered information on:

- **Planting details (area and year planted).**
- **Ownership status (original leaseholder, deceased estate, caretaker).**
- **Population (number of individuals and families living on block).**
- **Range of income sources.**
- **Labour supply.**
- **Farm management and agronomic practices.**

Interviews

The second primary source of data was formal and semi-formal interviews, mainly with smallholders. The majority of the semi-formal interviews were conducted with smallholders selected for the socio-economic and farm management survey. On completing this survey, smallholders were encouraged to express their own views on oil palm production and productivity and social issues on their blocks. This approach sought insights into what smallholders

themselves felt were the important everyday issues affecting production and/or their lives. It also allowed people to tell their own '*stori*' and uncovered areas that were significant to the needs and interests of smallholders. Some surveyed smallholders were interviewed at a later date. Other smallholders who were not part of the survey approached the research team or OPIC to be interviewed and where possible they were also interviewed. These semi-formal interviews were distinct from, but complementary to the smallholder surveys. The interviews provided in-depth qualitative information on the questions in the smallholder survey relating to:

- household labour and income decision-making;
- factors influencing household and family members' participation in oil palm production;
- additional and/or competing labour and income demands;
- levels of household cohesion and cooperation;
- constraints on oil palm production;
- impacts and perceptions of agricultural extension and company initiatives.

Formal interviews with smallholders were conducted towards the end of the fieldwork period and were used to cross-check and clarify information emerging from the surveys and semi-formal interviews. We randomly selected 33 smallholder households in Wilelo and Balima to follow-up specific research questions relating to the relationship between replanting and under-harvesting, and at Soi and Kabaiya 34 smallholders were randomly selected to gather further information on specific questions relating to labour shortages and under-harvesting. Of the latter, only 24 interviews took place due to vehicle breakdowns.

In all interviews the research team was careful to include women in the discussions. It should be noted that due to time constraints most

smallholder interviews were ‘one-off’ interviews and not ‘repeat’ interviews. Repeat visits allow a level of trust and rapport to develop thereby providing more reliable and detailed information.

Interviews were also conducted with OPIC-Bialla senior managers and extension officers, senior management in HOPL, including the smallholder officer, and the manager of the Rural Development Bank in Bialla. These interviews provided information on corporate policies and management issues relating to smallholders, and helped to cross-check and expand on information supplied by smallholders.

Community Meeting

Four community meetings were held with smallholders (at Matililiu VOP, Wilelo LSS and two meetings at Tiaru LSS). Numbers present varied from four to twelve smallholders, with males outnumbering female participants. The purpose of the meetings was to inform smallholders of the aims of the study and solicit their views on what they identified as the key factors affecting smallholder production and productivity on their blocks and subdivisions. The meetings also provided an opportunity to discuss the research questions arising from the OPIC workshop.

Secondary Data

Smallholder data-bases held by OPIC and HOPL provided data on block production, planting details and debt levels. Reports and other studies on the Bialla scheme were also consulted.

ENDNOTES

1. Customary obligations do not necessarily lead to lower productivity. For some growers, customary obligations drive their involvement in oil palm production, so that, for example, oil palm production can increase when cash is required for customary purposes.

CHAPTER FOUR

SMALLHOLDER LIVELIHOOD STRATEGIES

Introduction The economic, social and demographic characteristics of smallholder oil palm households are becoming more diverse through time, and many smallholders are now pursuing non-oil palm income sources both on and off-block. We use the term livelihood strategies to describe the diverse economic, household and customary activities in which Bialla smallholders are involved. Livelihood strategies can be defined as the range of activities adopted and choices made by smallholders in pursuit of household economic and social security (DFID 1999). Oil palm production is one of several livelihood strategies that smallholders employ to meet their economic and social needs in a changing socio-economic and demographic environment.

This chapter outlines the main livelihood strategies pursued by Bialla smallholders. By focusing on livelihood strategies the chapter reveals the social and economic complexity of smallholder blocks today. This has implications for extension services and for formulating appropriate smallholder interventions. Also, an analysis of social and non-oil palm economic activities that draw on smallholder labour and time helps explain variations in smallholder productivity and commitment to oil palm production.

Livelihood Strategies

The main activities in which Bialla smallholders are engaged include:

- commodity production, in addition to oil palm;
- small business enterprises;

- off-farm employment;
- informal marketing;
- subsistence production (for household consumption and for sale at local markets); and
- customary activities.

For some farmers, the term oil palm smallholder is not entirely appropriate because oil palm production is only a minor part of their lives. For example, for some VOP smallholders, oil palm harvesting may be limited to periods when cash demands are unusually high such as when school fees are due, when a relative requires financial assistance, or a customary payment like a brideprice must be made.

There is an average of 2.49 non-oil palm income sources per LSS block and 3.32 per VOP block at Bialla. The higher economic diversification of VOP blocks is partly explained by customary landowners' greater access to land (see below). The main components of livelihood strategies of Bialla smallholders are outlined below.

Commodity Production

Like Hoskins and Popondetta smallholders, Bialla smallholders have holdings of cash crops other than oil palm (Table 4.1). Bialla VOP smallholders are more likely than LSS smallholders to have other cash crops such as cocoa and coconuts (Table 4.1). Sixty-four per cent of VOP smallholders have access to at least one non-oil palm cash crop, and 14% have two or more types of cash crops in addition to oil palm. This reflects VOP smallholders' greater access to land, their more recent move into oil palm production, and their response to the unstable market conditions of commodity tree crops. Many smallholders have retained their original holdings of cocoa and coconuts by planting oil palm on land that was not previously used for export cash crops.

Table 4.1. Percentages of LSS and VOP blockholders with export cash crops other than oil palm.

OIL PALM SCHEME		COCOA %	COPRA %	COFFEE %	VANILLA %	RUBBER %
BIALLA	LSS	1	4	0	5	0
	VOP	43	14	4	7	0
HOSKINS	VSS	24	10	0	2	0
	VOP	62	66	2	10	0
POPONDETTA	LSS	2	0	4	0	0
	VOP	32	0	25	0	7

(Source: Smallholder Surveys n=300)

VOP smallholders view cash crop diversity as a form of income security against fluctuating commodity prices, and they will adjust their labour and investment inputs into different cash crops according to relative prices. For example, at the time of fieldwork when the price of oil palm was relatively high (K130-K140), many VOP smallholders had withdrawn from copra production because of the depressed copra price, and were relying mostly on oil palm income. The prolonged period of low copra prices led some villagers to take up oil palm production in an attempt to restore their income levels and income security.

With limited access to land, LSS smallholders are restricted to planting only one commodity tree crop – oil palm. The few LSS smallholders (Table 4.1) with cocoa and coconut holdings are local landowners with access to customary land. Vanilla, which requires only a small area of land, is becoming popular among LSS smallholders (5.3% of LSS blocks had planted vanilla by June 2002,

and this proportion is expected to increase). Apart from providing an additional income source, vanilla is attractive to smallholders because it can be cultivated on hilly areas unsuitable for oil palm and requires less labour than oil palm. Further, because it does not require much land, it need not undermine food production on the third phase at the rear of the block. One elderly grower at Balima LSS planted 100 vanilla vines because it enabled him to withdraw from the physically demanding work of oil palm production and ‘hand-over’ the management and harvesting of oil palm to his eldest son.

Other Income Sources

Other non-oil palm incomes pursued by smallholders to maintain household income security and social well-being are shown in Figures 4.1 and 4.2. Small businesses are popular with smallholders, the most common being poultry raising, tradestores and kerosene sales. Poultry businesses are common at both Hoskins and Bialla because they can be established relatively easily and there is a ready market for live chickens. Fresh chickens are often cooked as a form of in-kind payment of harvesting labour or as part payment for hired labour. If the poultry business owner can limit the proportion of sales on credit, then there is potential for profitable returns. One smallholder in Wilelo subdivision purchased his block in October 2000 for K9,500. The capital was raised over three years from his poultry business¹.

Tradestores and kerosene sales are also popular, especially among LSS smallholders, and are more common among Bialla smallholders than at Hoskins. This may be due to fewer large stores in Bialla township than at Kimbe, and the more limited transport between the land settlement subdivisions and town, particularly in the more isolated subdivisions in Division 3. It is also possible that factors like the increased uncertainty of oil palm income at Bialla arising

from poor roads and irregular fruit pickups has induced some growers to diversify their income sources to a greater extent than those at Hoskins.

Betel nut sales are expanding and are an important income source for LSS and VOP smallholders. Although betel nut has been long established as an item for sale at local markets, the nature of betel nut production, marketing and trade is changing.

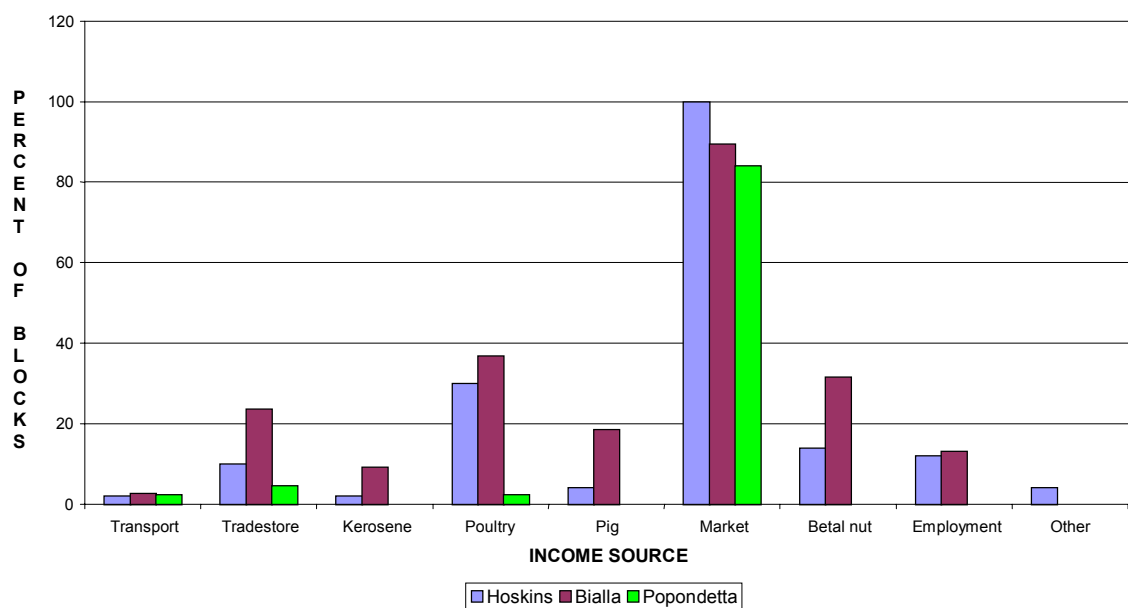


Figure 4.1. Non oil palm income sources for LSS smallholders

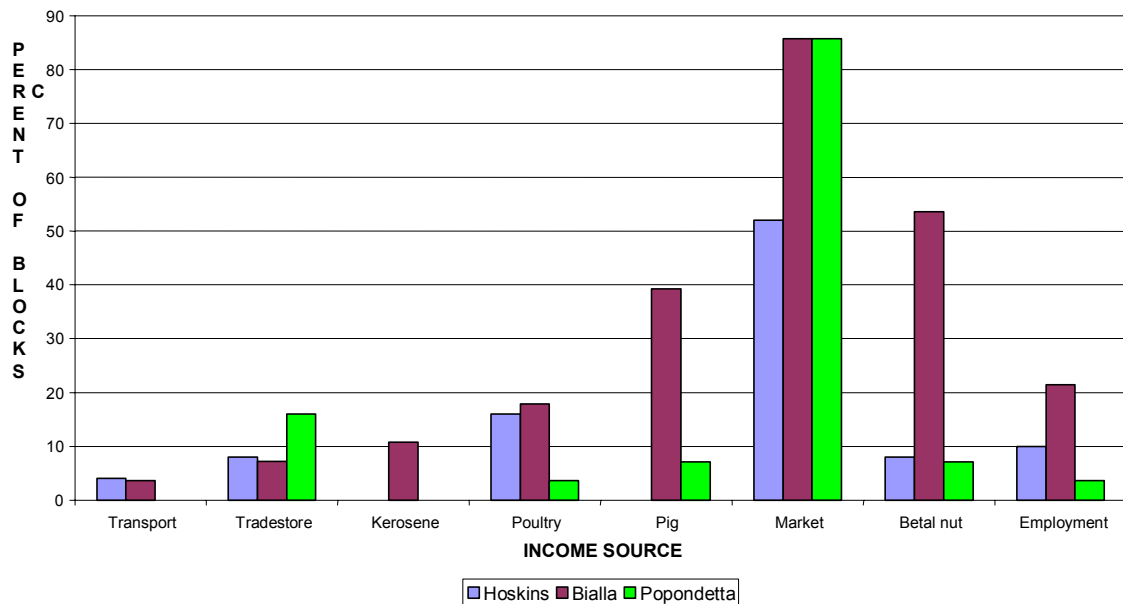


Figure 4.2. Non oil-palm income sources for VOP smallholders

People now view betel nut as another cash crop and have established smallholdings for bulk wholesaling. Rather than marketing the crop at the local market, some smallholders are selling in bulk to buyers who market the crop within the province or export it to other provinces. Many of the buyers on-selling the crop at local markets reside in the informal urban settlements at Kimbe and Bialla and do not have land of their own. A growing wholesale market in betel nut has thus induced some smallholders to plant large numbers of betel nut palms. In 2002, 17% of smallholder households in Bialla reported betel nut sales as their second or third most important income source. The increased cultivation and trading of betel nut is an example of how smallholders adjust their labour and land use strategies to capitalise on new opportunities that arise in the market.



Plate 4.1. Betel nut sales are a common source of income for women.

Off-farm employment

Some members of smallholder families seek full-time or part-time off-block employment to supplement household incomes (Figures 4.1 and 4.2), most of which is undertaken by men. Employment is varied and includes teaching, health care services and working for provincial government departments and the two oil palm companies in the province.

Off-farm employment does not necessarily lead to reduced oil palm production. Generally, off-farm employment constrains oil palm productivity when it limits the labour available for harvesting and block maintenance. However, with rising population density on smallholder blocks, off-farm employment is playing a very important role in relieving the social and economic pressures on the blocks by providing much needed supplementary income (Koczberski *et al.*, 2001). Indeed, on the more populated blocks that we visited at Bialla (and Hoskins), family members in full-time employment often provided considerable income support to other block residents and

capital for farm and non-farm investments. They often met large expenses such as school fees, farm inputs, customary payments, and provided start-up capital for small businesses. Off-farm employment therefore can provide investment capital as well as reduce the social tensions and conflicts between family members that arise over the distribution of oil palm income on highly populated blocks. This has the effect of increasing social stability on the schemes and thus creating an environment more conducive to oil palm production.

Population & Income Sources

The economic pressure to generate supplementary incomes, especially on the LSS schemes is reflected by the positive relationship between numbers of non-oil palm income sources and mean block population at both Bialla and Hoskins LSS schemes (Table 4.2).

Table 4.2. Numbers of non-oil palm income sources by mean block population for Bialla and Hoskins LSS schemes.

LSS Scheme	Mean Population per Block		
	One non-oil palm income source	Two non-oil palm income sources	Three or more non-oil palm income sources
Bialla LSS	9.4	10.1	12.2
Hoskins LSS	11.2	13.1	15.9

(Source: Smallholder Surveys n=200)

These data suggest that economic diversification among LSS smallholders is driven largely by population and land pressures. An increasing proportion of second and third generation settlers are now unable to access resources in their ‘home’ villages, and hence population growth rates on the leaseholder blocks are likely to rise leading to further income diversification (for a fuller discussion of

this issue see, Chapter 4.2.2 of Koczberski *et al.*, 2001; also Curry and Koczberski 1999).

VOP smallholders also pursue income diversification, though for different reasons. As mentioned earlier, VOP smallholder pursue cash crop diversity to reduce income risk against fluctuating commodity prices, and as we argued in the 2001 study among Hoskins smallholders:

On the VOP subdivisions income diversification is facilitated by more than adequate access to land (e.g., land for other cash crops such as cocoa and copra), whereas on the populated LSS blocks diversification is driven by inadequate access to land. In other words, land shortages in the context of rising population pressure compel LSS settlers to diversify income sources, whereas VOP landowners' greater access to land offers opportunities for income diversification that may or may not be taken up

(Koczberski *et al.*, 2001, 77).

Subsistence Production

In addition to lowering livelihood risks by pursuing and strengthening strategies that increase and diversify cash income sources, oil palm smallholders also reduce livelihood risks by maintaining subsistence food production. Most LSS settlers and VOP smallholders rely on food gardening, and, in the case of coastal VOPs, also on fishing.

Most LSS and VOP smallholders grow sufficient food to meet their household requirements, and the majority of LSS women sell surplus garden produce at local markets. Usually food gardens on the LSS subdivisions are located on the rear two hectares of the block, the area originally reserved for smallholder food gardens. However, on some blocks in the older subdivisions of Wilelo, Balima and Tiaru, OPIC extension officers encouraged smallholders to plant the rear two hectares to oil palm. This advice was given because of the

company delay in poisoning old palms in the First and Second Phases. Given that most of the old palms were too tall for harvesting, OPIC thought it in the best interests of smallholders to plant the Third Phase to oil palm to allow them to earn an income while they waited for the first two phases to be poisoned (Chapter 6). This move undoubtedly helped maintain smallholder cash incomes, though the extent to which medium-term household food security has been undermined has yet to be determined.

The Bialla study did not examine the importance of food gardens for smallholder food security. Research among Hoskins and Popondetta LSS smallholders revealed that smallholders rely heavily on subsistence food production. Based on a 24 hour dietary recall survey over a six week period, Koczberski *et al.* (2001) found that approximately 80% of meal ingredients at Kavui LSS (Hoskins) and Popondetta were from food gardens. Meals containing at least one non-garden ingredient tended to be concentrated within the first week following the monthly oil palm payment to smallholders. Given the similar socio-economic circumstances of Bialla and Hoskins LSS smallholders, it is not unreasonable to suggest that food gardens are likely to make a significant contribution to smallholder diets in Bialla. It should be noted, however, that the dietary surveys undertaken at Hoskins and Popondetta in 2000-2001 were during a period of depressed oil palm prices (K50-K70/tonne). It is possible that 2002-2003 prices (K160-K200/tonne) have lessened smallholders' dependence on subsistence food production. The relationship between population, food production, and oil palm prices is an area requiring further investigation.

As well as meeting household dietary requirements, food gardens provide an additional source of income for women and their families. Eighty-nine per cent and 86% of Bialla LSS and VOP smallholders respectively market regularly (at least once a week), and 60% of

smallholder households reported food marketing as their primary or secondary income source². Local markets provide essential income for smallholder households, especially non-primary or visitor households on multiple household blocks. Importantly, market income is earned regularly and provides for families in the periods between oil palm payments. The fact that women dominate local markets means that a significant proportion of market income is likely to be spent on family needs.

Finally, fishing is an important activity in many of the coastal VOPs. Twenty-one per cent of VOP blocks reported fishing as an income source, and several noted that fishing provides a fall-back income when prices of commodity crops fall. It appears that like coastal VOP growers in the Hoskins scheme, Biialla VOP growers shift their labour between fishing and commodity production depending on relative prices. For example, during the 2001 survey at Gaungo VOP (Hoskins scheme) when oil palm prices were relatively low (K56/tonne), some households temporarily abandoned oil palm production to concentrate on fishing. A study in two villages in New Ireland which owned copra plantations showed that fish landings were negatively correlated with the mean annual copra price (Dalzell and Wright 1990).

Customary Economy

Like Hoskins and Popondetta, and throughout Papua New Guinea for that matter, customary exchange remains a central part of most people's lives. Customary exchange between individuals and groups is mainly concerned with developing (or repairing in the case of conflict) alliances, social relationships and obligations. Exchange items include daily gifts of cooked and uncooked food, subsistence and oil palm labour, various services, traditional and modern wealth items and cash contributions to major events to mark initiations, marriage, birth, death, adoptions, dispute settlements, and land

transfers. Importantly, nowadays, customary exchange is also an important source of capital for business ventures, land purchases and education investments in children.

The conventional view in Papua New Guinea is that customary exchange activities are a constraint on economic development, particularly the development of a market economy. It is often held that such activities divert people's attention and efforts away from market economic activities such as cash crop production to uneconomic social activities leading to periodic labour shortages and thus the intermittent production of, say, oil palm. While this is true up to a point, changes in the types of items used in customary exchange and socio-demographic changes in the smallholder population mean that the requirements of customary exchange can drive people's involvement in the market economy/oil palm production. For example, store bought goods (cash required) and cash itself have largely replaced traditional wealth items in customary exchange, and the cash requirements of customary exchange are now an important reason for people engaging in the market economy. Thus, for the most part, customary exchange has become a driving force for people's engagement in the market economy whether as wage labour or as cash crop producers.

Also on the land settlement schemes, where there is a more than adequate potential supply of labour for cash crop production, labour diverted to customary exchange activities is unlikely to contribute to labour shortages for oil palm production. In fact, given the role of these activities in the formation of social relationships and conflict resolution they are likely to have a positive influence on oil palm production through creating a more stable social environment. The problem of under-utilised labour (and under-production) in the smallholder oil palm sector in Biialla, and the other schemes, can seldom be attributed to customary activities disrupting oil palm

production. Instead, labour shortages are largely the result of the absence of a remuneration mechanism that guarantees payment of labour. We return to this point in Chapter 5.

Summary Smallholders engage in a range of economic and social activities, and oil palm is not always the main activity or focus of people's lives. For some blocks, where multiple households reside, oil palm income alone may not be sufficient to support all residents and some households may need to seek supplementary sources of income. As indicated earlier, it is probable that as population and land pressures continue to rise on the LSS, it will become necessary for an increasing proportion of block residents to be engaged in non-oil palm economic activities, both on and off-farm. Economic diversification on the LSS schemes in Bialla (and Hoskins) is therefore expected to increase over the coming years.

Population growth on the LSS contains both risks and opportunities for the oil palm industry. If economic diversification and the generation of supplementary income sources can keep pace with population growth, then there is no reason to suggest that population growth will undermine oil palm production. In fact, oil palm is likely to remain the cornerstone of the local economies in both Bialla and Hoskins and provide a platform upon which broader economic development can occur. The oil palm industry is well placed to provide this platform for two reasons. First, it injects large amounts of cash into the local economies in both regions; and, secondly, the monthly cash injections are dispersed throughout the local economies with a significant proportion of the local population being paid directly for oil palm either as smallholders or as plantation labourers.

Finally, it is important to note that many multiple household blocks diversify their income sources as a strategy to maintain social harmony and reduce income risks, both of which are important in

encouraging investment in farm inputs such as replanting and fertiliser. Thus, indirectly, income diversification is important for the long-term economic and social viability of the smallholder sector. In the next chapter this theme of social cohesion is discussed further in relation to the labour and income strategies that households employ in oil palm production.

ENDNOTES

1. He began with one box of 50 chicks and by reinvesting his profits he built up his business until he was raising 200 chickens at a time.
2. When families report food marketing as their primary or secondary income source, they are referring to the fact that marketing provides them with a regular (weekly) income source that meets their day-to-day needs. This is especially the case on multiple household blocks where individual households may receive an oil palm cheque only three or four times a year. In the intervening periods between oil palm cheques these families are heavily reliant on income earned from sales at local markets.

CHAPTER FIVE

SMALLHOLDER OIL PALM PRODUCTION: HOUSEHOLD LABOUR ISSUES

Smallholder Production

Smallholder production in Bialla has been increasing steadily over the last five years (Table 5.1), though 2002 productivity levels at 13.6 tonnes per hectare remain much lower than nearby Hoskins smallholder yields at 16.3 tonnes per hectare. There is great variability in productivity amongst smallholders in terms of tonnes per hectare. Also, through time individual smallholders can shift from high to low production and vice-versa. Such shifts in productivity depend on several factors including stage in the life cycle (demographic change), health status, whether or not social conflict is present on the block, absenteeism and other socio-cultural factors. Together these variables impact on household resources and labour allocation. This chapter examines the household labour issues that influence oil palm production. Chapter 6 then discusses broader agronomic and farm management practices affecting the productivity of Bialla smallholders.

As the smallholder sector develops over time, different smallholder household types are emerging, and these influence the ways in which labour is organised and remunerated. Single household blocks, caretaker households and multiple co-resident households are the three primary types of smallholder households on the Bialla Scheme. The first part of the chapter outlines the main features of these different household types and draws out the implications for oil palm

production. Attention then turns to discussing the issues surrounding household labour shortages, the under-utilisation of household labour and why a market in hired labour has not emerged on the land settlement schemes.

Table 5.1. Bialla smallholder production (tonnes) from 1997 to 2002.

BIALLA SMALLHOLDER PRODUCTION			
YEAR	TOTAL HECTARES	SMALLHOLDER FFB PRODUCTION*	YIELDS**
1997	9,355	99,174	10.6
1998	9,843	116,665	11.8
1999	10,559	133,791	12.6
2000	11,250	151,359	13.4
2001	12,182	158,888	13
2002	12,182	165,241	13.5

(Data supplied by HOPL and OPIC-Bialla)

* FFB production includes fruit sold by Bialla smallholders to HOPL and NBPOL.

** Yields calculated on production and total hectares planted to oil palm.

Smallholder Householder Production Units

This section describes the different types of household production units commonly found on the Bialla scheme. We draw on a typology of smallholder households developed in the 2000-2001 Hoskins and Popondetta study (Koczberski *et al.*, 2001) as it became apparent from the Bialla survey findings and the workshop with OPIC-Bialla that this typology also applies at Bialla.

The typology is based on the types of smallholder households residing on a block and the harvesting strategies they employ in oil palm production. When the Bialla LSS started over two decades ago, there was generally only one household that settled on the block – the original settler household. Now, the sons of the original

settlers have grown up, married and continue living on the block, and often there are other close relatives residing permanently or temporarily on the block. Today, therefore, it is not unusual for several households to be co-residing on a block.

On some blocks, the original household may be residing elsewhere and a 'caretaker' is managing production. In some cases the original, now elderly, leaseholder and his wife may be still living on the block, but their children work in other parts of the province or country. Thus, the single nuclear family managing a block, which dominated the oil palm schemes when they were first established, is being replaced by other household configurations.

The different household types (single, caretaker and multiple) and the dominant harvesting strategies employed on a block can be used to develop a typology of smallholder production units. The main types are:

- **Single household *wok bung***
- **Caretaker household**
- **Multiple household *wok bung***
- **Multiple household *markim mun***
- **Multiple household 'mixed' – *wok bung/markim mun*.**

As a result of population growth, multiple household blocks are becoming the norm on the older subdivisions. Mean population per LSS and VOP block respectively is 11.08 and 9.

The various household types are associated with oil palm harvesting strategies that differ in the ways that labour is organised and remunerated. The communal *wok bung* production strategy where all or most adult family members and co-resident households participate in harvesting and block maintenance and share the resultant income is no longer the only form of labour organisation (Table 5.2). Whilst most blocks (71%) continue to practice *wok bung* harvesting, a rotation harvesting strategy is becoming more common in which harvesting work and oil palm income are rotated on a monthly basis among co-resident households. This type of production organisation is called *markim mun* by smallholders, and 27% of blocks have adopted this harvesting strategy (Table 5.2).

Table 5.2. Percentages of Bialla LSS and VOP blocks using different harvesting strategies.

BIALLA	<i>WOK BUNG</i> HARVESTING STRATEGY	MIXED HARVESTING STRATEGY	<i>MARKIM MUN</i> HARVESTING STRATEGY
LSS BLOCKS	67%	1%	32%
VOP BLOCKS	82%	3.50%	14%
TOTAL LSS/ VOP BLOCKS	71%	2%	27%

(Source: Smallholder survey)

As shown in Table 5.2 there is a higher proportion of VOP *wok bung* blocks (single or multiple household) than amongst LSS blocks, and harvesting often involves reciprocal exchanges of labour with village relatives. Single household *wok bung* blocks are also common on the new LSS subdivisions of Soi and Kabaiya, reflecting the recent development of these subdivisions. On the older LSS subdivisions

there is a smaller proportion of single household *wok bung* blocks. These blocks belong to the original leaseholders whose sons, for employment reasons, have moved elsewhere in the province or to other parts of PNG. For these elderly leaseholders labour shortages can be a problem, and are reflected in such practices as ‘skip-harvesting’ where the block, or a portion of the block is harvested once a month or less.

The ways in which labour is differently organised and remunerated between the various harvesting strategies are outlined in Table 5.3. Blocks with a *wok bung* strategy usually share the monthly oil palm income amongst family and household members, whereas on *markim mun* blocks the monthly income is typically allocated to an individual household on a rotating basis. Levels of labour remuneration also differ between *wok bung* and *markim mun* harvesting strategies. Labour remuneration on a multiple household *markim mun* block is usually commensurate with labour input and there is limited in-kind payment of labour.

Table 5.3. Labour and labour remuneration characteristics by household and harvesting type.

HOUSEHOLD TYPOLOGY	LABOUR AND PAYMENT CHARACTERISTICS
SINGLE HOUSEHOLD WOK BUNG	<ul style="list-style-type: none"> • Wok bung for harvesting and lus frut collection. • All or most adult family members involved in harvesting • Oil palm income shared among household members
CARETAKER HOUSEHOLD	<ul style="list-style-type: none"> • Single household • Wok bung for harvesting • Family income depends on payment arrangements with block owner
MULTIPLE FAMILY WOK BUNG	<ul style="list-style-type: none"> • Wok bung for FFB harvesting • All or most adult family members involved in harvesting • Inter-household labour cooperation • FFB income shared among adult males of all households • Lus frut collection rotated each month amongst households (women from one household usually collect the fruit) • Lus frut income allocated monthly to adult women from one household
MULTIPLE FAMILY MAKIM MUN	<ul style="list-style-type: none"> • FFB and lus frut harvesting rotated monthly between different households on block • Limited inter-household labour cooperation • Block labour under-utilised • FFB income is rotated among male heads of households • Lus frut income rotated among female heads of households • Each month the two incomes will go to two different households
MULTIPLE FAMILY MIXED (WOK BUNG/MARKIM MUN)	<ul style="list-style-type: none"> • Wok bung for FFB harvesting • Inter-household labour cooperation • FFB income is rotated among male heads of households • Lus frut harvesting and income rotated among female heads of households • Each month the two incomes will go to two different households

Some blocks display a ‘mixed’ production strategy where adult members of each household on the block work together (*wok bung*) for the harvesting but rotate the oil palm income each month amongst co-resident households. Sometimes in a mixed harvesting

strategy, co-resident households move in and out of *wok bung/markim mun* strategies to suit their changing socio-economic and demographic circumstances. In this mixed strategy, *wok bung* is the dominant form of harvesting, and *markim mun* may be used on occasions when a household requires a relatively large sum of money to pay school fees, fund a visit to the home village, or pay for a visitor's return trip to the village.

The mixed production strategy can be viewed as a transitional stage, where households, over a period of several years, gradually move from a *wok bung* to a *markim mun* production strategy. The transition is often in response to population growth, changing household economic circumstances or to the collapse of centralised authority on the block following the death of the original leaseholder.

The type of harvesting strategy adopted by smallholders reveals much about other aspects of farm management including labour supply, decision-making, income distribution, family and gender relations, production motivation, incentives to invest in the block, propensity to repay loans, and the range of livelihood strategies employed by block residents.

Population and Harvesting

The relationships between numbers of households per block/block population and harvesting strategies are shown in Tables 5.4 and 5.5 respectively. The growing numbers of people and households per block often leads to social stresses that result in disputes over labour allocations and income distribution. This can act to undermine the labour cooperation found in the *wok bung* strategy and lead to a block shifting from a *wok bung* to a *markim mun* strategy. The

switch to a *markim mun* strategy is therefore a way of reducing conflict, not of maximizing income or oil palm production.

Table 5.4. Mean numbers of households per LSS and VOP block at Bialla using different harvesting strategies

BIALLA	<i>WOK BUNG</i> HARVESTING STRATEGY	MIXED HARVESTING STRATEGY	<i>MARKIM MUN</i> HARVESTING STRATEGY
LSS BLOCKS	1.57	2	2.96
VOP BLOCKS	1.59	2	2
LSS & VOP BLOCKS	1.58	2	2.82

(Source: Smallholder survey)

Table 5.5. Mean population per block using different harvesting strategies at the Bialla and Hoskins oil palm schemes.

OIL PALM SCHEME	<i>WOK BUNG</i> HARVESTING STRATEGY	<i>MARKIM MUN</i> HARVESTING STRATEGY
Bialla	9.15	13.68
Hoskins	10.41	14.45

(Source: Smallholder surveys)

Multiple household blocks that continue to work together in a *wok bung* or mixed strategy generally can be described as cohesive family units where cooperation and sharing remain important and where disputes over labour or income rarely disrupt oil palm production. The high level of inter-household cooperation at harvest time results in an adequate labour supply leading to complete and regular harvesting.

Impact on Oil Palm

The type of household production unit affects the supply of labour through how labour is recruited, deployed and remunerated. It therefore has a direct influence on block production and productivity. The main ways in which these household production units influence block production and productivity are summarised in Box 5.1 and Box 5.2.

BOX 5.1

***WOK BUNG* HOUSEHOLD PRODUCTION UNITS AND OIL PALM PRODUCTION**

- Labour shortages on single household *wok bung* blocks often lead to incomplete or irregular harvesting. Skip-harvesting is more likely to occur on these blocks where labour is short or where other activities take labour away from oil palm production. The latter is common on VOP blocks. There is no disincentive to investment.
- The single household *wok bung* blocks most prone to labour shortages are those on the LSS that have limited access to additional off-block labour. These households may have restricted kinship ties or social networks, and, for a range of reasons, are unlikely to hire labour to overcome labour shortages.
- Multiple household *wok bung* blocks have the greatest capacity for production. Disputes over FFB income distribution are uncommon which means that there is sufficient labour for harvesting and block maintenance. Thus, an adequate labour supply and harmonious social and working relationships result in regular and complete harvesting. There are no disincentives to invest in these blocks.
- Changing circumstances on a multiple household *wok bung* block, such as the death of the father or increasing economic and population pressure, may lead to disputes over oil palm income and labour allocations. The disputes, if protracted, may lead to households shifting from a *wok bung* production strategy to either a mixed or *markim mun* production strategy

BOX 5.2

MARKIM MUN HOUSEHOLD PRODUCTION UNITS AND OIL PALM PRODUCTION

- A *markim mun* production strategy on multiple household blocks often emerges from a *wok bung* strategy as the number of co-resident households increases and disputes over income distribution and labour allocations begin to undermine inter-household co-operation and social harmony.
- Multiple household *markim mun* production strategies where minimal disputes occur over harvesting and where some labour is recruited from other households on the block, means that production can be consistently high.
- Oil palm production and productivity can be low on multiple household *markim mun* blocks where disputes over income and labour lead to labour being withdrawn from oil palm production.
- On some multiple household blocks (either *markim mun* or *wok bung*), population and economic pressure can lead to complete and regular harvesting. Production is generally high and fluctuations in the price of oil palm appear to have little impact on production levels.
- Multiple household *markim mun* production strategies tend to result in under-utilised labour each harvest round. Also, there can be major disincentives to invest in the block (e.g., fertiliser, block maintenance, loan repayments, etc).
- There is a higher probability that multiple household *markim mun* blocks will attempt to evade loan repayments. Each household will attempt to maximise its income in its allocated month by avoiding loan deductions. The costs of such an action are shared by all households on the block.
- On Multiple household *markim mun* blocks, there is a higher probability that block maintenance or farm investment (such as replanting) will be neglected or disputed. For an individual household wishing to minimise its labour expenditure while maximising its income, it makes more economic sense not to engage in block maintenance as the benefits of such labour (higher yields) are dispersed amongst all resident households including those that did not contribute to block maintenance.
- Oil palm productivity is higher on highly populated blocks that have not adopted a rotation (*markim mun*) strategy. Multiple household blocks that harvest together tend to have more people working each harvest round and therefore harvest more of the crop. Under a rotation strategy where fewer block members participate in each harvest round, harvesting is more likely to be incomplete.

To summarise this section, the household typology provides a means to examine some of the constraints on the supply of labour in oil palm production. It is evident that the era of the single household block is drawing to a close as a result of population growth and as multiple household blocks become more common at Bialla. While 32% of LSS blocks have adopted a *markim mun* strategy, this proportion will increase as it has in the older Hoskins scheme where 60% of LSS blocks have now adopted this harvesting strategy. As the social configurations on the oil palm blocks change as a result of population growth, smallholders are responding by adopting new strategies that may not be aimed primarily at maximising oil palm income, but which aim to maintain social stability and harmony amongst block residents. Thus if a *markim mun* strategy is adopted as a way to resolve internal conflict on a block, total production may be less than if all adults worked together (*wok bung*) to harvest oil palm. In this situation a household working on its own during a harvest round may not have access to sufficient labour to undertake a full harvest. This is particularly the case when the *markim mun* harvesting strategy emerged in response to ongoing conflict on a block.

Under- Harvesting

This final section of the chapter examines household labour issues and under-harvesting in more detail. To examine the extent of under-harvesting we draw on two sets of data. First, an OPIC ‘late pickup’ survey and, second, the research team’s post-harvest survey data from 57 blocks in four LSS subdivisions (Wilelo, Balima, Soi and Kabaiya).

OPIC Late Pickup Survey

The late pickup survey gathered data on the numbers of extra nets of fruit stacked for collection when the fruit collection truck was delayed for 24 hours or more. In 2002, HOPL was concerned that the tonnage of fruit harvested by smallholders for collection by company or contractor trucks was frequently underestimated by OPIC¹. This meant that extra trucks had to be redirected by HOPL to collect the additional fruit thus disrupting transport schedules and leading to the inefficient use of trucks. OPIC attributed the disparity between predicted and actual tonnages to late pickups thereby giving smallholders more time to harvest fruit. In November 2002, OPIC counted the nets in those sections of Wilelo (one of the earliest LSS subdivisions in Bialla) and Soi (a recent LSS subdivision) and Porkisi VOP where the truck was one or more days later than the scheduled pickup day (Table 5.6).

Table 5.6. Expected and actual numbers of nets of fruit collected in a harvest pickup round in November 2002 when harvest truck was more than 24 hours late for the scheduled pickup.

BIALLA SUBDIVISION	EXPECTED NUMBER OF NETS	ACTUAL NUMBER OFNETS	INCREASE (%)
Wilelo (older LSS)	231	362	57
Soi (recent LSS)	362	456	26
Porkisi (VOP)	133	169	27
TOTALS	726	987	36

(Source: Data supplied by OPIC-Bialla)

Across the three subdivisions, late pickups resulted in an increase in production of 36%. Soi LSS and Porkisi VOP had similar increases of 26% and 27% respectively, but the most significant increase was

in the older subdivision of Wilelo where production increased by 57%. Wilelo is a subdivision with many elderly growers and where delayed replanting has resulted in large areas of very tall palms which are much more difficult and time-consuming to harvest. Delayed pickups thus allowed more time for harvesting.

It is important to note, however, that the additional fruit harvested because of the delayed pickup would not have been all wasted. It is likely that a significant proportion of this fruit would have been harvested a fortnight later in the following harvest round. Postponed harvesting though does affect fruit quality and a portion of this fruit undoubtedly would have been lost to the mill. In summary, the increased tonnage of fruit during delayed pickups suggests that labour shortages are a factor, though the causes and nature of these labour shortages are more difficult to pinpoint. They may be due to direct labour shortages or because poor time management has the effect of reducing the supply of labour as the following quotation suggests:

...the toksave came on Friday morning [that the pickup would be on Monday]. But Saturday was church day [Seventh Day Adventist] and Sunday is a day for visiting and socialising. There was not enough time to harvest all the fruit, so half the fruit in Phase 2 could not be harvested.

(Smallholder grower, Kabaiya LSS)

Post-harvest Survey

Post-harvest surveys were undertaken to estimate the extent of under-harvesting. Surveys were conducted within two days following a harvest pickup and recorded harvesting rates from Phase 1 at the roadside edge of the block through to Phase 3 at the rear of

the block. The surveys were conducted with OPIC officers in June 2002 in the older LSS subdivisions of Wilelo and Balima (33 blocks) and the more recent LSS subdivisions of Soi and Kabaiya (24 blocks). The results demonstrate a considerable level of under-harvesting and also a very marked edge-effect in which harvesting rates decline from Phase 1 through to Phase 3 plantings at the rear of the block² (Figure 5.1). The results have been compared with the post-harvest data collected among smallholders in the Hoskins scheme in May-June 2002.

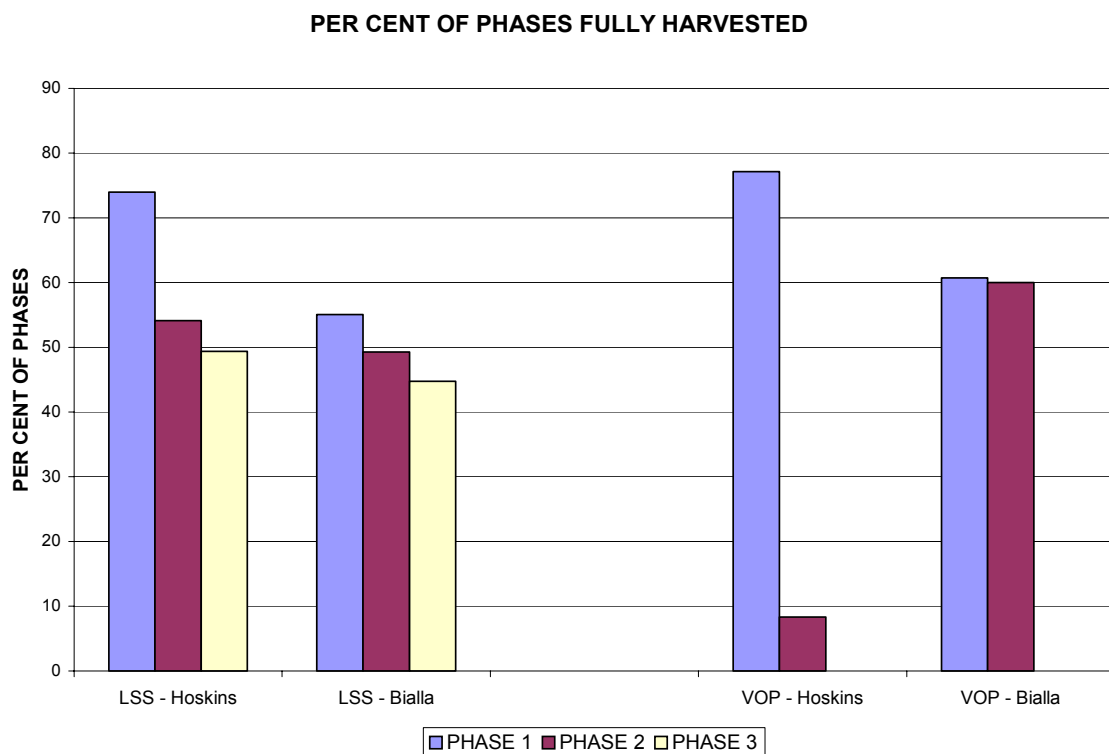


Figure 5.1. Per cent of phases fully harvested for Hoskins and Bialla LSS and VOP schemes.

Harvesting rates tend to be higher at Hoskins for all three planting phases on the LSS and the First Phase of VOP blocks. The lower harvesting rates at Bialla LSS are suggestive of the reluctance to

harvest old palms on the older subdivisions (see Chapter 6). Because of the small number of VOP blocks in the survey with a Phase Two planting, it is not possible to draw any conclusions about differences in the harvesting propensities of VOP smallholders on the two schemes. It should also be noted that the harvesting surveys were undertaken when oil palm prices were reasonably high (K120-K130). The high price may explain the higher than expected harvesting rates on Phase 1 of VOP blocks.

While the Bialla survey was not large enough to estimate the annual losses of fruit in the Bialla scheme, some indication of potential losses can be gained by examining data from the nearby Hoskins scheme where a larger post-harvest survey was undertaken in May-June 2002. At Hoskins, total annual losses of smallholder fruit were conservatively estimated at over 60,000 tonnes per year, or around 25% of production for 2001. If we assume that smallholder under-harvesting rates at Bialla are similar to those at Hoskins (a likely assumption), then in 2002, over 33,000 tonnes of smallholder fruit were not processed by the HOPL mill. Thus, there is considerable potential to raise smallholder productivity and incomes at Bialla.

The harvesting edge-effect, together with labour supply issues, across the two LSS schemes reveals the impact of distance from the road on harvesting practices. On the LSS schemes at both Bialla and Hoskins less than half of Phase 3 plantings were fully harvested, compared with 55% and 74% of Phase 1 plantings at Bialla and Hoskins respectively. The greater distance which fruit must be carted by wheelbarrow from the rear of the block may serve as a disincentive to harvesting. However, a combination of factors is also likely to compound the effect of distance. These may include insufficient labour or time to evacuate fruit from Phase 3 plantings,

age of blockowner, poor terrain (e.g. slopes, gullies, swampy ground), and minimal maintenance of oil palm stands at the rear of the block. A discussion of household labour issues follows.

**Household
Labour Issues**

To better understand under-harvesting, not only of Phase Three plantings, but the whole smallholder block, it is necessary to examine household labour issues in more detail for it is at the household level where labour is mobilised, organised and remunerated. Household labour shortages and the under-utilisation of labour are primary determinants of under-harvesting and low productivity (Figure 5.2)

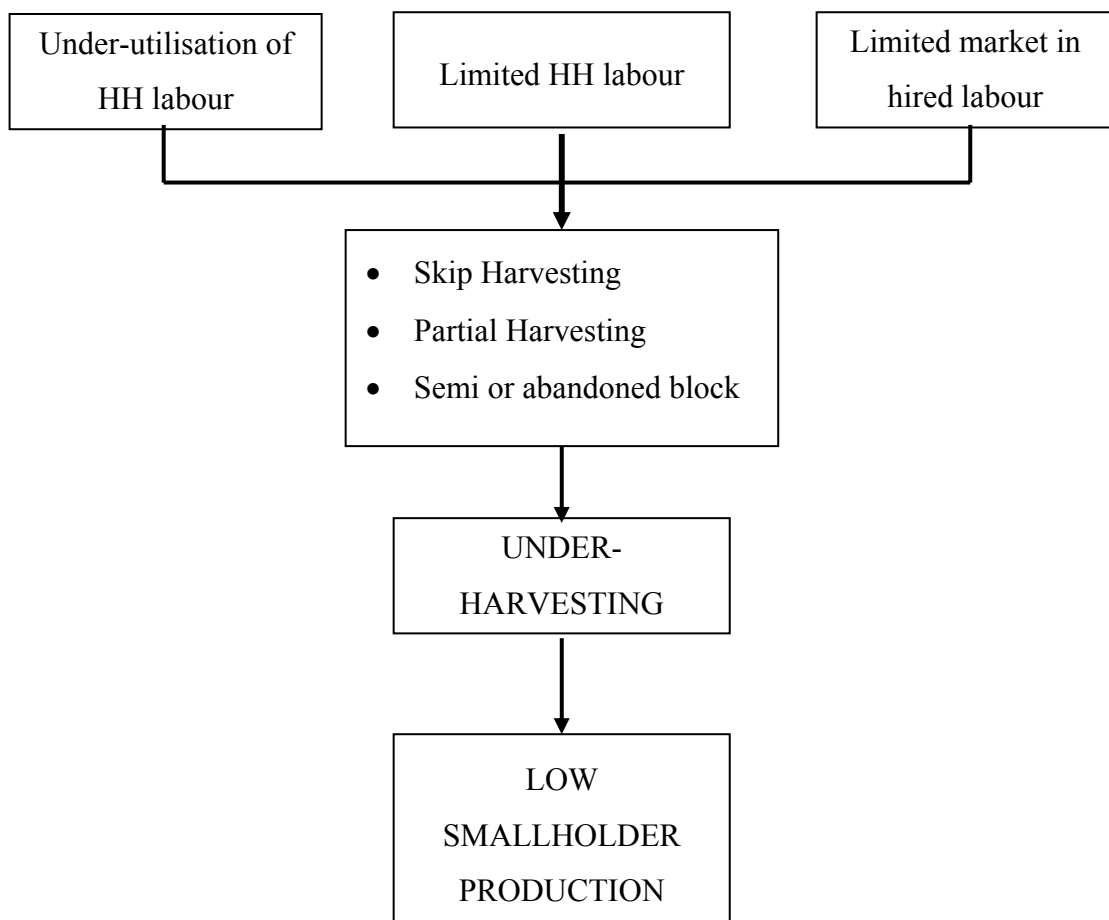


Figure 5.2. Flow chart of factors contributing to low smallholder productivity.

Labour shortages can be temporary or long-term and result in incomplete harvesting, skip harvesting, abandonment of blocks or the semi-abandonment of a portion of an oil palm block (usually at the rear of the block, or an old stand of oil palm awaiting replanting). There are three main sets of issues associated with the supply of labour. They are:

- limited resources of household labour;
- the under-utilisation of available labour on the block; and
- minimal use of hired labour.

Each aspect is an outcome of various structural barriers and individual household circumstances that prevent labour from being deployed and adequately remunerated. Each aspect is discussed below.

Limited Resources of Household Labour

Household labour shortages are the primary determinant of under-harvesting and low productivity. There are several types of single household blocks that experience labour shortages:

- elderly blockowners or widow households with one or no sons residing on the block;
- young married couples with young dependants;
- female-headed households without adult sons.

These household types are concentrated in different subdivisions according to when the subdivisions were established. Elderly block owners experiencing labour shortages tend to be concentrated in the older subdivisions of Wilelo, Balima and Tiaru. Younger families

without adult sons are typically found in the newer subdivisions of Kabaiya and Soi. Also, labour-short households, for various reasons, have limited access to additional off-block labour, due for example, to their restricted kinship ties or social networks. Some single households are able to overcome long or short-term labour shortages through access to kinship labour (particularly VOP producers), social networks, adoption, hosting long-term visitors from their home villages or other forms of host relationships and/or by employing hired labour. When these sources of additional labour are unavailable labour shortages can be ongoing and result in consistently low productivity and incomes and, therefore, a reduced capacity to invest in the block.

Labour shortages can also be temporary, resulting in a shift to lower production. This may be induced by illness, customary or religious obligations or short-term absences from the block. Also, labour may be temporarily shifted away from oil palm to other more profitable economic activities, as in the case of coastal VOPs, where a seasonal abundance of fish or better returns on other cash crops may result in 'skip' harvesting, partial harvesting or even temporary abandonment of oil palm production.

Under-Utilisation of Available Labour

The type of harvesting strategy used on a block influences the amount of under-utilised labour on a block. As previously noted, the *wok bung* production strategy is usually more efficient than the *markim mun* strategy. On *markim mun* multiple household blocks where there is little inter-household co-operation during harvesting, a harvest round may involve only one or two harvestors from one household, yet there may be three or four households and over 10

adults living on the block. In this situation, a complete harvest may not be possible due to a 'shortage' of labour at harvest time.

The under-utilisation of labour sometimes reflects a low commitment level to oil palm. For many VOP growers, oil palm may not be their primary or sole income source and therefore oil palm harvesting may occur once a month or less, and only when additional cash is required (e.g., for customary purposes or to purchase expensive store items). Growers' commitment to oil palm varies depending on the price of oil palm, company transport issues, their relationships with the company and OPIC, block characteristics (e.g., swampy or hilly block or poor access), and debt levels. Thus low oil palm prices together with irregular transport collection of fruit may lead some smallholders to temporarily withdraw their labour from oil palm production. Similarly, as discussed in more detail in Chapter 6, tall palms are a major disincentive to harvesting on many blocks on the older LSS schemes in Bialla.

A common reason for the under-utilisation of available labour is the reluctance of people to provide labour because of inadequate and/or disputed remuneration of their labour. Because of incomplete, deferred or non-payment of family labour (e.g., to brothers, wives, children), or hired labour (e.g., youth groups), the supply of labour for oil palm harvesting and block maintenance is constrained because people are reluctant to sell their labour. This results in a great deal of under-utilised labour, particularly on blocks where there is a poor relationship between the caretaker and owner, and on the more heavily populated blocks on the older land settlement subdivisions, such as Balima, Wilelo and Tiaru. On these more populated blocks conflict often emerges between fathers and sons over payments for oil palm work. To some extent these conflicts

reflect inter-generational issues where young men challenge their fathers' leadership on the block by disputing levels and types of remuneration.

Inter-generational conflict can also be seen as part of wider socio-economic changes occurring amongst smallholders, and in PNG more generally (see a similar discussion in Koczberski *et al.*, 2001). For example, expectations surrounding payment for labour appear to be changing, especially among youth on the LSSs. On many VOP and *wok bung* LSS blocks, labour payments often do not reflect labour inputs, but rather payment is governed more by gender, age or kinship status, and reciprocal or in-kind labour is common. In-kind payments for labour often consist of cooked food. However, reciprocal and in-kind labour are steadily being replaced by cash payments for labour that are more likely to be commensurate with market rates for labour. Young men, particularly on the LSSs, want to be paid well for their work, whereas previously food or some other small payment was considered adequate. Many sons are now challenging their father's authority and traditional cultural norms surrounding labour and in-kind obligations. Male blockowners told us how their son/s refused to work on the block and some reported how they evicted their son from the block because of continual arguments over payments. Sons of blockowners also related stories of how their fathers underpaid them for their labour.

Minimal Use of Hired Labour

As mentioned above labour shortages are rarely overcome through the use of hired labour. Only two of 103 blocks reported the regular use of hired labour. There are several reasons why a market in labour has not developed in the smallholder sector, despite the large numbers of under-employed youth. The most important reason is

the reluctance of young men to provide hired labour because of the uncertainty of payment for their labour by blockowners. The employment of youth and youth groups for contract harvesting and block maintenance has been very limited and many groups have failed as a result of the 'labour contract' not being fulfilled (i.e., inadequate or non-payment of labour).

Hence, the high level of uncertainty over fulfilment of the labour contract because of the absence of a mechanism to guarantee payment for work done inhibits the emergence of a labour market in oil palm production. As the evaluation of the *Mama Lus Frut* Scheme in Hoskins revealed, low rates of loose fruit collection by women prior to the scheme were the result of limited and/or uncertain remuneration of their labour by their husbands³. This was a frequent cause of domestic disputes and led many women to withdraw their labour from oil palm production to concentrate their efforts on food gardening where they had greater control over the income earned from the sale of garden produce. By paying women directly for loose fruit collection, the scheme has removed much of the payment uncertainty when women relied on their husbands to remunerate them from the papa cheque. As a result of this initiative, nearly 100% of loose fruit is collected in the Hoskins scheme.

One solution to labour shortages caused by the under-utilisation of labour is to introduce initiatives that guarantee payment for hired labour. This discussion, together with some recommendations for Bialla, is taken up in Chapter 7.

Summary This chapter highlighted the major changes occurring in how household labour is organised and remunerated. These shifts in harvesting practices reflect broader demographic, social and economic changes operating at the household and local level. Not only are families finding new ways to organise labour as the number of households per block increases, but second generation settlers have very different expectations regarding payments for labour than their parents' generation.

As the smallholder population grows through time, the single household block that typified the land settlement schemes when they were first established is now giving way to the multiple household block where several co-resident households share the block's resources. As an increasing proportion of blocks support more than one household, smallholders are responding by diversifying their income sources and adopting new labour strategies in oil palm production. The shift from the single household *wok bung* strategy to the *markim mun* strategy where harvesting labour and the corresponding monthly oil palm payments are rotated between co-resident households on a monthly basis is probably the most important example of this change.

It is important to note that the motivation to adopt new labour strategies in oil palm production is not necessarily concerned with maximising income. There is evidence to suggest that the decision to switch to a *markim mun* strategy has much to do with maintaining social harmony amongst residents and is often viewed as a way of reducing social conflict on a block. While these conflicts have their roots in the social consequences of declining per capita incomes

from oil palm, the *markim mun* strategy is often viewed as a strategy for restoring social harmony, NOT maximising income.

Where the *markim mun* strategy emerged in response to ongoing social conflict, labour productivity can decline because a smaller proportion of the available labour on a block is employed in each harvest round. In these situations a household whose month it is to harvest and collect the corresponding pay cheque may not be able to complete a full harvest each fortnightly round. Thus, total annual production for the block may fall after adopting a *markim mun* strategy. One third of LSS blocks at Bialla have adopted the *markim mun* strategy and this proportion is expected to increase through time as the population of settlers continues to grow.

It would be difficult to increase productivity by promoting *wok bung* harvesting strategies through extension efforts because the underlying reasons for the switch in harvesting strategies would remain (i.e., population growth and social conflict). To improve productivity the industry must promote smallholder strategies that lessen the causes of social conflict, and this entails developing new extension strategies that are cognisant of the new demographic and economic environment in the smallholder sector, particularly the LSS component of the scheme. Some recommendations in this regard including alternative payment systems and income diversification strategies that increase the flexibility of labour are discussed in Chapter 7.

While multiple household blocks are common and increasing, we must not lose sight of the large number of single household blocks that have a different set of constraints on productivity. For example, there are the elderly leaseholders without sons (typically found on

the older subdivisions) for whom age is a factor constraining their labour productivity. Some of these elderly leaseholders have stands of old palms that are almost impossible to harvest because of their height. There are the younger, single families with children on the newer subdivisions of Soi and Kabaiya where limited social and kinship networks restricts the range of labour they can draw on during harvesting. A third group is the number of caretaker blocks where low or uncertain payments for harvesting labour, or insecure tenure constrain block productivity and investment. To improve productivity, each of these single household types requires different extension strategies that meet their needs and circumstances. Suggestions as to how this can be achieved are outlined in Chapter 7.

ENDNOTES

1. Growers indicate the number of nets they will put out for collection by attaching loose fruitlets to a stick where each fruitlet represents one net. OPIC counts these before a pickup and the total is used to calculate the number of trucks required to collect fruit in each section of a subdivision.
2. The leaseholder on a block together with an OPIC extension officer estimated the numbers of nets of fruit unharvested in each planting phase of the block.
3. The reluctance or inability of men to share some of the income with their spouse was due to the numerous demands on the monthly oil palm cheque including debt repayments, credit repayments at tradestores, the financial demands of immediate and extended family, and the social pressures on men to gamble and participate in beer drinking parties. Often these short-term cash demands greatly exceeded the value of the cheque with the result that women were often inadequately remunerated for their labour.

CHAPTER SIX

SMALLHOLDER OIL PALM PRODUCTION: AGRONOMIC AND FARM MANAGEMENT ISSUES

Introduction The previous chapter drew attention to the factors operating within households that limit labour availability for oil palm harvesting and block maintenance. This chapter, while still emphasising the household, examines broader agronomic and farm management practices constraining smallholder productivity. The four most important factors affecting the productivity of Bialla smallholders are:

- •Low replanting rates on the older subdivisions.
- •Limited rates of fertiliser application.
- •Poor block maintenance.
- •Low levels of motivation and commitment to oil palm production.

Each of the above factors is discussed below.

Low Replanting Rates

Old and tall palms are a major factor explaining the low yields in Divisions 1 and 2, especially on the older LSS subdivisions of Division 2. At the end of 2002, 3,600 hectares of palms required replanting, representing approximately 36% of the total area under smallholder management in Divisions 1 and 2.

A replanting program was scheduled to begin in 1995/96 but for various reasons was delayed until 1999/2000. Since then the replanting program has performed poorly (Table 6.1). In 1999, only 334 hectares of OPIC's target of 1,006 hectares were replanted, due to minimal support from the previous management of HOPL and seedling shortages for smallholders. During the same year, NBPOL, which was collecting fruit from Tiaru and the Central Nakanai growers, poisoned 134 ha of old palms and provided growers with seedlings and credit for replanting (A.Vegoa, pers. comm.).

Table 6.1 Hectares replanted from 1999 to 2002

YEAR	REPLANTING TARGET (Ha)	HECTARES REPLANTED
1999	1,006	334
2000	500	250
2001	n.a.	100
2002	n.a.	18

(Source: Data supplied by OPIC-Bialla)

In 2000, only half of the 500 hectares targeted for poisoning and replanting was achieved, due mainly to a company decision to halt the poisoning program and remove smallholder credit facilities for replanting. In 2001, only 100 hectares were replanted as company credit facilities and Rural Development Bank (RDB) funds were unavailable to fund smallholder replanting.

Credit constraints on replanting continued into the first half of 2002, and together with the drought and heightened risk of fire (Plate 6.1), minimal replanting occurred that year¹. Most of the replanting in

2002 was in Division 1 (A. Vegoa, pers. comm.). By mid 2002 the RDB-Bialla had K400,000 available for replanting, sufficient for 400 hectares or 11% of the total area requiring replanting. OPIC presented the Bank with a list of 328 ‘priority’ blocks for credit (defined as those blocks that met the Bank’s criteria – see below). However, by February 2003 only 80 growers had replanting loans of K1,700 approved by the RDB (T. Valu, Manager, RDB-Bialla, pers. comm.).

The low uptake of the RDB loans is partly explained by the bank’s strict criteria for loan eligibility. To be eligible for an RDB loan, smallholders must have:

- A third planting of oil palm in production.
- No outstanding land rental fees.
- A copy of the lease title documents.

These criteria automatically exclude a large number of growers that do not have a Third Phase planted to oil palm and growers with insufficient land to plant a Third Phase. Also, given the importance of food production for home consumption and local markets, this criterion undermines food security. An additional group ineligible for RDB loans are the many growers with outstanding land rentals, and those who have lost their lease title documents².

The replanting program is currently being reviewed by HOPL following a change of company management. Replanting is now a priority for OPIC and the milling company, and the replanting target for 2003 is 1,012 hectares (Vegoa 2002). HOPL is also considering extending interest-free credit to smallholders for palm poisoning and possibly seedlings.



Plate 6.1. Young palms burnt at Bialla in 2002.



Plate 6.2. Underplanted palms at Tiaru LSS subdivision.

Delayed replanting has had considerable impacts on production, income levels, farmer motivation and farm management practices. Loss of income is the most serious problem confronting smallholders with tall palms, many of whom have semi-abandoned their old plantings because their harvesting poles are too short. On many of these semi-abandoned plantings, growers are practicing 'selective' harvesting, where they harvest only those palms where the fruit is within reach of their harvesting poles. Exacerbating this problem are growers with damaged or short harvesting poles, who are unwilling to buy new harvesting poles because their old palms are earmarked for replanting. Many of these growers borrow harvesting poles from neighbours or relatives and may miss a harvest round if no poles are available. Some of these growers planted a Third Phase of oil palm in the mid to late 1990s and rely on these new plantings for most of their oil palm income. As mentioned in Chapter 2, OPIC encouraged these growers to plant a Third Phase because of the protracted delay in the replanting program for Phases 1 and 2.

On some blocks with old and tall palms, growers practice 'skip' harvesting or partial harvesting because of the lower quantity of ripe fruit each harvest round and the longer time and greater physical effort required to harvest tall palms. The difficulty of harvesting tall palms is compounded by an elderly population of blockowners on the older LSS subdivisions.

Growers often referred to the lower quantity of fruit on their old palms relative to younger Phase 3 palms. The lower quality of fruit is likely to be an outcome of not only the age of the palms (past their most productive stage), but also inadequate application of fertiliser over the years, and poor maintenance of old stands³ (see below). Our

field observations in July 2002 at Wilelo and Balima indicate that maintenance of old palm stands is negligible and sexava outbreaks can go untreated for prolonged periods. On those blocks ready for replanting and where sexava is present, some in the industry argue that it is necessary to treat palms for sexava before they can be poisoned for replanting. This could further delay the replanting program on the older subdivisions⁴.

A final aspect of the replanting program is the serious long-term consequences of underplanting that occurred on some blocks. We were unable to confirm the extent of underplanting, but observed several cases at Tiaru and one at Kiava VOP where seedlings were underplanted in 1999/2000 (Plate 6.2). These underplanted palms were stunted and had very poor fruit development. Palms underplanted in 1999 were not producing fruit at the time of fieldwork in mid 2002.

Explaining Low Replanting Rates

Putting aside the institutional factors underlying the delayed replanting programs, smallholders themselves also show much reluctance to replant. Interviews with smallholders indicated that they were reluctant to replant for several reasons including a disinclination to go into debt, potential short-term losses of income, old age, poor road conditions and un-reliable fruit pickups.

Bialla smallholders, like those of Popondetta (see Koczberski *et al.*, 2001) are averse to taking out bank loans with high interest rates. Many smallholders have poor repayment rates. Moreover, many do not wish to go into debt at the same time when their income from the block is reduced due to poisoning two hectares of mature palms.

Indeed the loss of income alone is a considerable disincentive for many smallholders, especially those on the more populated blocks and on two hectare VOP blocks where growers would need to rely on non-oil palm income sources while waiting for their new palms to bear fruit. On blocks with four hectares of oil palm, replanting is arguably an easier option when two hectares remain in production, although several growers stressed that their reduced income would be insufficient to cover basic household needs.

Also, replanting is much less likely to occur on caretaker blocks where the leaseholder is living elsewhere. While the absentee leaseholder retains 'ownership' of the block and therefore can either sell the block or return to live on it, caretakers are unwilling to invest in replanting when they bear the costs of replanting but the benefits of higher production and income may not accrue to them.

Two other groups of growers who are typically reluctant to replant are 'hobby' farmers or 'semi-retired' farmers who do not see a need to replant. These growers are more likely to be low to medium producers who have only a partial commitment to and interest in oil palm production. For these growers, oil palm is a resource that can be tapped into occasionally as the need arises. 'Hobby' farmers are found amongst VOP producers where a range of subsistence options and alternative cash crops reduces the need to replant. As long as they are able to earn some income from their tall stands of oil palm, these growers will find it unnecessary to commit to a substantial investment in replanting.

The 'semi-retired' farmers are to be found amongst elderly leaseholders on the older LSS subdivisions. Without dependants and relatively low cash needs these elderly producers may be satisfied

with a low rate of productivity and see no pressing need to replant, especially if they have difficulties recruiting labour for harvesting. Without sufficient harvest labour, these elderly producers would find it very difficult to repay their replanting loans.

Finally, road conditions and company transport-related issues affect grower commitment to oil palm production including replanting. Poor road conditions mean that company and contractor trucks require continual repairs, resulting in fewer trucks available for FFB collection and less reliable FFB collection schedules. When fruit collection is unreliable because of impassable roads or unreliable harvest pickup schedules, smallholders become less confident about investing (replanting) in their blocks. These issues were also important in explaining poor replanting rates among Popondetta smallholders (Koczberski *et al.*, 2001). Developing smallholder confidence in the oil palm industry is thus critical not only for smallholder investment in replanting but a whole range of production issues.

The factors identified above serve to discourage replanting. Debt levels, potential income foregone, poor roads and unreliable harvest pickups, either singly or in combination are major disincentives to replanting. Such problems are not easy to overcome, though it is recognised that HOPL's new management team is moving to address these issues, especially transport problems. However, problems like road maintenance require long-term solutions that are largely outside the control of the industry. Some recommendations to improve replanting rates are outlined in Chapter 7.

Farm Management Practices

A noticeable characteristic of the Bialla scheme compared with the Hoskins and Popondetta schemes is the large number of blocks with poor agronomic practices, especially among the older subdivisions of Tiaru, Wilelo and Balima. Poor agronomic practices include inadequate levels of fertiliser application, damaged (or a lack of) harvesting tools and generally low levels of block maintenance.

Low Fertiliser Use

It is recognised in the industry that low fertiliser use by smallholders is a major agronomic constraint on smallholder productivity. Of surveyed growers in the Bialla scheme just less than 3% had applied fertiliser in the first half of 2002 and 36% in 2001 (Figure 6.1). However, for 27% of LSS blocks and 68% of VOP blocks, the last application of fertiliser was sometime before 2000. Those most unlikely to apply fertiliser are VOP growers and growers from the older LSS subdivisions. In the older LSS subdivisions of Wilelo, Balima and Tiaru, the last time fertiliser had been applied for 30% of growers was before 2000 (Figure 6.1). Some growers who replanted or planted an additional two hectares of oil palm in the last three years have yet to apply fertiliser. It should be noted, however, that in all oil palm project areas the promotion of fertiliser among smallholders has proven to be a difficult task for OPIC and the milling companies.

A combination of factors appears to explain the low rates of fertiliser use among Bialla smallholders. The three primary reasons to emerge from interviews with smallholders were:

- negative experiences with the company fertiliser credit scheme;
- lack of knowledge of fertiliser use and the potential yield and income benefits from fertiliser application; and
- a general perception amongst smallholders that the cost of fertiliser outweighs any economic gain from fertiliser use, especially during periods of low oil palm prices.

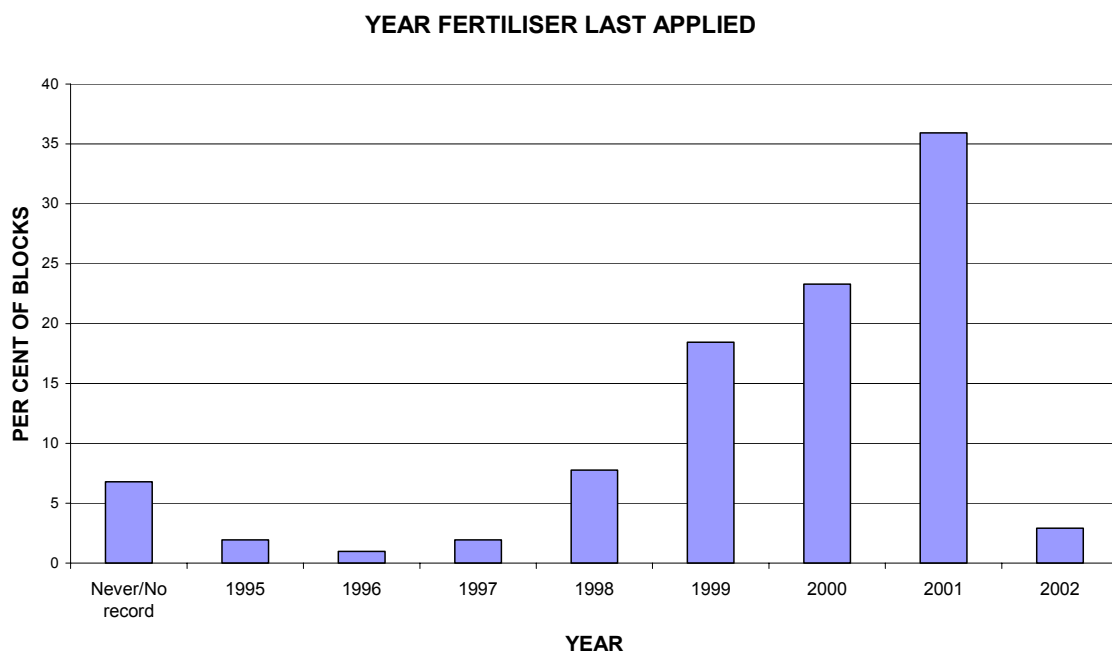


Figure 6.1. Year of most recent fertiliser application on the Bialla scheme.
(Source: Smallholder survey)

Negative Experiences with the Company

While interest-free company credit schemes for fertiliser have worked with some success in Hoskins and Popondetta, at Bialla the scheme was plagued with management problems for several years and this has contributed to a situation where many smallholders are now reluctant to purchase fertiliser from the company. At Bialla, the mismanagement of the fertiliser scheme under a previous company

management regime, has made the task of promoting fertiliser application that much more difficult than in other oil palm project areas. A common complaint by Divisions 1 and 2 smallholders, concerned a delivery of fertiliser in 1999 that was delivered to blocks without consent forms signed by smallholders. Many of these growers also complained that they were later charged 2001 prices for the fertiliser, and some complained that deductions continued after full payment for the fertiliser. On several blocks the 1999 fertiliser delivery remains at the roadside edge of the block or under the house.

These experiences with the milling company have created a mindset amongst many smallholders that the company cannot be trusted and that it uses the fertiliser credit scheme to generate further profits at smallholders' expense. While the fertiliser credit scheme is now improving under new company management, a more difficult challenge for the company and OPIC to address is overcoming the distrust of the company by some smallholders.

Growers' Lack of Knowledge of Fertiliser Use and Potential Benefits of Fertiliser Application

It was clear from interviews that many growers had little knowledge of the recommended application rates and methods, and many did not appreciate the general agronomic benefits of fertiliser. Many growers were unconvinced of the economic and agronomic benefits of fertiliser. Indeed, as demonstrated in the following section, for low producers there may not be any perceptible increase in income following fertiliser application; the only visible effect of fertiliser being the monthly deductions for fertiliser from their pay cheques. Together these factors (lack of knowledge about fertiliser, reluctance

to go into debt and poor returns to low producers for investment in fertiliser) explain the reluctance of growers to purchase fertiliser.

Questionable Economic Benefits of Fertiliser?

Alongside negative perceptions of the company's fertiliser credit scheme and the lack of knowledge about fertiliser benefits is a view amongst smallholders that the price of fertiliser has increased to unreasonably high levels. From 1998 to 2002, when the PNG Kina devalued markedly, the price of ammonium chloride fertiliser for Bialla growers increased from K17 in 1998 to K29⁵ in 2002. The recommended annual application rate of 20 bags for four hectares at Bialla now costs K580 (K781 at Hoskins⁶). For some growers, especially 'part-time' VOP growers and other 'low' producers who regularly under-harvest, the high price of fertiliser and the prospect of debt with the company are considerable disincentives to purchasing fertiliser. For these growers the investment in fertiliser is difficult to justify. It is to this issue we now turn.

In December 2002, to assess the economic costs and benefits of fertiliser for smallholders we undertook a preliminary economic analysis of fertiliser use with Dr Paul Nelson of OPRA. Using yield data from OPRA's fertiliser trials in WNB, we examined cash returns to growers under several scenarios using the variables of FFB price, smallholder harvesting rate (per cent of crop harvested) and fertiliser price (Figure 6.2; Table 6.2). Expected yield increases of four tonnes of FFB per hectare per year are based on the average of several of OPRA's fertiliser trials over a number of years. Of course, actual yield response to fertiliser depends on many farm management and bio-physical factors which cannot be taken into account in this exercise. It should also be noted that yield effects lag

behind fertiliser application. Nevertheless, the exercise casts some light on why some smallholders are reluctant to purchase fertiliser.

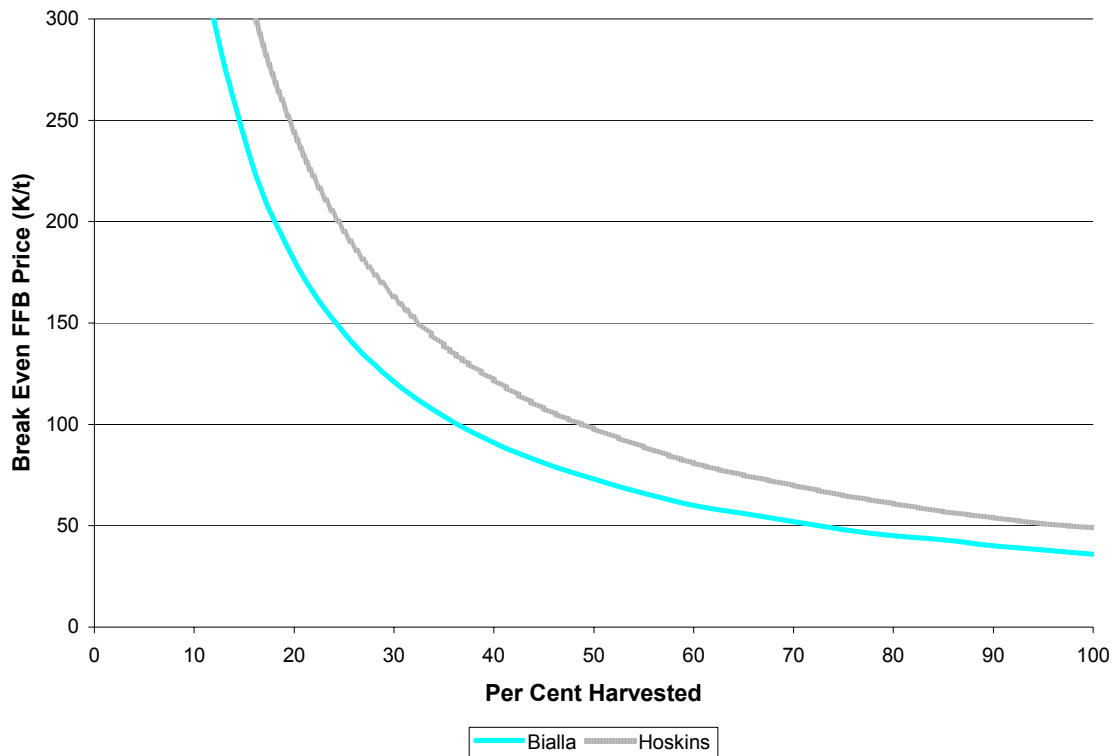


Figure 6.2. Break even FFB price plotted against rate of harvesting for Hoskins (K39.05/bag) and Bialla (K29/bag). Prices are for 2002. (Data provided by Paul Nelson, 2003, OPRA Popondetta)

Two key points can be drawn from Figure 6.2:

1. The slope of the curve increases as harvesting rate declines. This means that for a high producer, harvesting 95% of the crop, a drop of 10% in the proportion of the crop harvested will have only a relatively small effect on the FFB price increase required for this grower to break even. On the other hand, a 10% fall in the harvesting rate for a low-producing grower, usually

harvesting, say 40% of their crop, requires a much greater increase in the FFB price to break even. Thus, consistently high producers will receive much greater income gains from fertiliser application than low producers.

2. The impact of a fertiliser price increase has a much greater negative impact on low producers than high producers (Figure 6.2). For a high producer, an increase in fertiliser price requires only a relatively small increase in FFB price for these growers to reach a new breakeven point. For low producers, a relatively large increase in FFB price is required to reach the new breakeven point. In summary, the income benefits from fertiliser application may be marginal or even negative for low producers who do not fully harvest their crop.

To understand the choice facing smallholders to apply fertiliser or not, it is useful to consider the net income gains/losses from fertiliser application under several scenarios using different FFB prices and harvesting rates. Table 6.2 shows the net income gain per hectare using a range of FFB prices and harvesting rates at Bialla and Hoskins. For example, a Bialla smallholder receiving a price of K150 per tonne for FFB with a harvesting rate of 75% will receive a net annual income gain per hectare of K305 (K25.4/ha/month) by applying the recommended quantity of fertiliser. If the price of oil palm falls to K50 per tonne, then the same grower (maintaining a harvesting rate of 75%) will receive a net annual income gain per hectare of K5. As the table indicates, most low producers (i.e. harvesting less than 50%) receive few financial benefits from applying fertiliser.

Table 6.2. Net income gain per hectare for Bialla and Hoskins smallholders using different FFB prices and harvesting rates (Shaded areas indicate net income gains greater than or equal to K10/Ha/month).

FFB PRICE PER TONNE (PNG KINA)	HARVESTING RATE (PER CENT)	NET ANNUAL GAIN PER Ha FOR BIALLA GROWERS (PNG KINA)	NET ANNUAL GAIN PER Ha FOR HOSKINS GROWERS (PNG KINA)
50	25	-95	-145
	50	-45	-95
	75	5	-45
	100	55	5
100	25	-45	-95
	50	55	5
	75	155	105
	100	255	205
150	25	5	-45
	50	155	105
	75	305	255
	100	455	405
200	25	55	5
	50	255	205
	75	455	405
	100	655	605

If we assume a grower will perceive a net income gain of K10/month per hectare from fertiliser application (anything less than this would not be obvious to growers)⁷, then for many growers fertiliser application has no perceptible impact on their incomes. For many low producers for whom low production is attributable to under-harvesting, the cost of fertiliser will outweigh any potential income

gains. It is therefore understandable that for some 'low' producers (i.e., blocks where under-harvesting occurs), an annual investment of K580 in fertiliser may not be considered economically attractive nor sound cash management. Thus, the disproportional negative impact on low producers who regularly under-harvest may be one of the reasons why OPIC has had such difficulty encouraging some growers to purchase fertiliser.

This brief economic analysis of fertiliser brings into question conventional strategies of fertiliser promotion by OPIC, OPRA and the milling companies.

**Poor Block
Maintenance**

Levels of block maintenance vary greatly across the three smallholder divisions and between LSS and VOP blocks. Our observations during the smallholder survey and interviews, reveal that block maintenance was generally poorer on VOP blocks than LSS blocks, a finding consistent with surveys at Hoskins and Popondetta. Further, on the new LSS subdivisions of Soi and Kabaiya block maintenance was significantly better than on the older subdivisions of Wilelo, Tiaru, and Balima.

A range of factors underpin poor block maintenance among Bialla smallholders, the most important being:

- Labour diverted to other household livelihood activities (see Chapter 4). This is more relevant on the VOP blocks.
- Labour shortages and the under-utilisation of available labour.
- Low rates of loose fruit collection on some blocks resulting in palm circles not being maintained.

- Older plantings of tall palms that are semi-abandoned on the older LSSs.
- Lack of grower motivation.

Rates of loose fruit collection are low on the VOP blocks at Bialla with only 40% of VOP blocks having registered '*lus frut mamas*'. This compares with 73% of LSS blocks at Bialla that have '*lus frut mamas*'. Evidence from the Hoskins scheme (Lewis 2000) reveals that block maintenance improved considerably following the widespread uptake of the mama card. This was mainly for two reasons. First, with greater participation in oil palm production, women tend to maintain palm circles to enable easier collection of loose fruit. Second, the existence of the mama card means that it is easier for men to pay women for block maintenance work by placing some FFB on the mama net. That so few Bialla VOP blocks are part of the mama scheme may partly explain the low levels of maintenance on these blocks. Also, at Bialla, FFB is not permitted to be weighed as loose fruit, and this may limit the amount of female labour deployed in oil palm production, particularly block maintenance.⁸

The low levels of block maintenance found on the older LSS subdivisions appear to be the result of extensive areas of oil palm requiring replanting. As noted earlier, many growers have almost ceased harvesting their tall palms, and invest minimal labour in maintaining these stands. Poor block maintenance on these older subdivisions is reflected in the large areas treated for sexava in 2001. For example, at Wilelo, 20% of the total subdivision was treated for sexava in 2001, and for Tiaru and Balima the areas treated represented 15% and 12% respectively of the total areas of these

subdivisions. Table 6.3 shows the levels of sexava infestation on these older subdivisions, with the three older subdivisions of Wilelo, Tiaru and Balima making up 38.6% of the total area in West New Britain requiring chemical treatment in 2001.

Table 6.3. Oil palm areas in West New Britain that required chemical treatment for economically significant levels of Sexava infestation in 2001.

SMALLHOLDER/ PLANTATION	SITE	APPROX AREA (HA)
NBPOL plantation	Togulo	32
NBPOL plantation	Malilimi	60
Hoskins VOP	Ganeboku	1.5
Hoskins LSS	Kavui	19
Bialla LSS	Kabaiya	200*
Bialla LSS	Wilelo	240
NBPOL plantation	Togulo	80
NBPOL plantation	Bilomi	150
Bialla LSS	Tiaru	112
Bialla LSS	Balima	96
NBPOL plantation	Togulo	70
TOTAL		1,160.5

(Data provided by Rob Caldwell, 2002 OPRA, Hoskins)

* The Kabaiya sexava outbreak is related to the sexava problems at Navo plantation spreading into the LSS.

**Smallholder
Motivation**

Smallholder motivation is a key factor influencing productivity. The motivation to harvest regularly and invest in one's oil palm holding is influenced by a range of inter-related factors including:

- access to alternative income sources;
- subsistence security;
- age of grower;
- levels of debt;
- tenure security;
- customary obligations and demands;
- levels of social conflict on the block;
- relations between settlers and customary landowners;
- numbers of dependants;
- economic pressures;
- competitive nature of individual smallholders;
- physical characteristics of blocks;
- relationships with milling company and OPIC;
- regularity and certainty of harvest pickups;
- road conditions.

The last three factors are of most relevance to explaining under-harvesting and poor block maintenance amongst Bialla smallholders.

As mentioned briefly in earlier sections of this report, the relationship between smallholders, the company and OPIC deteriorated in the mid-1990s. HOPL management ceased paying the OPIC levy and began withdrawing services to smallholders. Until the management change in 2002 there was little liaison and cooperation between the company and OPIC. From 1997 to 2002

HOPL ceased paying the K3.50/tonne levy to OPIC (see Chapter 2). This placed severe financial constraints on OPIC and limited OPIC's capacity to provide extension services to growers. Smallholders, who continued to pay their levy, complained of the poor services they received from OPIC. Delayed fruit pickups (a problem of the company - see below), also raised smallholder dissatisfaction with OPIC.

At the same time as the OPIC problems, smallholders were disillusioned with HOPL. The delay in the replanting program, the problems with the fertiliser credit scheme, unreliable fruit pickups and the under-weighing of smallholder fruit have, together, undermined smallholder motivation and interest in oil palm, and caused a loss of confidence in the company. The most common grievances we heard from smallholders were the unreliable schedules for harvest pickups and the under-weighing of fruit by private trucks contracted to the company (and sometimes company trucks).

References to contractor trucks cheating smallholders by recording lower tonnages were noted in interviews in all three divisions, as were tales of ongoing delays and irregular fruit pickups. For most of 1998 there was only one harvest round per month. Harvest rounds increased to two per month for most of 1999, but for the period October 2000 to August 2001, harvest rounds were reduced again to once a month, and in a few subdivisions to more than 30 day intervals (A. Vegoa, pers. comm.). During this period relationships between smallholders and the company were tense, and some smallholders vented their frustration with the company by attacking trucks and setting up road blocks. Since October 2001 transport has improved and is becoming more regular and reliable.

The uncertainty of regular pickups is equally as damaging to grower motivation as the lack of payment certainty for hired labour (Chapter 5). Deferred or under-payment of hired labour results in the withdrawal of labour, conflict and disruptions to harvesting. Similarly, continual uncertainty regarding pickups of smallholder fruit results in the withdrawal of labour, conflicts with the company and disruptions to harvesting as people shift their labour to activities where the returns to their labour are assured. Thus, reliable and regular fruit pickups will increase smallholders' motivation to harvest and invest in their blocks.

Whilst the company is addressing the transport problem through restructuring company transport procedures and improving milling capacity, the deteriorating road system (including bridges) will continue to disrupt transport schedules until considerable funding is made available by the provincial government and overseas donors to rebuild and maintain existing roads. Bialla LPC and OPIC have made four submissions to the provincial government for road maintenance funds and neither has received a response from the provincial government. A World Bank commissioned report released in 2001 estimated that K21.4m is required to rehabilitate the roads in the Bialla scheme (ADS [PNG], 2001). OPIC estimates that of the total 720km of roads in the Bialla scheme, almost 200km were built when the scheme started and are in need of complete reconstruction. The remaining road system is also in need of urgent repair.⁹

OPIC has identified the poor and deteriorating condition of the existing road system and the lack of provincial funding as major constraints on smallholder oil palm production in Bialla (Vegoa

2002). OPIC is correct in this assessment: if roads were upgraded, transport schedules would become more regular and reliable, and smallholder motivation to produce oil palm would increase and their confidence in the company would rise accordingly. OPIC-Bialla, on commenting on the road situation, noted in its 2002 report:

To date OPIC in Bialla has only received from the West New Britain Provincial government K25,000 in 1998 and compared to the 720 km plus of harvest roads we have in the project, this only amounted to K0.03/metre (Vegoa 2002, 15).

Summary

This chapter outlined how a conjunction of factors working together contribute to the low productivity of Bialla smallholders. Institutional factors combined with a range of inter-related socio-economic factors form part of the explanation as to why smallholders are reluctant to replant old palms, purchase and apply fertiliser, and maintain and invest in their blocks.

To effectively address some of these farm management issues a reappraisal of existing extension strategies employed by OPIC and HOPL may be necessary. For example, with regard to fertiliser use, if low producers are unable to realise the income benefits from applying fertiliser, then the increased debt loads they incur from purchasing fertiliser may have the effect of further reducing their motivation to produce oil palm. It may also lead some to seek ways to avoid loan repayments. Thus, it makes little sense to promote fertiliser use amongst smallholders who regularly under-harvest. Instead, for very low producers consistently under-harvesting their blocks, it may be more appropriate to consider fertiliser promotion together with other initiatives aimed at raising the harvesting rates on

these blocks. The Mobile Card may be useful here. This issue is discussed further in Chapter 7.

At the other end of the production scale, there is a clear case for promoting fertiliser use amongst high producers fully harvesting their blocks. For these growers the income gains from fertiliser are tangible and readily observable. In short, it may be worthwhile for the industry to become more selective in promoting fertiliser by targeting high producers in the first instance, or only those blocks where the impact of fertiliser is likely to be realised as net increases in smallholder incomes.

In summary, addressing farm management issues is not straightforward and there is no single quick-fix. For sustainable long-term solutions, the industry must avoid relying solely on technical fixes to particular problems, and instead develop and implement a range of interlocking strategies to meet the needs of smallholders and build smallholders' confidence in the industry over the long-term. By building confidence in the industry, smallholders' motivation to produce oil palm and make long-term investments in their blocks will grow as a consequence. In the next chapter, we put forward some strategies to achieve these long-term goals.

ENDNOTES

1. Fires during the 2002 drought destroyed 61 hectares of smallholder oil palm (A. Vegoa, pers. comm).
2. The requirement of RDB loans that a Third Phase must be planted to oil palm and generating an income is based on the assumption that blockowners with tall palms and without the rear 2 ha planted to oil palm would have little capacity to repay the loan. Also, for the RDB, loan recovery would be more secure if a Third Phase were planted to oil palm.

The requirement that a block has no outstanding land rental fees is difficult for some smallholders to prove. In late 2002 Lands Department personnel from Port Moresby were in Bialla collecting outstanding land rental fees from leaseholders. Smallholders had to produce receipts for land rental payments made in previous years. If receipts could not be produced they were deemed to be in default of payment. Any old receipts, together with new ones issued during the Lands Department visit, were taken by Lands personnel with the promise that they would be returned to them from Port Moresby once the records in Port Moresby were updated.

3. The impact of climatic events like drought cannot be ignored.
4. There is debate in the industry about the need to treat sexava infested oil palms before replanting. It is argued by some that poisoning infested palms in the absence of sexava treatment merely displaces the sexava outbreak to adjoining stands of oil palm.
5. In 2002, Bialla smallholders were charged K26/bag plus K3 spreading cost for fertiliser. The K3 spreading cost is refunded to the smallholder following fertiliser application. This initiative is similar to that introduced in Hoskins in 2000 where the K3 cash refund provides an incentive for growers to apply fertiliser.
6. At Hoskins the price of a 50kg bag of fertiliser increased from K24.20 in 2001 to K39.05 in 2002.
7. This arbitrary figure of K10/ha/month probably errs on the conservative side, meaning that the point where growers notice an income rise in response to fertiliser is likely to be higher than K10/ha per month or K120/ha per year.

8. Loan repayments are deducted from the primary payment of the household head and not from loose fruit payments. By not permitting some FFB to be weighed as loose fruit, one avenue for avoidance of loan repayments is closed to Bialla smallholders. However, for debt-free blocks, this restriction constrains labour flexibility by limiting the ways in which labour and income can be allocated on a block, thereby possibly reducing productivity.
9. Some bridges destroyed by earlier flooding in 1990s have not yet been replaced. Flooding in March 2003 has also caused further destruction of roads and bridges in the Bialla region.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATIONS

Introduction Under-harvesting is the main constraint on smallholder productivity in the Bialla Scheme. While insufficient fertiliser application, old palms and low levels of block maintenance are also important constraints on smallholder productivity, they are secondary to under-harvesting. The importance of these constraints varies across the three divisions. On the older subdivisions, for example, where replanting is long overdue, poor block maintenance and under-harvesting are major constraints on production, whereas fertiliser application is consistently low on VOP blocks. On the newer LSS subdivisions of Soi and Kabaiya where productivity is higher, labour shortages are a major constraint on production.

Finding ways to increase smallholder production requires understanding the processes underlying each of the above constraints, and how they interact to influence smallholder production and the uptake of extension advice and other industry initiatives. In this final chapter we briefly outline the major agricultural changes occurring among smallholder households and highlight the key factors limiting smallholder productivity at Bialla. The suggested recommendations aim to increase smallholder production and incomes, and ensure a viable smallholder sector into the future. The recommendations are based on both an attempt to overcome a production problem, and, on strengthening smallholder livelihoods. Our work with smallholders suggests that when smallholders are assessing new industry and extension initiatives

they often focus on how a potential innovation or extension strategy fits into and strengthens their existing livelihood strategies and household needs. This assessment can be at three levels (Box 7.1):

1. In terms of how a potential intervention reduces/increases risks (e.g., income, food and land security).
2. How it expands/restricts income opportunities (e.g., new mechanisms of income distribution and range of choices).
3. Whether or not the intervention will promote/undermine household social cohesion and stability.

Box 7.1. Smallholder criteria for assessing new innovations

RISKS Household Livelihood	OPPORTUNITIES Household Options	SOCIAL STABILITY Social Well-Being
Economic security.	Widen Choices.	Intra & inter household conflict.
Food security.	Increases oil palm production.	
Land security.	Enhances peoples capacity to meet their needs.	Community social stability.
	Distributes income more equitably & more widely	Community-milling company rapport.

Industry initiatives or extension messages perceived to conflict with or undermine livelihood security are therefore much less likely to be adopted by smallholders. A good example of this is the reluctance of smallholders to replant. For many smallholders the short-term risks of income loss and increased debt levels outweigh any long-term benefits, and therefore it is difficult for many to commit to a replanting package. Similarly, for many low producers fertiliser application is not perceived as a means to increase income, but rather as a drain on income. Where potential conflicts exist between

livelihood security and a new initiative, it is important for extension efforts to be tailored in ways that avoid such conflicts. In other words, extension should aim to cater to the individual circumstances and needs of smallholders.

With the above points in mind, the recommendations made in this chapter are based on a set of principles that the research identified as playing a crucial role in determining the successful uptake of interventions by smallholders. Apart from encouraging the participation of smallholders in the design and development of new initiatives, as far as possible, initiatives should seek to:

- increase incomes and well-being;
- promote sustainable livelihoods through increasing household choices and food and income security;
- strengthen people's capacities to meet their basic needs;
- contribute to a stable social environment;
- facilitate the distribution of income within and between households;
- avoid creating inequitable access to income or resources (e.g., land); and
- be compatible with household livelihood strategies aimed at maintaining economic and social well-being.

Change and Smallholder Households

The Bialla results, together with the findings from Hoskins and Popondetta, indicate that major socio-demographic and agronomic transformations are occurring among smallholder households. These changes set the context for understanding contemporary smallholder production and for formulating appropriate smallholder interventions.

One of the most significant agronomic changes to emerge amongst smallholders is the development of new harvesting and income strategies in oil palm production. These shifts in harvesting practices are related to population growth and the emergence of different household configurations. The single household block that typified oil palm production when the schemes were first established is now giving way to other configurations such as caretaker blocks and multiple household blocks where, in the latter case, two or more families are co-residing and sharing the resources of a block. In the newer subdivisions of Soi and Kabaiya and recently incorporated VOPs, blocks tend to be managed by younger families, and the single household family with young dependants is common. On the other hand, in the older subdivisions of Wilelo, Tiaru and Balima, there is a higher proportion of multiple household blocks where the sons and daughters of the original leaseholders are sharing the block with their parents while raising their own families. Also, on these older subdivisions there tend to be more blocks with elderly leaseholders whose sons have found work elsewhere. In each of these examples the circumstances of block residents are different and the problems they face in oil palm production may require different strategies to address them.

One response to the changing demographic circumstances on the blocks is for some Biialla smallholders to shift from *wok bung* to a *markim mun* harvesting strategy. This change in harvesting strategies has also occurred at the Hoskins scheme. The increase in the number of blocks switching from the 'traditional' communal, *wok bung* harvesting and income strategy to the more individualised *markim mun* harvesting strategy where harvesting work and the corresponding income is rotated each month amongst co-resident households, raises two critical production issues.

The first key point is that the communal, *wok bung* strategy makes more efficient use of the available labour on a block than the *markim mun* strategy. In a *wok bung* strategy it is more likely that all able residents will be involved in harvesting and block maintenance, whereas on a *markim mun* block often a considerable proportion of resident labour is not involved in harvesting or maintenance. In the latter case this can mean that a household whose turn it is to harvest may have insufficient labour to complete a full harvest despite the presence of often a considerable amount of under-utilised labour on the block. This situation is more likely to be the case if *markim mun* harvesting was adopted as a strategy to reduce conflict on the block and there is little inter-household cooperation in oil palm production. Thus, total production on the block is less than if all available labour were deployed each harvest round.

This, of course, does not imply that the *wok bung* strategy will necessarily lead to higher production (though productivity per available worker on the block is higher) because there may not always be sufficient labour in total on a *wok bung* block to undertake full harvesting. This is usually the case for younger households residing on the newer subdivisions and for elderly leaseholders on the older subdivisions without kin to call upon for assistance with harvesting. Put another way, the highest production and productivity per worker in oil palm is likely to be on multiple household blocks still practising *wok bung* harvesting strategies.

The second critical production issue is that *wok bung* tends to be associated with ‘traditional’ patterns of labour arrangements and payments whereas the *markim mun* strategy is often associated with market rates of remuneration. The distribution of oil palm income

on *wok bung* blocks is often governed by gender, age and kinship status which means that some members of the work group receive disproportionately greater rates of remuneration than other members.

The switch between harvesting strategies, therefore, represents a fundamental shift in how people view their social and economic relations and is indicative of an increased emphasis on market economic relationships rather than ‘traditional’ social and economic relationships. As one might expect, this change is being led primarily by a younger generation no longer content with the ‘old ways’. While this is partly driven by the economic imperatives of a growing population it also reflects intergenerational changes in aspirations and expectations. Better educated than their fathers, second generation settlers now expect and demand to be paid market rates for their labour.

These new expectations, and the resultant shift to a *markim mun* strategy, are often the outcome of conflict and on-going social tensions between co-residents on a block. Conflicts often emerge on the monthly payday and sometimes erupt in violence particularly between fathers and sons and between brothers. Thus, the higher expectations of a younger generation together with falling per capita incomes from oil palm as a result of population growth are contributing to these social tensions and conflicts.

Another major transformation occurring on smallholder blocks is the diversification of non-oil palm income sources. Oil palm is now one of many income sources smallholders pursue as they respond to population and economic pressures. Many smallholders now seek supplementary income to augment oil palm income to maintain and strengthen their livelihoods. Income diversification is

being driven by second generation settlers as they reach adulthood, marry, and establish their own families on their parents' blocks. It should also be emphasised that a further purpose of seeking supplementary income sources is to maintain social cohesion and harmony amongst co-resident individuals and households.

The livelihood strategies that smallholders pursued when they first settled the schemes now appear much broader and include supplementary cash crops, increased reliance on food production for sale at local markets (and for domestic consumption), small business development (mostly stores and poultry production), wholesaling of betel nut and off-block employment. There is some evidence that off-block employment is a significant source of capital for investment in farm inputs, start-up capital for small businesses, housing and education.

Food production has always been important for meeting household consumption needs as has the income earned by women selling food at local markets. However, the importance of income earned from food production for household well-being is increasing as the numbers of families per block rises and per capita income from oil palm declines. Some families on multiple household blocks now depend primarily on local markets for their livelihoods. Food production, whether for domestic consumption or for sale at local markets, is a fundamental component of the livelihood strategies of the vast majority of LSS and VOP smallholders. Accordingly, the long-term viability of the smallholder sector depends to a considerable extent on the food and income security provided by access to gardening land. This is especially so during periods of depressed oil palm prices.

It is probable that as population and land pressures continue to rise on the LSS, an increasing proportion of settlers will be engaged in non-oil palm income activities, both on and off-farm. Economic diversification is therefore anticipated to increase on the LSS schemes at Bialla (and Hoskins) over the coming years. There is little doubt, however, that population growth, particularly on the LSS scheme, contains both risks and opportunities for the industry. On the LSS scheme continued population growth in the absence of a corresponding growth in income opportunities is likely to lead to greater social instability, especially if population growth were to fuel disputes between customary landowners and settlers. However, if a broadening of the economic base is promoted and it generates new income opportunities in line with population growth, then social instability is less likely to occur.

Through these projected demographic, social and economic changes, oil palm is likely to remain the cornerstone of the local economies by providing a platform upon which broader economic development can occur. The labour intensiveness of the oil palm industry (compared with, say, mining) means that considerable amounts of cash are widely dispersed amongst the populations and local economies of Bialla and Hoskins as payments to smallholders and wages to plantation labourers. This broad distribution of income in both local economies means that the conditions are present for more broadly-based economic development to occur. This process has commenced with diversification of income sources amongst settlers and VOP producers, the latter because of greater land availability.

By drawing attention to new ways in which smallholder oil palm labour is being organised and remunerated and the expanding income sources found on smallholder blocks, the study highlights the

adaptability of smallholders to respond to pressures and the changing circumstances on their block. While some smallholders are more successful than others in responding to change, or in taking up new opportunities, the overall picture is one of smallholders actively finding solutions and seeking new ways to maintain their livelihoods and household well-being. Further, by emphasising the changing context in which oil palm production now occurs, the study provides a more solid base from which to understand the factors affecting smallholder production and to develop appropriate extension interventions.

**Finding
Solutions to
Improve
Smallholder
Production**

In this section we briefly review the main constraints on smallholder production and outline some possible solutions to increase smallholder production.

**Under-
Harvesting**

We conservatively estimate that over 30,000 tonnes of smallholder fruit are lost to the Hargy mills each year, largely as a result of under-harvesting. While the primary cause of under-harvesting relates to constraints on the supply of labour for harvesting and block maintenance, the problem can be broken down into several components that vary amongst the key household types identified in the project area. First, however, mention must be made of the strong edge-effect identified both at Bialla and Hoskins, because this provides some clues about the nature of the problem.

Harvesting Edge-effects

The consistent and strong edge-effect in harvesting rates at both Bialla and Hoskins reveals the effect of distance on labour utilisation. Smallholders tend to concentrate their harvesting labour

at the front of the block nearest the roadside where the harvested fruit is stacked for collection by mill trucks. At the rear of the block harvested fruit often must be carted by wheelbarrow 200m or more to the roadside edge. Therefore, in a situation where labour shortages result in incomplete harvesting in a single harvest round, smallholders make the most use of available labour by concentrating on harvesting the fruit nearest the road. In this way smallholders are maximising the amount of fruit that can be harvested each round given the available labour.¹

While the edge-effect provides evidence that there are constraints limiting the supply of labour in smallholder oil palm production, the nature of these constraints and how they operate are difficult to identify. Also, the impact of the edge-effect on harvesting rates raises broader questions relating to the promotion of Phase 3 plantings at the rear of the block and applying fertiliser on the Phase 3 where harvesting rates are low. More information is required to understand how distance from the road affects strategies of labour utilisation and other farm management issues.

Labour Supply Issues

The supply of labour both within and between blocks is constrained, and is the primary reason for under-harvesting in the Bialla scheme. Labour shortages on many low population blocks and the social constraints that prevent labour being deployed on more populated blocks, contribute to high levels of under-harvesting. The absence of a market in labour in the smallholder sector exacerbates this situation. Confounding these issues further is the fact that many smallholder producers are ‘hobby’ or part-time growers/semi-retirees who produce to a level to achieve a target income. When this target income level is reached their motivation to produce oil palm declines

rapidly. Amongst this group would be some elderly LSS leaseholders (semi-retirees) without dependants and who, because of their health status and advanced age, are reluctant to work any harder and longer than is necessary to meet some minimal material requirements. Their economic aspirations tend to be lower than a younger family who, because of their younger age and higher educational attainment, tend to have higher material aspirations.

The largest component of the hobby/part-time farmer group, is VOP producers, who have a range of cash crop and subsistence options. For many VOP producers, their level of engagement in oil palm production is much more sensitive to relative cash crop prices, the demands of the customary economy and other subsistence options. Falling oil palm prices are therefore more likely to lead to a larger decline in VOP production than in LSS production because the latter's options are much more constrained.

Blocks facing absolute limits on labour supply tend to be single household blocks who, for a range of reasons, cannot call on kinship labour or are unwilling or unable to hire labour. Growers with insufficient labour on the block to assist with harvesting and block maintenance tend to be elderly leaseholders without sons living on the block, younger married leaseholders with dependant children and some caretaker blocks.

To overcome absolute labour shortages on single household blocks it is necessary for labour to be recruited off-block. The Mobile Card currently being trialled at Hoskins is one potential solution (see Koczberski *et al.*, 2001: 195-199). Given that a market in hired labour has not developed in the smallholder sector because of non-compliance with the 'labour contract', a mechanism that ensures

payment of labour may overcome this problem and increase the supply of labour.

At Hoskins, payment for Mobile Card labour is in FFB with a specified proportion of the fruit harvested using Mobile Card labour being used to pay that labour. The reluctance or inability of blockowners to pay cash for labour is overcome and contract labour is guaranteed timely payment. This payment transaction is attractive to blockowners because they are not required to outlay cash in advance and nor is it necessary for them to retain a portion of their monthly oil palm cheque for the payment of hired labour. Thus the probability of the blockholder not complying with the labour contract (deferred, under or non-payment of labour) is greatly reduced.

The principle underlying the Mobile Card – guaranteed payment of labour – could also be adapted for use on some multiple household blocks and low producing caretaker blocks where uncertain or disputed remuneration of caretakers has limited their productivity. For example, most caretakers rely on the leaseholder to pay them from the primary cheque each month. When caretakers are underpaid or their payments delayed by leaseholders, they lose interest in oil palm production, and productivity can be consistently low.

This study has identified under-harvesting as the major constraint on smallholder production. We provide the following recommendations:

Recommendation: the edge-effect in harvesting (and block maintenance) be investigated further with a small survey supervised by OPRA.

The edge-effect should be investigated by surveying harvesting rates by phase for blocks with road access on only one side of the block and for blocks with road access both at the rear and front of the block (some subdivision sections at Hoskins have fruit collection points at both ends of the block). If distance from the road is a key constraint on smallholder productivity then those blocks with both rear and front road access should have higher levels of productivity. Further, it would be useful to know how labour strategies vary between Phase 1 and Phase 3 plantings. Do certain household configurations (e.g. single or multiple household blocks) lend themselves to higher harvesting rates at the rear of the block.?

Recommendation: OPIC-Bialla and OPRA establish a trial of a version of the Mobile Card which is restricted to use on labour-short blocks, particular multiple household blocks and caretaker blocks. On caretaker blocks in the trial, the ‘caretaker card’ should replace the primary card.

On *markim mun*, multiple household blocks that regularly under-harvest despite the presence of under-employed labour, the principle of a Mobile Card could be used to free-up on-block labour. The Card would function more like a secondary papa card, and be rotated each month between co-resident households². Remuneration on this secondary card would be by an agreed proportion of the fruit harvested on that card, with the balance being paid to the primary card. Work associated with this new Card could be defined spatially (e.g., oil palm stands furthest from the road, thus reducing harvesting edge-effects), or the cardholder could work with the primary cardholder for that month. In any given month, therefore, three households would receive income from oil palm: the household holding the primary card for that month (the largest oil palm payment); the household collecting loose fruit (the Mama Card); and, the household holding the Mobile Card (the secondary card).

The principle of an ‘on-block’ Mobile Card should be trialled on caretaker blocks. A new card (Caretaker Card?), with an agreed

percentage split on the crop between caretaker and leaseholder, would encourage caretakers to harvest more of the crop. The caretaker would be guaranteed full and timely payment each month, and the incentive provided by a percentage split of the crop would raise caretaker productivity.

Recommendation: OPIC and OPRA to target under-harvesting in extension activities, especially during field days.

Extension efforts to promote full and complete harvesting should emphasise the following issues:

1. The higher production and income advantages of *wok-bung* over the *markim mun* harvesting strategies. Here, the importance of family cooperation and social cohesion for regular full harvesting should be emphasised³.
2. The income benefits to be derived by employing labour to achieve full harvesting – the Mobile Card could be promoted as a solution to labour shortages.
3. Improve growers' understanding of the potential income gains of fertiliser when combined with strategies to achieve full harvesting (OPRA has commenced this extension work at Popondetta).

Replanting Old and tall palms on the older subdivisions of Wilelo, Tiaru and Balima are rarely fully harvested and many old stands are not harvested at all. Harvesting tall palms is physically demanding work and too difficult for many elderly leaseholders. Replanting was initially delayed when the milling company disrupted the replanting programme by withdrawing credit facilities for smallholders in the mid 1990s. Replanting is now a priority for the new HOPL management and OPIC, and HOPL is considering extending credit facilities to smallholders for palm poisoning and possibly seedlings. In addition, in mid 2002, K400,000 became available through the Rural Development Bank (RDB) at Biialla for replanting.

Factors contributing to low replanting rates include credit restrictions, an unwillingness by smallholders to go further into debt

(15% interest on RDB loans), short-term income losses following poisoning of old palms, insecure tenure, old age, poor road conditions, lack of smallholder confidence in the industry, and a view by some smallholders that replanting is unnecessary. There is no doubt that for many growers replanting will result in financial hardship. A significant disincentive to replanting is the short-term financial ‘double disadvantage’ it causes. By this we mean smallholders are required to go into debt (replanting loan) at the same time as their capacity to repay loans is reduced through the loss of income from two hectares of poisoned palms. Blocks that would be hardest hit financially during replanting are those with only old strands of oil palm, VOP producers with a single, two hectare stand, and part-time/semi-retired smallholders. Multiple household blocks where oil palm income is already thinly spread amongst residents would also experience financial hardship during replanting.

Further, for smallholders replanting is a risky strategy, particularly in the context of fluctuating commodity prices, and other uncertainties such as income loss through illness, social conflicts or irregular and unpredictable fruit pickups. To overcome the short-term income risks and the financial ‘double disadvantage’ there is a need to introduce more flexible replanting options to meet the various needs and circumstances of smallholder households.

To lessen the financial hardship of replanting and to maintain household economic security, supplementary income sources should also be encouraged. In making this point we would argue that the promotion of supplementary income sources should not be limited to blocks undergoing replanting, but rather be an integral part of OPIC’s general extension strategies.

With population growth it is unlikely that diversification of income sources would disrupt or detract from oil palm production. The reverse is likely to be the case for two reasons. First, as noted throughout this report, livelihood diversification contributes to social stability and harmony amongst co-residents on a block. Oil palm production is often disrupted when there is conflict between co-residents. Conflict, particularly on multiple household blocks, makes smallholders less likely to consider long-term investments in oil palm and more likely to seek ways to avoid loan deductions. Second, many recent agricultural studies in Third World countries (e.g., Evans and Ngau 1991; de Janvry and Sadoulet 2001; Rigg & Nattapoolwat 2001) have revealed that income diversification, especially off-farm income, is associated with agricultural innovation and greater levels of farm investment. By reducing social conflict and lowering livelihood risks, income diversification, encourages and facilitates innovation and investment in farming. Diversification into non-oil palm income sources amongst smallholders is therefore not a threat to the industry; rather, it is an indicator of the successful maturation of the smallholder sector.

Due to the large area requiring replanting at Bialla and the need to maintain the productivity and viability of the smallholder sector, replanting requires immediate attention. While the company and OPIC are firmly committed to a replanting programme and are giving it high priority, there are insufficient RDB funds for the implementation of a full replanting programme. Additional funding is required for replanting, and OPIC and the company should pursue this issue as a matter of urgency. At the same time extension and industry strategies must be put in place to encourage smallholders to take up loan replanting packages. With this in mind we present the following recommendations:

Recommendation: improve access to credit for replanting

First, the RDB should relax its eligibility criteria for replanting loans, especially the requirement that a third phase of oil palm be in production before loan approval. Also, as outlined above, third phase plantings are typically under-harvested and should therefore not be encouraged unless there is clear evidence that the area would be regularly harvested.

Second, in the light of limited RDB funding, HOPL and OPIC should pursue suitable funding sources for replanting. Possible sources include the company itself extending credit to smallholders for replanting, or seeking international assistance from the World Bank, Asian Development Bank or AusAID. If international assistance were the preferred option, then this might be best approached as an industry-wide initiative working through OPIC with other PNG oil palm companies which have large areas of smallholder palms requiring replanting (i.e., Popondetta and Hoskins).

Third, in procuring credit from international organisations, such funding should be available to smallholders at concessional interest rates. Smallholders are reluctant to take on debt, and interest charges are a deterrent to investment in replanting. Therefore, if these loans were to be channelled through the RDB, for example, interest charges would need to be significantly lower than the 2002 rate of 15%. With interest-free loans, smallholders would be less inclined to postpone replanting for as long as possible.

Recommendation: develop a range of replanting options for smallholders to lessen the financial hardship of poisoning a full 2ha.

VOP producers with only two hectares of oil palm and some LSS smallholders be given the option of poisoning only one hectare of old palms. Once this is back in production, the second hectare could be poisoned and replanted. Other, related, replanting options should be explored by OPRA.

Recommendation: replanting package to include a Mobile Card on selected multiple household blocks.

For some multiple household blocks undertaking replanting, it may be useful to provide a Mobile Card so that they can earn income by harvesting other blocks while they wait for their new palms to come into production. The Card could become part of a ‘replanting package’ for blocks where severe financial pressure would result following palm poisoning.

Recommendation: The Board of the Bialla Growers’ Fund investigate the benefits to growers of extending the fund to cover replanting costs.

A longer-term option is for growers to accumulate savings in the years leading up to replanting, so that when replanting becomes necessary, sufficient funds have been set aside to pay all or a portion of the costs. The Bialla Growers Fund which was established by OPIC in 2002 (Chapter 2) may provide a vehicle for such saving. At present the fund’s priorities are tools and sexava treatment. However, OPIC, HOPL and some growers are considering extending the purview of the fund to fertiliser and replanting. The current levy of K1/tonne would need to be raised and this would require the consent of growers. The monthly contributions to the Growers’ Fund for replanting should be based on a 20 year repayment period, the productive life of oil palm. In this way, monthly deductions would be minimal, and growers would be more likely to agree to this option. For growers joining the scheme late (e.g., 10 years to replanting), over half the costs of replanting would be met (with interest accumulation) when replanting became due. Thus replanting would be less of a financial burden on growers.

Recommendation: promote non-oil palm supplementary income sources.

Encourage smallholders to prepare for the loss of income during replanting by promoting diversification of income sources such as the cultivation of quick return high value market crops (e.g., chillies, bananas, tobacco, etc.) on their replanted area or the rear section of their blocks. Further diversification should be encouraged by promoting small business development including small-scale businesses for the repair of wheelbarrows and tools. The creation of a more secure economic (and thus social) environment in the smallholder sector will raise growers’ confidence in the industry and their own futures with a consequent rise in their propensity to

innovate and to adopt a long-term view of their investments in oil palm (e.g., replanting).

Fertiliser A combination of factors explains the low rate of fertiliser use by Bialla smallholders. First, some growers have little awareness of the agronomic benefits of fertiliser and many are unaware of the recommended rates and methods of application. Second, growers' negative experience with fertiliser delivery by HOPL in 1999 has adversely affected their propensity to purchase fertiliser. As confidence in the company grows the issue of distrust will lessen, and smallholders' overall commitment to oil palm production, including fertiliser use, will increase.

Thirdly, some growers question the economic benefits of fertiliser. For a significant proportion of growers – those who regularly under-harvest – income gains from fertiliser may be marginal or negative. For these growers the only visible impact of fertiliser application is the monthly loan deductions for fertiliser. Many under-harvesters would not perceive an increase in production and income following applications of fertiliser. While more research is required on the economics of fertiliser from a smallholder perspective, some recommendations can be made at this stage.

Recommendation: OPIC and OPRA should encourage fertiliser purchases only amongst those growers who consistently harvest all or most of their crop.

Growers who regularly under-harvest and are unlikely to raise their harvesting rate should not be encouraged or feel compelled to purchase fertiliser (increased debt levels from fertiliser purchases may further reduce their already low productivity levels). Rather, extension advice should stress the importance of full harvesting for maximising the income gains from fertiliser. We therefore recommend a reappraisal of fertiliser field days and extension advice to smallholders. As discussed above, extension messages must

emphasise the income losses from under-harvesting, and educate growers on the relationships between harvesting rates, fertiliser use and smallholder income.

Further, by promoting fertiliser use only amongst growers who fully harvest their blocks, the production and income differentials between full-harvesters and under-harvesters would widen through time. Thus, the impact of fertiliser on yields and income would become apparent to other growers, and fully harvested blocks would serve as demonstration blocks. In this way, growers who regularly under-harvest would come to see the income benefits of fertiliser when fertiliser application goes hand-in-hand with full harvesting.

Recommendation: Where feasible, fertiliser application should be promoted on blocks where the Mobile Card is being used to raise harvesting rates.

Fertiliser application should be encouraged on labour-short blocks (e.g., single household blocks and elderly growers without sons) where the Mobile Card is being used to raise harvesting rates. The income benefits from fertiliser are more likely to be realised as the Mobile Card leads to higher harvesting rates.

**Low Levels of
Block
Maintenance**

Poor block maintenance is a constraint on smallholder productivity at Bialla. On the older subdivisions where poor block maintenance is associated with old and semi-abandoned stands of oil palm, it would be unrealistic to expect growers to invest labour in maintaining these stands. However, because these stands are largely an unproductive asset for smallholders there is a risk that they can become a reservoir for sexava. Replanting is therefore the only realistic option for old, unproductive stands. Maintenance will improve with replanting, as growers are better able to realise potential production and incomes.

While block maintenance would improve following implementation of most of the recommendations made so far, further improvements in standards of block maintenance are possible through women's greater involvement in this work. Despite the success of the Mama

Loose Fruit scheme in raising the proportion of loose fruit going to the mill, women's participation in the industry could be increased further with some minor modification of the scheme. Currently, Bialla 'Loose Fruit Mamas' are not permitted to place fruit bunches in the 'mama' nets. At Hoskins, some bunches are allowed to be included in each mama net, and this has provided a mechanism for men to pay their wives and daughters for other kinds of work on the block. Many Hoskins women now weed palm circles and maintain access paths, and are paid for this work in FFB. If some FFB were permitted on the mama net (e.g. 5 bunches per net), this would provide a mechanism for the payment of female labour beyond loose fruit collection.

Weeded palm circles and better access paths would not only lead to the evacuation of more loose fruit, but would improve the efficiency of harvesting labour in general, thus raising the harvesting rate of FFB.

Recommendation: Up to five fruit bunches be permitted to be weighed on each mama net.

Roads

A major constraint on smallholder productivity is the poor and deteriorating road infrastructure on the Bialla scheme. While the company is making major efforts to improve the reliability of transport schedules for pickup of smallholder fruit, the poor road network (including bridges) will continue to undermine company efforts to improve this area of their operations. With approximately 200km of roads requiring complete reconstruction and over 500km in need of urgent repair, funding will have to be sourced externally.

Because road infrastructure is in urgent need of repair on the other oil palm schemes in PNG, particularly Hoskins and Oro, OPIC and the companies should coordinate their efforts to secure international assistance from the World Bank, Asian Development Bank or AusAID. Such a request might best be part of an overall package that includes funds for replanting.

Recommendation: OPIC, HOPL and the other oil palm companies in PNG seek international assistance for the upgrading of road infrastructure.

As a final point to this report, it must be stressed the new management team of HOPL has made significant progress in repairing HOPL's relationship with OPIC and smallholders. From the mid 1990s until 2001 smallholder confidence in the industry was undermined by the delayed replanting programme, late and irregular pickups, fertiliser deliveries without growers' consent, cases of over-charging for fertiliser and the under-weighing of smallholder fruit by trucks contracted to the company. The distrust of the company created by these actions sapped smallholder confidence in the oil palm industry and had a negative impact on smallholder productivity and willingness to invest.

Smallholders are risk averse for good reason, and are reluctant to risk labour and capital where returns cannot be assured. The new management team has already made considerable progress towards restoring smallholder confidence in the industry but it must be recognised that this is a difficult and time-consuming task for all involved. Company commitment to the smallholder sector is perhaps most apparent to growers by the recent dramatic improvements in the reliability of fruit collection schedules.

Certainty of fruit pickup will encourage smallholders to commit more labour to oil palm. In a period of high prices together with the recent increase in mill capacity, the smallholder response should be that much more rapid. Further, as smallholder confidence in the reliability of fruit pickups increases, their trust in the company will grow, and they will be more likely to commit to long-term investments in their blocks. The company is already well on the way to rebuilding smallholder confidence in the industry.

ENDNOTES

1. In deciding harvesting strategies it is likely that growers take into account the height of palms. So, for instance, if Phase 1 is difficult to harvest because it has tall palms and Phase 2 has shorter palms, then harvesting may commence in Phase 2 rather than in Phase 1.
2. The recruitment of off-block labour on a multiple household block would likely exacerbate existing social tensions between co-residents.
3. It is unrealistic to recommend that *markim mun* blocks be encouraged to revert to *wok bung* strategies without also addressing the underlying issues that led to the adoption of *markim mun* strategies in the first place. Such issues include conflicts over the distribution of the income, and population and economic pressures on the block.

REFERENCES

- ADS (PNG). 2001. *Study of the Smallholder Oil Palm Sector. Achievements and Potential for Future Development*, Port Moresby, Papua New Guinea.
- Christensen, J. 1986. The development of the oil palm industry in Papua New Guinea: past present and future, *Harvest 11*(4): 136-141.
- Curry, G. & Koczberski, G. 1999. The risks and uncertainties of migration: an exploration of recent trends amongst the Wosera Abelam of Papua New Guinea, *Oceania 70*(2): 130-145.
- Dalzell, P.J. & Wright, A. 1990. Analysis of catch data from an artisanal coral reef fishery in the Tigak Islands, Papua New Guinea, *Papua New Guinea Journal of Agriculture, Forestry and Fisheries 35*(1-4): 23-36.
- Department for International Development (DFID). 1994. *Sustainable Livelihoods Guidance Sheets*, London.
- De Janvry, A. & Sadoulet, E. 2001 Income strategies among rural households in Mexico: the role of off-farm activities, *World Development 29*(3): 467-480.
- Evans, H. & Ngau, P. 1991. Rural-urban relations, households income diversification and agricultural productivity, *Development and Change 22*: 519-45.
- Hulme, D. 1984. *Land Settlement Schemes and Rural Development in Papua New Guinea*, Unpublished PhD thesis, James Cook University, Queensland.
- Jonas, W.J. 1972. Timber production in the Hoskins area, in J.P. Longayroux, Fleming, T. Ploeg, A., Shand, R.T., Straatmans, W.F. and Jonas, W. (eds), *Hoskins Development: The Role of Oil Palm and Timber*, New Guinea Research Bulletin No. 49, Australian National University, Canberra: p153-72.
- Koczberski, G., Curry, G., and Gibson, K. 2001. *Improving Productivity of the Smallholder Oil Palm Sector in Papua New Guinea. A socio-economic study of the Hoskins and Popondetta Schemes*. The

Australian National University, Department of Human Geography,
Canberra.

Landell Mills Ltd. 1991. *Smallholder Oil Palm Productivity Study, Volume 1: Main Report*, Bath, United Kingdom.

Lewis, F. 2000. *The 'Lus Frut Mama' Scheme: Developing Opportunities for Women in Agriculture. An Initiative of the OPIC Hoskins Project and New Britain Palm Oil Limited*, unpublished report, OPIC, Kimbe, Papua New Guinea.

Rigg, J. & Nattapoolwat, S. 2001. Embracing the global in Thailand: activism and pragmatism in an era of deagrarianization, *World Development* 29(6): 945-960.

Vegoa, A. 2002. Profile: Biialla Oil Palm Project, 2002. OPIC-Biialla, Papua New Guinea

APPENDIX 1

Factors identified by OPIC officers to explain high and low production among Hoskins smallholders

	HIGH PRODUCTION	LOW PRODUCTION
PHYSICAL FEATURES	Good soils. Good terrain conditions and drainage.	Poor soils. Poor terrain conditions and poor drainage.
AGRONOMIC AND FARM MANAGEMENT PRACTICES	Regular harvesting More likely to harvest rear section of block. Regular and correct use of fertiliser. Well maintained tools regularly available for harvesting. Well maintained block. Introduction of the Badang to overcome labour shortages, irregular harvesting and terrain problems.	Irregular harvesting. Low harvesting rate at rear of block. Harvesting rate decreases away from the road (i.e., strong edge-effect). Fertiliser use poor or irregular. Harvesting tools often unavailable for harvesting or broken and not repaired promptly. Poorly managed block.
LABOUR CHARACTERISTICS	Co-operation of all family members (<i>wok bung</i>) in production. Organised, hard-working family unit. Limited labour availability overcome by use of contract work (e.g., contract workers used to apply fertiliser and for block maintenance). Visitors provide additional labour for harvesting and block maintenance work.	Elderly blockowner with limited labour supply. Limited labour availability unable to be overcome. Usually the result of family conflict. Labour disorganised. Illness and poor health, but no support with block maintenance or harvesting.
INTRA-HOUSEHOLD RELATIONS AND DECISION MAKING	Family unity and cohesiveness.	Family conflict.
INCOME DISTRIBUTION	All the family benefits from income earned on block. All co-operate to harvest and maintain block.	Reluctance to share income. One person controls the money and thus little incentive for other family members to harvest. Too many visitors on the block wanting to share in the income. Can act as a disincentive to harvest regularly.
TIME AND CASH MANAGEMENT SKILLS	Good cash management. Community type distractions limited. Good time management. Limited demands on their time from customary obligations.	Community distractions which remove labour from oil palm production (e.g., funerals, local and community politics and customary obligations). Poor cash management. Spending money on beer often results in low block maintenance and less commitment to production
TENURE SECURITY		Inheritance problems on the LSS acts as a disincentive as ownership uncertain. Land disputes, either with customary owners or within the family.
ECONOMIC MOTIVATION	Economic pressure to earn a high income (e.g., some households motivated by school fees, debt repayments, etc. Once economic pressure is removed (e.g., payment of school fees) then the household can shift to lower production levels.	Limited or no economic pressure to earn a high income (e.g., VOPs blocks). Less economic pressure to harvest as they have greater access to subsistence and alternative sources of income (e.g., cocoa). Young people lack commitment to the industry, or pride in the block. They are interested in money, but not interested in maintaining the block.
LEVEL OF INTEREST		Multiple block owners. Several low producers are multiple block owners, especially on VOP. Lazy grower.

APPENDIX 2

Factors identified by OPIC officers to explain high and low production among Popondetta smallholders

	HIGH PRODUCTION	LOW PRODUCTION
PHYSICAL FEATURES	Favourable topography	Poor topography.
AGRONOMIC AND FARM MANAGEMENT PRACTICES	Regular harvesting. Owner harvests and maintains all the block. Adequate supply of tools.	Irregular and partial harvesting. Only harvests and maintains front section of the block. Lack of tools. Old palms on block. Grower tends to harvest only the younger and shorter palms.
LABOUR CHARACTERISTICS	Most family members involved with harvesting.	Family members unwilling to provide labour due to family conflicts. Off-block employment – less labour for oil palm.
INTRA-HOUSEHOLD RELATIONS AND DECISION MAKING	Co-operation between family members. Disputes rare.	Disputes within family. Mainly between brothers, between fathers and sons and sometimes between sons and step-fathers.
INCOME DISTRIBUTION	Fair distribution of income within family.	Unequal distribution of income acts as disincentive to family members to harvest.
TIME AND CASH MANAGEMENT SKILLS	Good cash management. Balanced social and community obligations.	Poor cash management. Customary obligations takes time away from oil palm production.
TENURE SECURITY		Land ownership disputes on VOP blocks. Some blocks being reclaimed or compensation demands made. Insecurity of tenure of LSS blockowners acts as disincentive to production and improving living standards.
ECONOMIC MOTIVATION	Rely heavily on oil palm income and block to provide family sustenance. No alternatives. Fall in oil palm prices has only limited impact on production.	VOP smallholders have good access to garden land and other subsistence resources. Do not need to rely heavily on oil palm. Fall in oil palm prices acts as disincentive. Some stop harvesting and maintaining the block.
LEVEL OF INTEREST	Personal character. Competitive and plans ahead. Readily listens to extension advice.	Personal character. Grower 'lacks vision and initiative'. Some growers resist change. Unwilling to listen to extension advice.

