ECONOMIC EFFICIENCY OF SHARECROPPING IN DRYLANDS:
A CASE STUDY OF GUM ARABIC PRODUCTION
IN KORDOFAN GUM BELT, SUDAN

ELRASHIED ELIMAM ELKHIDIR

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ECONOMIC EFFICIENCY OF SHARECROPPING IN DRYLANDS: A CASE STUDY OF GUM ARABIC PRODUCTION IN KORDOFAN GUM BELT, SUDAN

By

ELRASHIED ELIMAM ELKHIDIR

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of Requirement for the Degree of Doctor of Philosophy

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To my father Professor Dr. Elimam Elkhidir,

who always being there for me during my education.
The enigma of sharecropping as an economic institution of resource allocation has a long history and always been a fruitful source of controversy in economic literature. The Marshallian economists generally condemned sharecropping as an inefficient institution in that it did not provide incentives to the sharecroppers, because producers had to share the output with the landlords, while the Cheungian economists claimed sharecropping to be as efficient as any other tenure system. This study examines the empirical validity of these two approaches, using evidence from the Kordofan gum arabic orchards of Sudan.

This study was planned mainly to examine the differences in input and output intensities among the mixed and pure sharecroppers of gum arabic orchards. Mixed sharecroppers are gum farmers who rent-in land besides cultivating own land. Pure sharecroppers are gum farmers who rent-in land with no land of their own. We examined these differences by modeling three comparison cases. Case (A) compares input and output differences on owned versus sharecropped gum orchards of mixed sharecroppers. Case (B) compares input and output differences on the owned
orchards of mixed sharecroppers with the gum orchards of pure sharecroppers. Case (C) compares input and output differences on the shared gum orchards of mixed sharecroppers with the gum orchards of pure sharecroppers.

The significance of these differences in input and output intensities was measured by employing two test procedures. An F-test based on Hotelling's $T^2$ statistic was employed to measure the significance of differences in input and output intensities of comparable but different cases. The second test, which is based on Shaban's methodology, measures the impact of tenancy on input and output intensities by isolating the pure tenancy effect from the total variation in input and output intensities. Shaban's methodology was modified to incorporate five new variables: gum orchard size, gum trees capital services flow, gum trees tapping intensity, rainfall and its fluctuation, and soil type, in the model.

The findings of the study reveal that total differences in inputs and output intensities across the tenure systems can be explained by differences in gum orchard size, gum trees capital services flow, gum trees tapping intensity, rainfall and its fluctuation, soil type and the tenancy effect. The tenancy effect and gum orchard specific characteristics (in particular differences in gum orchard size, gum trees capital services flow, rainfall and its fluctuation, and tapping intensity) are the most significant factors in determining inputs and output intensities.

The results of this study also indicate that the impact of tenancy is stronger and more sizeable for those inputs that are not shared by the gum orchard owner. Mixed sharecroppers apply more family labour in their owned-operated gum orchards than in the shared-operated orchards they tap. Among the shared inputs, differences in
input intensity are sizeable and significant for other inputs variable. There are similar results in case (B) (comparing owned-operated gum orchards of mixed sharecroppers and pure sharecroppers), though differences in inputs and output intensities are relatively smaller, a result consistent with Bell’s findings.

Our case (C) comparison between mixed sharecroppers and pure sharecroppers is fully corroborating Bell’s findings. A sharecropper-owned resources such as family labour is used more intensively in pure sharecropped gum orchards in the case (C) comparison. Input intensity of other inputs is mainly determined by input share rules applicable to them. Mixed as well as pure sharecroppers’ input intensity increases when their gum orchard owners share these inputs.

Our empirical results, moreover, contain some implications for the theoretical controversy between the traditional and the Cheungian views of land tenure arrangements. Our results, which confirm and extend the earlier views of Bell and Shaban, support the traditional view of the matter; in some relative sense sharecropping arrangements are less efficient than production on owned gum orchards.
Abstrak tesis yang dikemukakan kepada Senat of Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah.

KEBERKESANAN EKONOMI PERKONGSIAN KEUNTUNGAN DI TANAH KERING: SATU KAJIAN KES PENGELUARAN GAM ARAB DI KORDOFAN GUM BELT, SUDAN

Oleh

ELRASHIED ELIMAM ELKHIDIR

Mac 2003

Pengerusi: Profesor Ahmad Zubaidi Baharumshah, Ph.D.

Fakulti: Ekonomi dan Pengurusan


Kajian ini dirancang untuk mengkaji perbezaan intensiti input dan output di antara pihak berkongsi keuntungan tulen dan campuran bagi kebun gam Arab. Pihak yang berkongsi keuntungan campuran merupakan peladang gam yang menyewa tanah disamping mengusahakan tanah sendiri. Manakala pihak berkongsi keuntungan tulen merupakan peladang gam yang menyewa tanah dan tidak mempunyai sendiri.
Perbezaan ini dikaji melalui perbandingan model untuk tiga kes berikut. Kes (A) membandingkan perbezaan input dan output di antara pihak tuan tanah dengan pihak peladang berkongsi keuntungan. Kedua-duanya berkongsi untung campuran. Kes (B) membandingkan perbezaan input dan output di antara pihak tuan tanah yang berkongsi keuntungan campuran dengan pihak yang berkongsi keuntungan tulen. Kes (C) pula mengkaji perbezaan input dan output di antara kebun gam pihak peladang yang berkongsi keuntungan campuran dengan kebun gam kepunyaan pihak berkongsi keuntungan tulen.

Kesignifikanan perbezaan intensiti input dan output diukur melalui dua kaedah ujian. Ujian F yang berdasarkan statistik Hotelling’s $T^2$ digunakan bagi mengukur signifikan perbezaan input dan output bagi kes yang berbeza. Ujian kedua yang berdasarkan metodologi Shaban pula mengukur kesan penyewaan terhadap input dan output dengan mengasingkan kesan penyewaan tulen daripada jumlah variasi intensiti-intensiti input dan output. Model Shaban telah diubahsuaikan dengan mengambilkira lima pembolehubah baru iaitu saiz kebun gam, aliran khidmat kapital pokok gam, keamatan torehan pokok gam, taburan hujan dan perubahannya, serta jenis tanah.

Penemuan kajian mendapati jumlah perbezaan antara input dan output (bagi sistem-sistem yang dikenalpasti) boleh diterangkan melalui perbezaan dalam saiz kebun gam, aliran khidmat kapital pokok gam, intensiti torehan pokok gam, taburan hujan dan perubahannya, jenis tanah dan sistem penyewaan. Sistem penyewaan dan ciri-ciri spesifik berkaitan kebun gam (khasnya perbezaan dalam saiz kebun gam, aliran khidmat kapital pokok gam, taburan dan perubahannya serta keamatan
torehan) merupakan faktor-faktor yang paling signifikan dalam menentukan intensiti input dan output.

Hasil kajian turut menunjukkan bahawa sistem penyewaan adalah lebih bermakna dan lebih mudah diukur bagi input-input yang tidak dikongsi oleh pemilik kebun gam. Pihak berkongsi keuntungan campuran menggunakan lebih banyak tenaga kerja keluarga untuk mengusahakan kebun sendiri berbanding kebun yang dikongsi. Di antara input yang dikongsi, perbezaan dalam intensiti input boleh diukur dan signifikan bagi pembolehubah input yang lain. Walaupun perbezaan di antara keamatan input dan output secara relatifnya adalah kecil, hasil yang sama telah diperolehi bagi kes (B) (membandingkan kebun gam yang diusahakan sendiri oleh pihak berkongsi keuntungan campuran dan tulen). Hasil kajian ini konsisten dengan penemuan Bell.

Perbandingan di antara pihak berkongsi keuntungan campuran dan tulen dalam kes (C) menyokong penuh penemuan Bell. Perbandingan ini mendapati sumber kepunyaan pihak berkongsi keuntungan seperti bekalan tenaga kerja daripada pihak keluarga digunakan secara lebih intensif ke atas kebun gam pihak berkongsi keuntungan tulen. Intensiti bagi input yang lain adalah ditentukan oleh peraturan perkongsian input. Intensiti input bagi pihak berkongsi keuntungan campuran dan tulen meningkat apabila pemilik-pemilik kebun berkongsi input-input tersebut.

Implikasi kajian ini adalah ketara, khasnya dari segi kontroversi teori di antara pendapat tradisional dan Cheungian dalam sistem penyewaan tanah. Penemuan kajian ini menyokong dan mendalami pendapat awal Bell dan Shaban, di samping
menyokong pandangan tradisonal bahawa perlaksanaan perkongsian keuntungan adalah kurang berkesan berbanding penghasilan dari tanah sendiri.
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I will forever be grateful and indebted to the Government of Malaysia, in particular Malaysian Technical Corporation Programme, whose financial support brought me where I am today. I would also like to express my appreciation to all the Malaysian people, who have made my time here enjoyable. I have always found it necessary to have a release from the classroom, whether it is Universiti Putra Malaysia social activities, tourist places, sharing neighbours live, and the Kampung people dan selamat hari raya. I thank all my friends for the entertaining times we have had.

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Last but not least, I would like to intimate my special thanks to my affectionate parents, brother and sisters for their blessings and encouragement. They are the foundation for who I am, and anything I have been able to accomplish is a tribute to them.
I certify that an Examination Committee met on 6th March 2003 to conduct the final examination of Elrashied Elimam Elkhidir on his Doctor of Philosophy thesis entitled “Economic Efficiency of Sharecropping in Drylands: A Case Study of Gum Arabic Production in Kordofan Gum Belt, Sudan” in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

El rashied Elimam Elkhidir

Date: 10.04.2003
TABLE OF CONTENTS

DEDICATION ii
ABSTRACT iii
ABSTRAK vi
ACKNOWLEDGEMENTS x
APPROVAL xiii
DECLARATION xv
TABLE OF CONTENTS xvi
LIST OF TABLES xx
LIST OF FIGURES xxi
ABBREVIATIONS AND GLOSSARY OF TERMS xxii

CHAPTER

1 INTRODUCTION 1
1.1 Background Information on Sudan 1
1.2 Drylands 8
1.3 Gum Arabic: Production Trend and Marketing 9
1.4 Economic Importance of Gum Arabic 11
1.5 Sharecropping: Concept and Sudan's Agriculture Perspective 14
1.6 Statement of Problem 16
1.7 Objectives of the Study 18
1.8 Research Hypotheses 19
1.9 Significance of the Study 20
1.10 Organization of the Thesis 21

2 LAND TENURE AND SHARECROPPING TRENDS IN SUB-SAHARAN AFRICA AND SUDAN, AND DESCRIPTION OF GUM BELT, GUM ARABIC PRODUCT AND SYSTEMS OF PRODUCTION 23
2.1 Introduction 23
2.2 Land Tenure in Sub-Saharan Africa 24
2.3 Tenure Systems in Sub-Saharan Africa 25
2.4 Sudan Land Tenure Dimension 27
2.5 Types of Land Tenure in Sudan 29
2.6 Sharecropping in Sub-Saharan Africa 30
   2.6.1 Sharecropping as a Combining of Resources 31
   2.6.2 Tree Sharecropping 34
   2.6.3 Landlord and Sharecropper 36
   2.6.4 Sharecropping on State-sponsored Agricultural Projects 38
2.7 Agricultural Labour and Sharecropping in Sudan 39
2.8 The Gum Arabic Belt 41
2.8.1 Location and Area 41
2.8.2 Impacts of Land Degradation and Desert Encroachment 44
2.8.3 Land Degradation and Drought Impacts on Stock of Hashab Stands 45
2.8.4 Ecological Changes and Southward Shifts of the Gum Belt in Sudan 47
2.8.5 *Acacia senegal* Tree 48
2.8.6 Land Tenure in the Gum Arabic Belt 49
2.8.6.1 Customary Land Tenure 49
2.8.6.2 Other Forms of Land Tenure 51
2.8.6.3 Main Changes in Tenure Laws and Regulation 53
2.8.7 Types of Land Use within the Gum Arabic Belt 54
2.8.8 Forms of Livelihood Encountered within the Gum Arabic Belt 56
2.8.9 Gum Arabic Product 56
2.8.9.1 Description and Characterisation 56
2.8.9.2 Husbandry Practices 57
2.8.9.3 Yields 59
2.8.9.4 Uses of Gum Arabic 59
2.8.9.5 Special Role of Gum Arabic in the Sudanese Economy 61
2.8.10 Gum Arabic Production Systems 63
2.8.10.1 Hashab Owner: Smallholder Production System 64
2.8.10.2 Hashab Owner: Large-holder Production System 65
2.8.10.3 Hashab Rent Production System 67

3 REVIEW OF LITERATURE ON THEORETICAL FRAMEWORK 69
3.1 Introduction 69
3.2 Sharecropping Model 70
3.2.1 The Marshallian Thought of Share Tenancy 72
3.2.2 The Cheungian Thought of Share Tenancy 78
3.2.3 Sharecropping and Labour Market Duality 83
3.2.4 Sharecropping as an Efficient System 87
3.2.5 The Reconciliation from Chew’s Work 90
3.3 Empirical Studies 91
3.4 Persistence of Sharecropping Contract 96
3.4.1 Risk Shifting as the Motivation for Sharecropping 97
3.4.2 Incentive as the Motivation for Sharecropping 98
### 3.4.3 Relative Efficiency of Sharecropping in Different Environments

3.4.4 Selection as a Motivation for Sharecropping Contracts

3.4.5 Innovation and Sharecropping Contracts Form

3.4.6 Sharecropping Contracts and Performance

3.5 Summary of Review

---

### RESEARCH METHODOLOGY

4.1 Introduction

4.2 Conceptual Framework

   4.2.1 Mixed Sharecropper’s Economic Resources Allocation

   4.2.2 Pure Sharecroppers’ Economic Resources Allocation

   4.2.3 General Framework of the Study

4.3 The Study Area

4.4 Sampling and Data Collection

4.5 Model Specification (Shaban’s Procedures)

4.6 Estimation Procedure

4.7 Testing for Normality of Inputs

4.8 Hotelling’s T\(^2\) Test Method

4.9 Testing for SURE Appropriation

---

### EMPIRICAL RESULTS AND DISCUSSION

5.1 Introduction

5.2 Household Characteristics of Sharecroppers

5.3 Economic Status of Sharecroppers

5.4 Tenancy Relations

5.5 Input and Output Sharing Rules

5.6 Gum Arabic Orchard Owner Supervision

5.7 Empirical Tests: Tenure System Comparisons

   5.7.1 Testing for Normality of Inputs

   5.7.2 Hotelling’s T\(^2\) Test Method

   5.7.3 Testing for SURE Appropriation

   5.7.4 Shaban’s Test Method

      5.7.4.1 Case A: Owned and Shared Gum Orchards of Mixed Sharecroppers

      5.7.4.2 Case B: Owned Gum Orchards of Mixed Sharecroppers versus Purely Sharecropped Gum Orchards

      5.7.4.3 Case C: Purely Sharecropped Gum Orchards versus Shared-operated Gum Orchards of the Mixed Sharecroppers
6 SUMMARY, FINDINGS AND POLICY RECOMMENDATIONS 160
6.1 Summary 160
6.2 Methodology and Findings 165
6.3 Policy Recommendations 168

BIBLIOGRAPHY 171
APPENDICES 185
BIODATA OF THE AUTHOR 203
LIST OF TABLES

Table | Page
------|------
1.1 Vegetation zones of Sudan | 3
1.2 Percentage contribution of the three main sectors to GDP of Sudan: 1990/91 to 2000 | 4
1.3 Shares of main sub-sectors in agriculture of Sudan: 1990/91 to 2000 (percent) | 6
1.4 Decline of gum arabic production in Sudan: 1965-2000 | 10
1.5 Returns from gum arabic and its contribution to GDP of Sudan: 1990/91 to 2000 | 11
1.6 Sources of household income in the gum belt area of Sudan, 1989 | 12
1.7 Production and consumption of gum arabic in thousand metric tonnes (1980-2000) | 14
1.8 Temporary land arrangements: arrangement percentage of lease-out and rent-in land in gum arabic belt of Kordofan | 17
2.1 Causes for reduction in area of hashab orchards | 47
2.2 Estimate of population engaged in gum production in Sudan | 63
3.1 Optimal contract by type of environment | 101
3.2 Optimal contract by relative efficiency of landlord and tenant | 103
4.1 Definition of variables | 127
5.1 Family status of respondents in the study area | 138
5.2 Distribution of respondents by age in the study area | 139
5.3 Distribution of respondents by education level in the study area | 140
5.4 Distribution of respondents by household family size in the study area | 141
5.5 Normality test for inputs (N=120) | 147
5.6 Hotelling’s $T^2$ tests for inputs and output intensities of mixed and pure shared gum arabic orchards (casewise) | 147
5.7 Likelihood Ratio Test For SURE Appropriation | 149
5.8 Regression and decomposition of input and output differences on owned versus sharecropped gum orchards of mixed sharecroppers (N=40) | 151
5.9 Regression and decomposition of input and output differences on owned gum orchards of mixed sharecroppers versus shared gum orchards of pure sharecroppers (N=40) | 155
5.1 Regression and decomposition of input and output differences on shared gum orchards of pure sharecroppers versus mixed sharecroppers shared gum orchards (N=40) | 158
### LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Vegetation Divisions of the Sudan</td>
<td>2</td>
</tr>
<tr>
<td>1.2</td>
<td>Gum <em>Hashab</em> production by regions in Sudan, 70’s-90’s (1000 MT)</td>
<td>9</td>
</tr>
<tr>
<td>2.1</td>
<td>The gum arabic belt of the Sudan</td>
<td>42</td>
</tr>
<tr>
<td>3.1</td>
<td>Model of contract choice</td>
<td>71</td>
</tr>
<tr>
<td>3.2</td>
<td>Share tenancy: the tax-equivalent argument</td>
<td>73</td>
</tr>
<tr>
<td>3.3</td>
<td>The Cheungian thought of share tenancy</td>
<td>80</td>
</tr>
<tr>
<td>3.4</td>
<td>Sharecropping and labour market duality</td>
<td>84</td>
</tr>
<tr>
<td>3.5</td>
<td>Sharecropping as an incentive system</td>
<td>89</td>
</tr>
<tr>
<td>4.1</td>
<td>Flow chart showing influence of different factors governing inherent Potential of gum production in the study area</td>
<td>115</td>
</tr>
<tr>
<td>4.2</td>
<td>General framework of the study</td>
<td>120</td>
</tr>
<tr>
<td>5.1</td>
<td>Distribution of respondents by household family active members involving in gum tapping activities in the study area</td>
<td>142</td>
</tr>
</tbody>
</table>
### ABBREVIATIONS AND GLOSSARY OF TERMS

<table>
<thead>
<tr>
<th>Abbreviation/Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abusa</strong></td>
<td>Type of tree sharecropping in Ghana (palm oil), evolve out of a labour tenancy arrangement.</td>
</tr>
<tr>
<td><strong>ALARD ALIGTISADI</strong></td>
<td>Name of economical magazine issued in Egypt.</td>
</tr>
<tr>
<td><strong>Allah Yarham</strong></td>
<td>Ask Allah to be merciful toward a dead Muslim person</td>
</tr>
<tr>
<td><strong>ARC</strong></td>
<td>Agricultural Research Corporation, Wad Medani, Sudan.</td>
</tr>
<tr>
<td><strong>Dagali</strong></td>
<td>A worker involved in gum production by selling only his labour.</td>
</tr>
<tr>
<td><strong>dan</strong></td>
<td>A local Malaysian word, which means and.</td>
</tr>
<tr>
<td><strong>FAO</strong></td>
<td>Food and Agriculture Organization of the United Nations.</td>
</tr>
<tr>
<td><strong>Feddan (Feddans)</strong></td>
<td>A local unit for area measurement, equivalent to 0.42 hectares (4200 m²).</td>
</tr>
<tr>
<td><strong>GAC</strong></td>
<td>Gum Arabic Company, Sudan.</td>
</tr>
<tr>
<td><strong>Gamali</strong></td>
<td>A worker involved in gum production by selling both his labour and services of his camel.</td>
</tr>
<tr>
<td><strong>Gardud</strong></td>
<td>Heavy transitional sandy clay loamy soil having mostly a reddish brown colour.</td>
</tr>
<tr>
<td><strong>GDP</strong></td>
<td>Gross domestic product.</td>
</tr>
<tr>
<td><strong>Ghifar land</strong></td>
<td>A communal land in the vicinity of the village, where all people have free access and completely under the responsibility of the village leader (Sheikh).</td>
</tr>
<tr>
<td><strong>Gineina (Gineinas)</strong></td>
<td>Gum orchard or gum garden.</td>
</tr>
<tr>
<td><strong>Haresti riba ‘e</strong></td>
<td>Ethiopian type of sharecropping, involve a landowning family and a landless family or person.</td>
</tr>
<tr>
<td><strong>Hari</strong></td>
<td>A local Malaysian word, which means a day.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hashab El-fiafi</td>
<td>Large Hashab holdings that are located at great distances from villages.</td>
</tr>
<tr>
<td>IES</td>
<td>Institute of Environmental Studies, University of Khartoum.</td>
</tr>
<tr>
<td>IIED</td>
<td>International Institute for Environment and Development.</td>
</tr>
<tr>
<td>ILO</td>
<td>International Labour Organization.</td>
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<tr>
<td>ITCZ</td>
<td>Inter-Tropical Convergence Zone.</td>
</tr>
<tr>
<td>JEFCFA</td>
<td>Joint FAO/WHO Expert Committee on Food Additives.</td>
</tr>
<tr>
<td>Kampung</td>
<td>A local Malaysian word, which means a village.</td>
</tr>
<tr>
<td>Kardafa</td>
<td>They are financially capable individuals migrating from Kordofan to the Blue Nile to deal with gum production there.</td>
</tr>
<tr>
<td>Khor (Khors)</td>
<td>Seasonal temporary water courses.</td>
</tr>
<tr>
<td>Ls.</td>
<td>Sudanese pound; one US $ is equivalent to Ls. 2600 during data collection phase.</td>
</tr>
<tr>
<td>Majool</td>
<td>A fixed amount of gum allocated from the first collection to the Hashab owner or renter.</td>
</tr>
<tr>
<td>Makhamas</td>
<td>A local unit for area measurement, equivalent to 0.75 hectares (7500 m²).</td>
</tr>
<tr>
<td>Miri</td>
<td>Transfer of unregistered property rights in land to the State.</td>
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<tr>
<td>Mixed sharecropper</td>
<td>A landlord tenant cultivating his land and leased-in an additional piece of land.</td>
</tr>
<tr>
<td>MNP &amp; ES</td>
<td>Ministry of National Planning and Economic Survey.</td>
</tr>
<tr>
<td>Nazara</td>
<td>The tribe headmanship.</td>
</tr>
<tr>
<td>NEA</td>
<td>The Sudanese National Energy Administration.</td>
</tr>
<tr>
<td>Nkotokuano</td>
<td>Type of tree sharecropping in Ghana (cocoa tree), the sharecropper is paid a fixed amount for each load of cocoa produced.</td>
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<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td><strong>Omodiya</strong></td>
<td>Chieftainship.</td>
</tr>
<tr>
<td><strong>Pure sharecropper</strong></td>
<td>A landless tenant cultivating only sharecropped land.</td>
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<tr>
<td><strong>Qoz</strong></td>
<td>Common name for light poor sandy soils with low nutrient contents and high water permeability.</td>
</tr>
<tr>
<td><strong>Raya</strong></td>
<td>A local Malaysian word, which means a feast day of Islamic fasting month.</td>
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<tr>
<td><strong>SAW</strong></td>
<td>Allah blessing and peace be upon Prophet Mohamed.</td>
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<tr>
<td><strong>Selamat</strong></td>
<td>An arabic term, used by the Malaysian people to celebrate the feast days.</td>
</tr>
<tr>
<td><strong>Sharecropping</strong></td>
<td>A type of land tenure contract where a tenant cultivates the land for the landlord and the output that is produced is shared on some pre-determined basis.</td>
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<tr>
<td><strong>Sheikh</strong></td>
<td>The village leader.</td>
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<tr>
<td><strong>Shiyakha</strong></td>
<td>The village headmanship.</td>
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<tr>
<td><strong>Sunki</strong></td>
<td>The recently developed tool for tapping gum trees. It has a metal head fixed to a long wooden handle.</td>
</tr>
<tr>
<td><strong>SW</strong></td>
<td>Allah to Whom be ascribed all perfection and majesty.</td>
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<tr>
<td><strong>Taya (Tayas)</strong></td>
<td>Groups of labourers enter the gum arabic production and assign a specific area.</td>
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<tr>
<td><strong>Tetebani</strong></td>
<td>Ethiopian type of sharecropping, occur between two landholding families.</td>
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<tr>
<td><strong>Thangata</strong></td>
<td>Sharecropping between estate owners and smallholders in Malawi.</td>
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<tr>
<td><strong>Tugundi</strong></td>
<td>An agreed amount of advanced cash payment in return for use of the land.</td>
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<tr>
<td><strong>UNDP</strong></td>
<td>United Nations Development Program.</td>
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<tr>
<td><strong>UPM</strong></td>
<td>University of Putra Malaysia.</td>
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<tr>
<td><strong>Ushr</strong></td>
<td>Land tax, Islamic payment.</td>
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<tr>
<td><strong>Wadi gum</strong></td>
<td>A gum orchard that has grown naturally on a village wasteland.</td>
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</tbody>
</table>