

166305
9
2002 | 08 | 31

4.5000L

**INFLUENCE OF CROP PROFITABILITY, MARKET,
LABOUR AND LAND ON SMALLHOLDER CROPPING
SYSTEMS IN RUBBER GROWING AREAS OF SRI LANKA**

T. M. S. P. K. Thennakoon
B.A. (Honours), Sri Lanka

A thesis submitted to the University of Wales

for the degree
of
Doctor of Philosophy

166305

School of Agricultural and Forest Sciences
University of Wales
Bangor, United Kingdom

July 2002

CONTENTS

	<i>Page</i>
CONTENTS	I
LIST OF TABLES	IX
LIST OF FIGURES	XI
LIST OF PLATES	XV
LIST OF ABBREVIATIONS	XVI
LIST OF LOCAL NAMES	XVIII
ABSTRACT	XIX
CHAPTER 1: GENERAL INTRODUCTION	1
1.1 Introduction	1
1.2 Development of cropping systems in Sri Lanka	1
1.2.1 <i>Physical and socio-economic background</i>	1
1.2.2 <i>Development of cropping systems in Sri Lanka from 6 B.C. to 1505 A.D.</i>	2
1.2.3 <i>Influence of colonialism on cropping systems</i>	4
1.2.4 <i>Recent trends in Sri Lankan agriculture</i>	7
1.2.4.1 <i>Influence of colonization and land reform on agriculture</i>	7
1.2.4.2 <i>Impact of "Green revolution" on Sri Lankan agriculture</i>	9
1.2.4.3 <i>Influence of urbanization and industrialization on agriculture</i>	11
1.3 Importance of rubber as a smallholder crop	13
1.3.1 <i>Importance of rubber based cropping systems</i>	13
1.3.2 <i>Other important crops in rubber growing areas</i>	14
1.4 Socio-economic factors governing smallholder cropping systems	15
1.4.1 <i>Market accessibility and crop profitability</i>	15
1.4.2 <i>Labour availability (amount and skills)</i>	16
1.4.3 <i>Land availability</i>	17

1.5 Existing gaps in socio-economic research in smallholder context in Sri Lanka	18
1.6 Aims and objectives	20
CHAPTER 2: GENERAL METHODOLOGY	22
2.1 Theoretical background	22
2.2 Methodological framework	23
2.2.1 <i>Preliminary survey and selection of the study area</i>	23
2.2.2 <i>Selection of a sub sample of villages</i>	25
2.2.3 <i>Preparation for fieldwork</i>	28
2.2.4 <i>Data collection</i>	28
2.3 Maintenance of field notes	33
2.4 Data organization and analysis	34
2.5 Methodology for large-scale livelihood survey	34
CHAPTER 3: CHARACTERISATION OF THE PHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT OF VILLAGES LOCATED IN THE WET AND INTERMEDIATE ZONES OF SRI LANKA	
3.1 Introduction	37
3.2 Materials and methods	42
3.2.1 <i>Agro-climatic conditions</i>	43
3.2.1.1 <i>Rainfall</i>	43
3.2.1.2 <i>Soil</i>	43
3.2.1.3 <i>Topography</i>	43
3.2.2 <i>Capital assets and rural income generating activities</i>	44
3.2.2.1 <i>Participatory analysis of capital assets</i>	44
3.2.2.2 <i>Income-generating activities</i>	46
3.2.3 <i>Analysis of major cropping systems</i>	49
3.2.4 <i>Analysis of data</i>	50
3.3 Results	51
3.3.1 <i>Physical characteristics of selected villages</i>	51
3.3.1.1 <i>Village locations and topography</i>	51
3.3.1.2 <i>Soil conditions</i>	52

3.3.1.3	<i>Rainfall</i>	52
3.3.2	<i>Livelihood analysis</i>	56
3.3.2.1	<i>Analysis of capital assets</i>	56
3.3.2.2	<i>Income-generating activities</i>	60
3.3.3	<i>Agricultural land use systems</i>	64
3.3.3.1	<i>Major agricultural land use systems</i>	64
3.3.3.2	<i>Homegardens</i>	64
3.4	Discussion	68
3.4.1	<i>Major variations in the physical environment</i>	68
3.4.2	<i>Differences in capital assets amongst villages</i>	69
3.4.3	<i>Variation in income-generating activities amongst villages</i>	73
3.4.4	<i>Variation in land use amongst villages</i>	75
3.4.5	<i>Conclusions</i>	77
3.4.6	<i>Methodological insights</i>	78

CHAPTER 4: CROP PROFITABILITY AND MARKET FACTORS INFLUENCING SMALLHOLDER CROPPING SYSTEMS

4.1	Introduction	80
4.2	Materials and methods	84
4.2.1	<i>Marketing analysis</i>	85
4.2.1.1	<i>Selection of markets</i>	85
4.2.1.2	<i>Data collection and sampling methods</i>	86
4.2.1.2.1	<i>Sampling methods</i>	86
4.2.1.2.2	<i>Data collection</i>	88
4.2.2	<i>Analyses of benefits and costs of selected crops</i>	91
4.2.2.1	<i>Benefit/cost analysis of tea and rubber</i>	91
4.2.2.2	<i>Benefit/cost analysis of banana, pepper and arecanut</i>	92
4.2.3	<i>Farmer preference for different varieties of banana</i>	94
4.2.4	<i>Data analysis</i>	94
4.2.4.1	<i>Analysis of marketing margins</i>	94
4.2.4.2	<i>Discounted cash flow analysis</i>	95
4.3	Results	98

4.3.1	<i>Marketing channels</i>	98
4.3.2	<i>Market supplies and competition</i>	99
4.3.3	<i>Analysis of the price variation</i>	103
4.3.3.1	<i>Price variation influenced by the quality of the product</i>	103
4.3.3.2	<i>Temporal price variation</i>	104
4.3.3.3	<i>Analyses of spatial price variation amongst the markets</i>	109
4.3.3.4	<i>Cyclical variation in price of tea and rubber</i>	110
4.3.4	<i>Analysis of marketing margins</i>	112
4.3.5	<i>Infrastructural development and obstacles to marketing</i>	112
4.3.6	<i>Preference for different banana varieties</i>	115
4.3.7	<i>Financial assessment of profitability in selected crops</i>	119
4.4	Discussion	122
4.4.1	<i>Major marketing factors determining accessibility of markets for products</i>	123
4.4.2	<i>Influences of market accessibility and price behaviour on smallholder cropping systems</i>	125
4.4.3	<i>Influence of crop profitability on smallholders' crop selection</i>	129
4.4.4	<i>Combined effects of market accessibility, price variation and profitability on crop selection</i>	131
4.4.5	<i>Conclusions</i>	133
4.4.6	<i>Methodological insights</i>	134

CHAPTER 5: FACTORS INFLUENCING LABOUR AVAILABILITY ON SMALLHOLDINGS IN TWO AGRO-CLIMATIC ZONES OF SRI LANKA

5.1	Introduction	136
5.2	Materials and methods	141
5.2.1	<i>Selection of villages and sampling methods</i>	141
5.2.2	<i>Data collection</i>	142
5.2.2.1	<i>Factors influencing the type of labour used on-farm</i>	142

5.2.2.2	<i>Relationship between different cultivation activities and labour skills, gender and labour type</i>	145
5.2.2.3	<i>Data for the analyses of labour usage</i>	147
5.2.2.4	<i>Data for the analysis of seasonality of labour demand</i>	148
5.2.2.5	<i>Relationship between survival rate of banana and level of weeding and family labour availability</i>	149
5.2.2.6	<i>Reasons for cultivating banana within the large-scale community of Sri Lanka</i>	150
5.2.3	Data analysis	150
5.3	Results	151
5.3.1	Comparison of labour use amongst villages	151
5.3.2	Factors influencing the type of labour used	152
5.3.2.1	<i>Level of education</i>	153
5.3.2.2	<i>Occupation of the household head</i>	154
5.3.2.3	<i>Level of inter-familial relationship</i>	155
5.3.3	Comparison of socio-economic indices amongst villages	156
5.3.4	Association between cultivation activities, labour skills, labour type and gender	159
5.3.4.1	<i>Labour skills</i>	159
5.3.4.2	<i>Gender</i>	163
5.3.4.3	<i>Type of labour used for different crop activities</i>	166
5.3.4.4	<i>Spatial variation in type of labour used for cultivation activities</i>	168
5.3.5	Labour demand	170
5.3.5.1	<i>Total labour inputs and costs</i>	170
5.3.5.2	<i>Seasonality of labour demand</i>	173
5.3.6	Case study of banana	177
5.3.6.1	<i>Banana growers in the Wet and Intermediate Zones</i>	177
5.3.6.2	<i>Priorities for cultivating banana</i>	177
5.3.6.3	<i>Factors determining the survival rate of banana plants</i>	177
5.4	Discussion	179

5.4.1	<i>Type of labour used and labouring skills</i>	179
5.4.2	<i>Association between type of labour used, gender and cultivation activities for selected crops</i>	182
5.4.3	<i>Influence of seasonality in labour demand on smallholder cropping systems</i>	184
5.4.4	<i>Effects of quantity of labour and labouring skills on cropping systems</i>	185
5.4.5	<i>Conclusions</i>	190
5.4.6	<i>Methodological insights</i>	192

CHAPTER 6: FACTORS INFLUENCING LAND AVAILABILITY AND LAND USE

6.1	Introduction	193
6.2	Materials and methods	199
6.2.1	<i>Selection of villages and sampling methods</i>	199
6.2.2	<i>Data collection</i>	200
6.2.2.1	<i>Land size and ownership</i>	200
6.2.2.2	<i>Factors influencing land availability (size and ownership)</i>	201
6.2.2.3	<i>Historical changes in land use</i>	203
6.2.2.4	<i>Factors influencing the selection of cropping systems</i>	203
6.2.2.5	<i>Associations between land size and cropping intensity</i>	205
6.2.2.6	<i>Associations between land ownership and cropping practices</i>	206
6.2.3	<i>Data analysis</i>	207
6.3	Results	208
6.3.1	<i>Spatial variation of land size and land ownership</i>	208
6.3.2	<i>Factors determining land availability (size/ ownership)</i>	209
6.3.2.1	<i>Income level</i>	209
6.3.2.2	<i>Population density and distance to the capital</i>	210
6.3.2.3	<i>Government policies on land distribution</i>	211

6.3.2.4	<i>Traditional systems of land ownership</i>	212
6.3.3	<i>Present status of cropping system</i>	213
6.3.3.1	<i>Plantation crops (tea and rubber)</i>	214
6.3.3.2	<i>Semi-permanent crops (banana and citronella grass)</i>	216
6.3.3.3	<i>Homegarden crops (pepper and arecanut)</i>	217
6.3.3.4	<i>Seasonal crops (paddy and chena crops)</i>	219
6.3.4	<i>Constraints to land productivity</i>	221
6.3.5	<i>Historical comparison of land use changes</i>	222
6.3.6	<i>Factors determining land use systems</i>	224
6.3.6.1	<i>Land size</i>	224
6.3.6.2	<i>Land ownership</i>	229
6.3.6.3	<i>Proximity of cropland to homestead</i>	230
6.3.6.4	<i>Income levels and crop type</i>	231
6.3.6.5	<i>Soil erosion and fertility</i>	231
6.3.6.6	<i>Case study of rubber-based cropping systems</i>	233
6.4	Discussion	236
6.4.1	<i>Differences in land size, ownership and land quality in villages of the Intermediate and Wet zones</i>	236
6.4.2	<i>Combined effect of land related factors on smallholder cropping systems</i>	238
6.4.2.1	<i>Land size and quality of the land</i>	238
6.4.2.2	<i>Income level and land ownership</i>	243
6.4.2.3	<i>Proximity to the land and water facilities</i>	245
6.4.3	<i>Conclusions</i>	248
6.4.4	<i>Methodological insights</i>	249
 CHAPTER 7: GENERAL DISCUSSION		
7.1	Rural livelihoods in rubber growing areas	250
7.2	How crop profitability, market, labour and land influence the cropping systems of smallholder farmers	254
7.2.1	<i>Plantation crops (rubber and tea based cropping systems)</i>	255
7.2.2	<i>Semi-permanent crops (banana and citronella grass)</i>	260

7.2.3	<i>Homegarden crops (arecanut and pepper)</i>	263
7.2.4	<i>Seasonal crops (chena crops and paddy)</i>	265
7.3	Strategies to develop smallholder cropping systems	267
7.4	Conclusions	272
7.5	Further methodological insights and recommendations	273
BIBLIOGRAPHY		276
Appendix 2.1:	The checklist used to collect overall socio-economic information using key informants in the villages.	300
Appendix 2.2:	The checklist used to gather detailed information on land, labour, extension services and farm profitability.	302
Appendix 2.3:	The checklist used to gather detailed information on marketing channels.	304
Appendix 2.4:	Questionnaire used to assess the reasons for growing banana in part of the livelihood survey.	306
Appendix 2.5:	The method used to rank the reasons for the selection and non-selection of rubber based cropping systems.	307
Appendix 2.6:	The method used to organize detailed information.	308
Appendix 5.1:	Summary information of ranking labour skills.	309
Appendix 5.2:	Relationship between education level and the type of occupation.	310
Appendix 5.3:	Relationship between level of weeding and labour availability.	310
Appendix 6.1:	Indicators used to measure level of soil erosion and fertility in rubber smallholdings.	311
Appendix 6.2:	GLM analysis comparing villages in terms of average land size.	312
Appendix 6.3:	Relationship between soil erosion and fertility.	312
Appendix 6.4:	Summary information on growth rate, soil fertility and distance between homestead and rubber smallholdings.	312
Appendix 6.5:	Selection of crops depending on different land size, ownership and income sources in <i>Wegantale</i> .	313