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

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 Physical and socio-economic background ........ 1
   1.2.2 Development of cropping systems in Sri Lanka from 6 B.C. to 1505 A.D. 2
   1.2.3 Influence of colonialism on cropping systems .... 4
   1.2.4 Recent trends in Sri Lankan agriculture .......... 7
      1.2.4.1 Influence of colonization and land reform on agriculture ........ 7
      1.2.4.2 Impact of "Green revolution" on Sri Lankan agriculture .......... 9
      1.2.4.3 Influence of urbanization and industrialization on agriculture .... 11
1.3 Importance of rubber as a smallholder crop .......... 13
   1.3.1 Importance of rubber based cropping systems .... 13
   1.3.2 Other important crops in rubber growing areas ... 14
1.4 Socio-economic factors governing smallholder cropping systems 15
   1.4.1 Market accessibility and crop profitability .... 15
   1.4.2 Labour availability (amount and skills) .......... 16
   1.4.3 Land availability ........................ 17
1.5 Existing gaps in socio-economic research in smallholder context in Sri Lanka

1.6 Aims and objectives

CHAPTER 2: GENERAL METHODOLOGY

2.1 Theoretical background

2.2 Methodological framework

2.2.1 Preliminary survey and selection of the study area

2.2.2 Selection of a sub sample of villages

2.2.3 Preparation for fieldwork

2.2.4 Data collection

2.3 Maintenance of field notes

2.4 Data organization and analysis

2.5 Methodology for large-scale livelihood survey

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

3.2 Materials and methods

3.2.1 Agro-climatic conditions

3.2.1.1 Rainfall

3.2.1.2 Soil

3.2.1.3 Topography

3.2.2 Capital assets and rural income generating activities

3.2.2.1 Participatory analysis of capital assets

3.2.2.2 Income-generating activities

3.2.3 Analysis of major cropping systems

3.2.4 Analysis of data

3.3 Results

3.3.1 Physical characteristics of selected villages

3.3.1.1 Village locations and topography

3.3.1.2 Soil conditions
3.3.1.3 Rainfall

3.3.2 Livelihood analysis
   3.3.2.1 Analysis of capital assets
   3.3.2.2 Income-generating activities

3.3.3 Agricultural land use systems
   3.3.3.1 Major agricultural land use systems
   3.3.3.2 Homegardens

3.4 Discussion
   3.4.1 Major variations in the physical environment
   3.4.2 Differences in capital assets amongst villages
   3.4.3 Variation in income-generating activities amongst villages
   3.4.4 Variation in land use amongst villages
   3.4.5 Conclusions
   3.4.6 Methodological insights

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

4.1 Introduction

4.2 Materials and methods
   4.2.1 Marketing analysis
      4.2.1.1 Selection of markets
      4.2.1.2 Data collection and sampling methods
         4.2.1.2.1 Sampling methods
         4.2.1.2.2 Data collection
   4.2.2 Analyses of benefits and costs of selected crops
      4.2.2.1 Benefit/cost analysis of tea and rubber
      4.2.2.2 Benefit/cost analysis of banana, pepper and arecanut
   4.2.3 Farmer preference for different varieties of banana

4.2.4 Data analysis
   4.2.4.1 Analysis of marketing margins
   4.2.4.2 Discounted cash flow analysis

4.3 Results
4.3.1 Marketing channels
4.3.2 Market supplies and competition
4.3.3 Analysis of the price variation
  4.3.3.1 Price variation influenced by the quality of the product
  4.3.3.2 Temporal price variation
  4.3.3.3 Analyses of spatial price variation amongst the markets
  4.3.3.4 Cyclical variation in price of tea and rubber
4.3.4 Analysis of marketing margins
4.3.5 Infrastructural development and obstacles to marketing
4.3.6 Preference for different banana varieties
4.3.7 Financial assessment of profitability in selected crops
4.4 Discussion
  4.4.1 Major marketing factors determining accessibility of markets for products
  4.4.2 Influences of market accessibility and price behaviour on smallholder cropping systems
  4.4.3 Influence of crop profitability on smallholders’ crop selection
  4.4.4 Combined effects of market accessibility, price variation and profitability on crop selection
  4.4.5 Conclusions
  4.4.6 Methodological insights

CHAPTER 5: FACTORS INFLUENCING LABOUR AVAILABILITY ON SMALLHOLDINGS IN TWO AGRO-CLIMATIC ZONES OF SRI LANKA
5.1 Introduction
5.2 Materials and methods
  5.2.1 Selection of villages and sampling methods
  5.2.2 Data collection
    5.2.2.1 Factors influencing the type of labour used on-farm
5.2.2.2 Relationship between different cultivation activities and labour skills, gender and labour type

145

5.2.2.3 Data for the analyses of labour usage

147

5.2.2.4 Data for the analysis of seasonality of labour demand

148

5.2.2.5 Relationship between survival rate of banana and level of weeding and family labour availability

149

5.2.2.6 Reasons for cultivating banana within the large-scale community of Sri Lanka

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 Level of education

153

5.3.2.2 Occupation of the household head

154

5.3.2.3 Level of inter-familial relationship

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 Labour skills

159

5.3.4.2 Gender

163

5.3.4.3 Type of labour used for different crop activities

166

5.3.4.4 Spatial variation in type of labour used for cultivation activities

168

5.3.5 Labour demand

170

5.3.5.1 Total labour inputs and costs

170

5.3.5.2 Seasonality of labour demand

173

5.3.6 Case study of banana

177

5.3.6.1 Banana growers in the Wet and Intermediate Zones

177

5.3.6.2 Priorities for cultivating banana

177

5.3.6.3 Factors determining the survival rate of banana plants

177

5.4 Discussion

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

CHAPTER 6: FACTORS INFLUENCING LAND AVAILABILITY AND LAND USE
6.1 Introduction
6.2 Materials and methods
   6.2.1 Selection of villages and sampling methods
   6.2.2 Data collection
      6.2.2.1 Land size and ownership
      6.2.2.2 Factors influencing land availability (size and ownership)
      6.2.2.3 Historical changes in land use
      6.2.2.4 Factors influencing the selection of cropping systems
      6.2.2.5 Associations between land size and cropping intensity
      6.2.2.6 Associations between land ownership and cropping practices
   6.2.3 Data analysis
6.3 Results
   6.3.1 Spatial variation of land size and land ownership
   6.3.2 Factors determining land availability (size/ownership)
      6.3.2.1 Income level
      6.3.2.2 Population density and distance to the capital
      6.3.2.3 Government policies on land distribution
6.3.2.4 Traditional systems of land ownership

6.3.3 Present status of cropping system

6.3.3.1 Plantation crops (tea and rubber)

6.3.3.2 Semi-permanent crops (banana and citronella grass)

6.3.3.3 Homegarden crops (pepper and arecanut)

6.3.3.4 Seasonal crops (paddy and chena crops)

6.3.4 Constraints to land productivity

6.3.5 Historical comparison of land use changes

6.3.6 Factors determining land use systems

6.3.6.1 Land size

6.3.6.2 Land ownership

6.3.6.3 Proximity of cropland to homestead

6.3.6.4 Income levels and crop type

6.3.6.5 Soil erosion and fertility

6.3.6.6 Case study of rubber-based cropping systems

6.4 Discussion

6.4.1 Differences in land size, ownership and land quality in villages of the Intermediate and Wet zones

6.4.2 Combined effect of land related factors on smallholder cropping systems

6.4.2.1 Land size and quality of the land

6.4.2.2 Income level and land ownership

6.4.2.3 Proximity to the land and water facilities

6.4.3 Conclusions

6.4.4 Methodological insights

CHAPTER 7: GENERAL DISCUSSION

7.1 Rural livelihoods in rubber growing areas

7.2 How crop profitability, market, labour and land influence the cropping systems of smallholder farmers

7.2.1 Plantation crops (rubber and tea based cropping systems)

7.2.2 Semi-permanent crops (banana and citronella grass)
7.2.3 Homegarden crops (arecanut and pepper)
7.2.4 Seasonal crops (chena crops and paddy)

7.3 Strategies to develop smallholder cropping systems
7.4 Conclusions
7.5 Further methodological insights and recommendations

BIBLIOGRAPHY

Appendix 2.1: The checklist used to collect overall socio-economic information using key informants in the villages.
Appendix 2.2: The checklist used to gather detailed information on land, labour, extension services and farm profitability.
Appendix 2.3: The checklist used to gather detailed information on marketing channels.
Appendix 2.4: Questionnaire used to assess the reasons for growing banana in part of the livelihood survey.
Appendix 2.5: The method used to rank the reasons for the selection and non-selection of rubber based cropping systems.
Appendix 2.6: The method used to organize detailed information.
Appendix 5.1: Summary information of ranking labour skills.
Appendix 5.2: Relationship between education level and the type of occupation.
Appendix 5.3: Relationship between level of weeding and labour availability.
Appendix 6.1: Indicators used to measure level of soil erosion and fertility in rubber smallholdings.
Appendix 6.2: GLM analysis comparing villages in terms of average land size.
Appendix 6.3: Relationship between soil erosion and fertility.
Appendix 6.4: Summary information on growth rate, soil fertility and distance between homestead and rubber smallholdings.
Appendix 6.5: Selection of crops depending on different land size, ownership and income sources in Wegantale.