PRODUCTION AND MARKETING OF SORGHUM AND SESAME IN THE EASTERN CENTRAL RAINLANDS OF THE SUDAN. THE CONTRAST BETWEEN THE PUBLIC AND PRIVATE SECTORS

OMER-ELFAROUK ABDEL-AZIZ

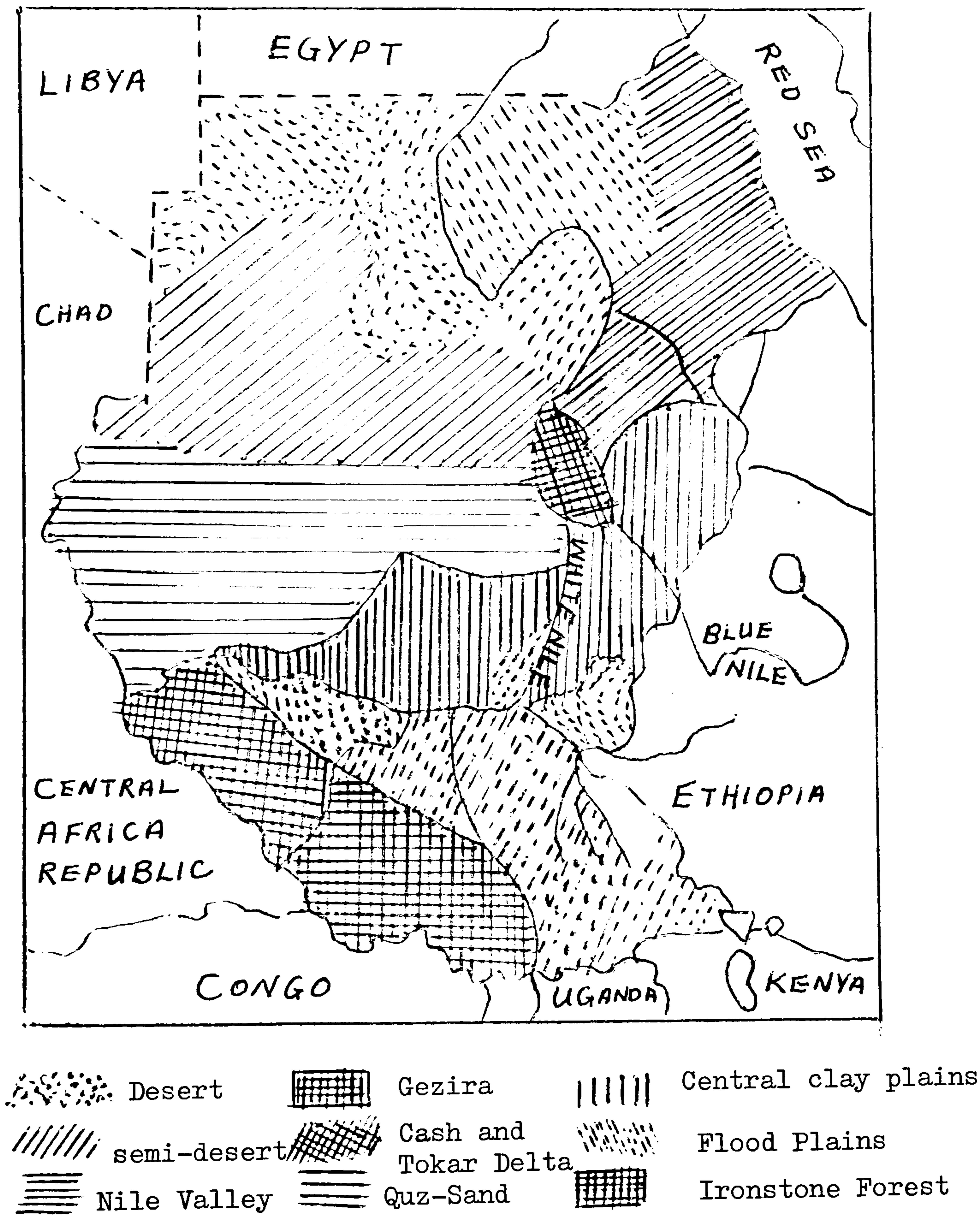
BSc Agriculture Elexandria University
M.A. Agricultural Economics Leeds University

A Thesis submitted in fulfilment of
the requirements for the degree of
Doctor of Philosophy

School of Economic Studies
The University of Leeds
June 1979

Map 1   The Sudan Republic

National Regions



Khartoum - Omdurman - Khartoum - North

Simplified sketch derived from a map of the Sudan Survey Dept. Khartoum
February, 1976

ABSTRACT

The study is concerned with the production and marketing of dura (sorghum) and sesame in the eastern central rainlands of the Sudan. The two crops are regarded as major export commodities and considerable emphasis has been given to expanding the areas under cultivation using mechanised farming cultivation. The study examines production aspects and the marketing component of the research concentrates on comparing the performancies of the public and private sectors. Dura marketing is in the hands of the latter and sesame in the former.

The thesis consists of eleven chapters and begins with an introduction to the economy of the Sudan. Four chapters then follow on dura production and marketing. The first deals with both the economic and agronomic aspects of mechanised dura production with special reference to the two main surplus areas, Gedaref and Damazine. The second chapter deals with the production of dura in the Sudan. The third chapter discusses the internal trade in dura - together with the spatial and temporal analysis. The marketing situation is also dealt with in detail. The final chapter on dura examines the world market situation. In the years with good crops the Sudan is a major exporter but when the annual crop is low, the Government bans exports.

The next four chapters deal with sesame. The first concentrates on production, the second on the internal trade, the third is concerned with the internal supply, demand and price situation and the fourth with the world trade in oilseeds in which Sudanese sesame is an important commodity. Chapter ten summarises common features of both dura and sesame production and marketing in the Sudan and makes various recommendations to alleviate major problems. In the final chapter, the thesis is summarised and the conclusion presented.

The private sector is characterised by oligopoly in the marketing structure, but the level of efficiency attained in the performance of marketing functions is relatively high, given the lack of infrastructure in the Sudan. The public sector is characterised by both exploitive prices and higher costs because of inefficiency. Both sections lead to the depression of producers' prices at a time when production costs are rising steeply. All this has a marked disincentive effect on the producers.

ACKNOWLEDGEMENTS

This thesis is a result of my postgraduate research started in October 1974 with the financial assistance of the Ministry of Agriculture, Food and Natural Resources — the Democratic Republic of the Sudan to whom I owe a great deal of gratitude.

The greatest debt of gratitude, however I owe to my supervisor, Mrs. Morag Simpson who by her constructive criticism made the completion of this thesis possible.

I would also like to acknowledge on this occasion the assistance which I received from government staff, merchants, exporters and farmers in Gedaref and Damazine.

I record also my sincere thanks to Mrs. D.E. Bielby for revising and checking the text, and to Mrs. Carter and Mrs. King for their skillful typing of the manuscript.

Finally I extend my appreciative thanks to all those friends whose contribution in one way or another had helped me to bring this thesis to its final stage.

Omer — Elfarouk Abdelaziz

CONTENTS

Page

List of Tables

List of Figures

LIST OF APPENDICES

Page

Appendix A

(Related to chapter : 1)

Page

Appendix B

(Related to Chapter 2)

Page

CHAPTER 1

The Economy and Export of the Sudan

Introduction to the economy of the Sudan.

1.1 The Country

The Sudan is the largest country in Africa occupying a vast plain of one million square miles. Only eighteen million acres are currently cultivated although some two hundred million acres are considered to have agricultural or livestock potential. Two hundred million acres are unsuitable for agriculture (the desert tract) and the balance of about one hundred and twenty five million ~~acres~~ is forest land.[1]

Sudan is bordered on the North by Egypt, in the South by Kenya, Uganda and Congo and in the West by Central Africa Republic of Chad and Libya, on the East by the Red Sea & Ethiopia.

The main topographic feature of the country is the River Nile with its annual floods from May to August. The Sudan has a tropical continental climate ranging from hot, dry desert in the North to a hot moist, tropical forest in the South with only, minor maritime influence on the Red Sea coast.

The vast flat plain slopes gently from South to North and West with only minor interruptions from mountain ranges. The country is divided into four broad zones; desert, semi desert, savannah and west savannah woodland. Zonal boundaries are not clearly defined but are a gradual function of the rainfall which decreases from 1,500 m.m annually in the South to a negligible amount in the desert areas of the North.

a) The Desert. The desert covers the Northern third of the Sudan. Rainfall in this area is minimal; the winds are constant dry northerly airstreams, bringing sand storms in the winter, temperatures range from 47-49°C in June to 1-6°C at night in January, February. Water comes from the River Nile and also from underground supplies which surface at oases. Irrigation is confined usually to small bands of land by the river banks because the land rises steeply at the side of the river valley.

b) The Semi Desert and Dry Savannah. This lies in a belt across the Sudan between approximately 14°N and the true desert and cover some 20% of the country. Rainfall varies from 50 to 400 m.m per year most of which falls during July and August, but evaporation is high. Normal agriculture is precluded and grazing is sparse. Temperatures range from 46-47°C maximum in April-June to 3-6° in December-February. Northerly winds predominate but the rain comes from moist southerly airstreams in June to September. The plain rises from 350 m to 600m in 800 Km. 90% of the country's irrigated lands are situated in this area.

c) The Savannah zone lies South of latitude 14° North and covers 40% of the land area. The rainfall which increases from 400 mm in the North to 1000 in the South is sufficient to support extensive agriculture and livestock production. The natural vegetative cover consists of coarse grasses, scrubs and the distinctive acacia trees which becomes thicker with increasing rainfall. In the Southern quarter of the zone lies the swamp area of the Sudan which is regularly inundated by the seasonal flooding of the Bahr El Jebel. The uniformity of the plain is uninterrupted, the land mass rises gently from 420 m in the North to 720 m in the South.

d) The West Savannah, country of South and South West Sudan marks the end of the savannah plains. The land is broken by hills and plateaus rising to 3.000m. Rainfall is heavier from 1000 to 1500 m.m and the humid climate is suitable for a wide range of tropical crops. A feature of the zone is the extensive tsetse fly infestation which limits transhumant and nomadic systems of livestock management. Agricultural production in the zone has been limited because of the lack of infrastructure and commercial development, but the potentials for both traditional sector and large scale crop production are substantial.

1.2 The People

The population according to the last census, 1975 was 15.7 million. with a growth rate of 2.7% per annum.
More than half of the population live in the central zone while one quarter lives in the North and the other quarter in the Southern zone. The mixture of Hamitic and Negro is especially noticeable among the Nilotic people of the savannah zone. The population is very unevenly distributed mainly because of lack of water, and permanent all the year round water sources in the dry savannah belt are scarce away from the Niles. The greatest concentration of population is in the Khartoum/Gezira area. The Khartoum and Blue Nile provinces cover 63,000 square miles with 2½ million people. The three southern provinces of Bahr El Chazal, Upper Nile and Equatoria have about the same population. Great tracts of the country have very few or even no people. Although the official language is Arabic, it is the native language of perhaps half the population, many indigenous languages occur specially in the South.

Finally the North of the Sudan is predominantly Moslem while the South is almost entirely pagan.[2]

1.3 Political History

Sudan became a condominium jointly administered by Britain and Egypt. During this period people emigrated from Europe, the Middle East and Asia and settled in the Sudan. Historically these emigrants introduced into African society a money economy linking subsistence farming with the outside world. Out of their profits they built factories and established transport companies and other activities. They have been the early entrepreneurs and pioneered monetarisation through a network of shops throughout the vast Sudan countryside. The commercial structure they created depended on caste and kinship.

In October 1951 Egypt unilaterally denounced the condominium. Subsequently the two countries in agreement with Sudanese representatives arranged for a General Election to be followed by Sudanese autonomy.

January 8th 1954 became the appointed day in which the administration was to be Sudanized and the British and Egyptian forces withdrawn. Actual independence was secured at the end of 1955.[3]

On December 1955 the Sudan became independent as a republic with a provisional constitution and a parliamentary system. In 1958 the provisional constitution was suspended following a military coup but reinstated after the overthrow of the military regime in October 1965 by teachers, students, lawyers, government officials, businessmen and other civilians. From 1965 to 1969 there was a succession of civilian governments. In 1969 civilian rule finally gave way to another military coup, the second in a decade.

Following independence internal dissention between the Northern and Southern provinces culminated in a civil war which flared up intermittently until 1970. The conflict placed a heavy burden on the economy of the newly independent state but in 1971 it was resolved by the Addis Ababa Agreement under which the three Southern provinces were granted regional self government.

1.4 Agricultural Production and Agricultural Resources

The Sudan economy depends heavily on agriculture which contributes 40% of the gross domestic product and almost all of the exports.

Sudan has over 200 million acres of land suitable for agricultural crop production but only 10% of this area is currently cultivated. Extensive development of irrigation has resulted in 4 million acres being irrigated at present.

There are a further 6 million acres of potentially irrigable land but the extent to which irrigation programmes may be developed is limited by the 1959 water agreement between Egypt and the Sudan. Under the agreement Sudan is entitled to 18.5 milliard* of the 84 milliard average annual flow of the Nile. At present 16.5 milliard of the allocation are being used leaving 2.0 milliard which is sufficient for almost 600,000 acres for future development.[4]

Sudan has two kinds of agriculture:

1. Irrigated agriculture

2. Rainfed agriculture which can be subdivided into mechanised farming and traditional (Bildat) production.

* cubic meters

Irrigation with Nile water has been known in the Sudan for many centuries. In 1911 the Sudan Plantation Syndicates started trials to grow cotton on irrigated plots. The experiment was successful and as a consequence funds were raised to build a dam across the Blue Nile at Sennar. This work was completed in 1925 and made it possible for gravity irrigation on a large scale in the Gezira. The area under cotton increased from 22,000 feddans in 1923 to 80,000 feddans in 1925 and to 600,000 in recent years.

There are three different types of irrigation schemes:

1. Large schemes cultivated by tenants and managed by the Government like the Gezira which is the largest cotton scheme in Africa.
2. Private pump schemes along the Blue Nile and White Nile South of Khartoum. The Blue Nile has 62 schemes with a gross area of 282,000 feddans while there are 186 schemes with a gross area of 419,000 feddans.* All these schemes were managed by the private sector but nationalized in 1970 and now managed by the Agrarian Reform Corporation.
3. Nine major pump schemes along the Nile North of Khartoum are managed by the Northern Province Agriculture Corporation.

Mechanised Rainfed Agriculture

The first mechanised farms were started in the Gedaref area in 1945. They were part of a mechanised crop production scheme operated by share croppers whose purpose was to produce food for army units stationed in East Africa.

In 1953 mechanised farming developed rapidly as the Government decided to allot land to private entrepreneurs provided that they cleared the land themselves.

In 1960 the system had been extended to other areas in the clay land belt which spread West from Gedaref along the Southern part of the Savannah region. By 1968 the Goverment had allotted 1.8 million feddans to private farmers and another 1 million feddans were cultivated in unauthorised mechanised farms. In that year the Government established the Mechanised Farming Corporation (MFC).[5]

As mentioned before agricultural production dominates the Sudan economy, contributes 40% of the gross domestic product and almost all of the exports. Agricultural production consists mainly of the following crops:-

cotton, groundnuts, sesame, gum arabic, dura for export and the home market, dukhn, wheat and sugar for local consumption.

COTTON

Cotton is the main export crop and the foremost foreign exchange earner. Proceeds from exported cotton represent 60% of total proceeds from exports. Oil seeds represent 20% and gum arabic constitute the larger part of the remaining 20%.[6]

Cotton is the only crop which is grown on a partnership basis between the Government and the tenants, whereas the tenants receive almost all the revenues of other crops. The production of long staple cotton which is estimated to be 40% of the world total production, represents 80% of Sudan's cotton production. The other 20% is mainly medium staple cotton with small quantities of short staple.[7]

The whole production of cotton is for export except 7% for local consumption.

Acreage and yield

Cotton production remained at a high level during the period

1969/70 - 1970/71 totalling 1.3 million bales inspite of a 2% decrease in acreage. Between 1971/72 and 1972/73 the total production reflected a slight decrease of 0.3%.

The actual production in 1973/74 was 1,247,800 bales and the area was 1,178,100 feddans. The decrease in total production is due to the lower productivity of the Gezira scheme which was adversely effected by shortage of water, scarcity of cotton pickers and unfavourable natural conditions. Table 1.1 gives details of area and production for the period 1970/71 - 1974/75.

DURA (Sorghum)

Dura is the main staple food in the Sudan and it is cultivated by both traditional methods and in mechanised farming schemes mainly in the rainland area.

Output fluctuates from year to year according to the amount of rain in every year. For instance the output of dura decreased substantially by 39.5% during 1972/73 compared with 1971/72 due mainly to the inadequate rainfall.(8) As a result of better rainfall in the year 1973/74 the output increased by 15% and continued to rise in 1974/75 when output is estimated to be about 1,744,250 tons* achieving an increase of 105,960 tons. Now the Sudan is self sufficient in dura and can export the surplus. Table 1.2 shows estimates of area, production and average yield of dura by production centres during the years 1973/74 and 1974/75.

SESAME

The area of sesame recorded nearly .3 million feddans by 1972/73, when the production recorded its peak. However in the

---

*All tons quoted are metric tons.

Table 1.1 Cotton Acreage and Production from 1970/71 to 1974/75

Year	Long Staple		Medium and short staple		Total	
	Acreage (Feddan)*	Production (bales) *	Acreage (Feddan)	Production (bales)	Acreage (Feddan)	Production (bales)*
1970/71	828,305	1,077,466	387,440	210,978	1,215,745	1,288,444
1971/72	832,954	1,062,795	370,180	220,578	1,203,134	1,283,373
1972/73	820,249	845,057	336,523	206,839	1,136,772	1,051,896
1973/74	824,500	1,009,000	333,500	238,800	1,178,100	1,247,800
1974/75	838,000	790,500	330,000	267,000	1,168,000	1,057,500

Remarks - * 1 bale of cotton lint weights 420 lbs. * Feddan equal - 1.038 acres.

1. It is noticeable from the above table, the fluctuation of the acreage from one year to another.
2. The substantial decrease of cotton production in 1972/73 is attributed to unfavourable conditions and attacks of animals on cotton.
3. The decrease in production 1974/75 due to three factors, shortage of water supply in the Gezira, scarcity of cotton pickers, unfavourable natural conditions. (For details see Appendix A 1).

Source: Sudan Year Book of Agricultural Statistics.

Table 1.2

Estimates of Area Production and Average Yield of Dura by Production Centres

From 1973/74 — 1974/75

Production Centre	1973/74			1974/75		
	Area (Fed)	Production (M.T.)	Average Yield Kgs/Fed	Area (Fed)	Production (M.T.)	Averag Yield Kgs/Fe
Northern Province	(		)	18,950	5,685	300
Nile Province	(16,000	7,000	438)	68,030	29,795	438
Khartoum	20,000	1,000	050	24,500	2,200	90
Cedaref	1,390,500	447,500	322	1,635,000	561,000	343
Cash	30,800	9,000	290	43,000	17,000	400
Tokar	35,000	15,000	430	40,000	16,000	410
Gezira & Managil	300,700	225,500	750	154,000	77,000	500
M.C.P., Blue Nile						
Private	598,000	223,000	373	654,280	169,060	258
State	53,000	20,000	377	41,570	15,116	363
Blue Nile (traditional)	-	-	-	500,000	150,000	300
Gezira	(687,000	137,000	199)	96,000	19,200	200
White Nile	(		)	127,000	37,700	297
Agrarian Reform	151,700	36,000	237	129,000	52,000	403
M.C.P. South Kordafan	124,200	31,500	254	160,420	59,040	367
Nuba Mountain	266,300	100,000	375	409,500	128,992	315
South Kordafan Sand	90,000	12,690	141	80,000	16,000	200
North Kordafan Sands	660,000	89,100	135	690,000	124,200	180
South Darfur	(175,000	57,000	326)	132,000	38,500	292
North Darfur	(		)	50,000	12,500	250
Upper Nile M.C.P. (Renk)	256,000	112,000	437	226,000	85,000	375
Upper Nile (traditional)	97,000	25,000	257	209,000	43,262	207
Bahr El Chazal	180,000	39,000	217	196,000	31,000	158
Equatoria	170,000	51,000	300	180,000	54,000	300
Total Sudan	5,301,200	1,638,290	309	5,863,820	1,744,250	298

Source: Sudan Year Book of Agricultural Statistics. Department of Agricultural Economics, Khartoum, June 1974.

(For details see Appendix A2)

1973/74 season acreage decreased by 27% and together with a decline of yield resulted in an acute drop of 36% in total production.(8) The favourable price compensated for this acute drop and proceeds from sesame exports exceeded sesame proceeds a year earlier.

The Sudan Oilseeds Company, a monopoly organization responsible for the export of all oilseeds including sesame, estimated sesame sales for export during the period from 15th September 1974 up to 30th September 1975 at 52,000 tons and the proceeds at about LS.13,913,200. Prices were estimated to average LS.277 per ton. Details of areas, production and yields are given in Table 1.3.

GROUNDNUTS

Production of groundnuts in 1973/74 season registered a new record in spite of the decrease in acreage.(8) High production and high prices resulted in raising proceeds from groundnuts exports. It is worth mentioning that prices in 1973/74 were double the prices of 1972/73 which was LS.126 per ton.(9)

The Sudan Company for Oil Seeds estimated sales for export during the period from 15th September 1974 up to 30th September 1975 to be about 62,750 tons with a total value of about LS.15 millions. Table 1.4 shows estimates of area, production and average yields of groundnuts by production centres.

GUM ARABIC

Gum arabic is one of the important cash crops in the Sudan. Proceeds from gum arabic represent almost 7 - 10% of the total exports by value. The Sudan is the main producer of gum arabic in

Table 1. 3

Estimates of Area, Production and Average Yield of Sesame by Production Centres

From 1973/74 – 1974/75

Production Centre	1973/74			1974/75		
	Area (Fed)	Production (M.T.)	Average Yield Kg/Fed	Area (Fed)	Production (M.T.)	Average Yield Kg/Fed
Gedaref	442,000	78,000	176	374,000	33,000	87
MCP Blue Nile (Private)	224,000	24,000	108	174,000	25,000	144
MCP Blue Nile (State)	6,000	500	83	4,000	500	125
Blue Nile Traditional				196,200	28,850	147
Gezira	(235,000	33,000	140)	-	-	-
White Nile	(		)	82,300	18,500	225
Agrarian Reform	3,000	300	100			
Nuba Mountains	100,000	16,000	160	143,000	19,000	133
MCP Kordafan (South)	10,000	1,000	100	2,500	2,500	100
Kordafan Sands (South)	(951,000	60,000	63)	142,600	21,100	148
Kordafan Sands (North)	(		)	843,000	106,000	125
Southern Darfur	(88,000	12,000	136)	42,000	7,400	177
Northern Darfur	(		)	27,000	2,350	87
MCP Upper Nile	48,000	3,000	68	45,000	4,000	118
Upper Nile (Traditional)	-	-	-	6,000	1,000	160
Bahr El Ghazal	68,560	8,090	118	70,000	9,450	135
Equatoria	17,000	1,955	115	25,000	3,000	120
Total Sudan	2,192,560	237,845	109	2,199,100	281,650	128

Source: Sudan Year Book of Agricultural Statistics. Department of Agricultural Economics, Khartoum, June 1974.

(For details see Appendix A3)

Table 1.4

Estimates of Area, Production and Average Yield of Groundnuts by Production Centres

1973/74 — 1974/75

Production Centre	1973/74			1974/75		
	Area (Fed)	Production (M.T.)	Average Yield Kg/Fed	Area (Fed)	Production (M.T.)	Avera Yield Kg/Fe
Nile Province	-	-	-	1,900	1,200	630
Gezira & Managil	216,285	216,000	1.000	260,937	388,000	1.500
Khashm El Girba	45,335	29,500	650	68,000	85,000	1.250
El Souki	16,325	4,900	300	30,235	8,000	270
Blue Nile (traditional)				14,200	4,000	280
Gezira	(		)	-	-	-
White Nile	(46,000	9,000	196)	62,500	16,250	260
Agrarian Reform	16,768	10,000	588	22,158	6650	300
Nuba Mountains	56,140	8,300	148	80,000	28,000	350
South Kordafan	(		)			
(traditional)	(929,000	127,000	137)	80,000	30,000	376
North Kordafan	(		)	800,000	160,000	200
South Darfur	(		)	320,000	128,000	400
North Darfur	(282,000	99,000	350)	85,000	23,000	280
Upper Nile	450	101	225	1,260	280	225
Bahr El Ghazal	32,000	12,000	375	51,000	13,000	250
Equatoria	85,000	28,000	329	90,000	27,000	300
Total Sudan	1,725,303	543,801	315	1,967,190	919,180	467

Source: Sudan Year Book of Agricultural Statistics, Department of Agricultural Economics, Khartoum, June 1974.

(For details see Appendix A4)

the world. Sudan's total production of gum arabic represents about 60 - 80% of world total. Gum production in the Sudan witnessed an acute decline during the past five years. Total production of 22,000 tons during 1973/74 is 38,000 tons less than total production during the 1967/68 season.

Prospects for gum production in 1975 * are optimistic due to adequate rainfall which include high yield and enough water for gum collectors. Production is estimated to be 35,000 tons. Sudan gum exports during the period from 1st January 1973 up to 21st December 1974 amounted to 20,391 tons representing 90% of total production. Proceeds from gum arabic exports totalled LS. 17,108,000 with average price of LS.840 per ton. The selling prices of this season were the highest prices ever achieved. Then unfortunately prices declined sharply the next year regressing to the same level of 1973.(10)

*Latest year in which information is available.

Livestock resources: The estimated livestock population of 14.2 million cattle 13.4 million sheep, 10.5 million goats and 2.7 million camels is spread throughout Sudan with the following approximate distribution.(11)

Province	Cattle	Sheep	Goats	Camels
N. and South Darfur	4,752,400 (1)	2,900,900	2,507,900	443,300
Bahr El Gazal	3,084,700 (2)	276,800	1,147,000	-
N. and South Kordafan	1,989,800 (1)	2,961,300	1,004,900	1,231,300
Upper Nile	1,850,800 (2)	697,800	1,242,700	-
Blue & White Nile and Gezira	1,196,500 (1)	3,624,000	2,403,400	252,100
Equatoria	628,600 (2)	478,400	861,300	-
Kassala and Red Sea	385,600	1,116,200	655,600	637,700
Northern Province	207,400	525,800	327,900	79,800
Khartoum	58,000	91,500	346,100	54,100
Total	14,153,800	13,372,700	10,496,800	2,698,300

(1) Predominant cattle are the Baggra type of commercial importantance

(2) Predominant cattle are the Nilotic type of social prestige value

Source: Public Animal Production Corporation 1975.

The livestock industry is a significant sector of the Sudanese economy. It is one of the main sources of food and employment for the population and it is a major contributor to foreign earnings.

In recent years it has accounted for about 10% of GDP and livestock exports have contributed from 6 to 10% of the value of total exports.

In December 1974 a temporary ban was placed on the export of livestock and meat in order to stabilize supplies and prices.

1.5 The National Economy

In the past decade, public sector finances have been characterized by a rapid growth in central government recurrent expenditure and revenue. Between 1963/1964 and 1973/1974 government revenue grew at annual rates of 10.4% (LS. 78.6 million) to LS. 213.9 million[12] while expenditure rose by 13% (LS. 60.8 million) to LS. 209 million. During the same period the gross domestic product at current prices grew at a rate of 5.8%. This figure indicates steeper rises in recurrent expenditure in relation to the GDP (14 to 26%) than in revenue to GDP (17 to 28%) and underlines the fact that government expenditure is outstripping the growth in resources.[13]

Development expenditure over the same period declined from LS.58.7 million in 1963/1964 to LS. 48 million in 1973/74, the decline does not reflect policy but is due to particularly large development expenditure incurred in 1963/1964.

Government deficits on the combined recurrent and development budgets have been financed approximately by 45% from external sources and about 55% from domestic sources including the Central Bank.

1.6 Development plan and development expenditure

The first comprehensive plan of economic and social development covering the period 1961/1962 to 1970/1971 was in March 1962.[14] Even though it was abandoned in 1964 its quantitative targets continue to serve as a general guideline for long run development planning. The plan covered a period during which some large projects were to be completed, including the Managil Extension under the Gezira Board and the Roseires and Khashm El Girba Dam projects. Total public sector development expenditure for the period was estimated at LS. 337 million.

In 1970 a second development plan, the Five Year Plan of Economic and Social Development to cover the period 1971-1975 was published.(15) It did not contain any projects for early implementation and the largest, the Rahad Irrigation Project is only now giving rise to substantial annual investment expenditure. Recently the National Five Year Plan has been extended for a further two years. The extension has been accompanied by significant amendments to the 1974/1975 development budget which contains revised five year allocations amounting to LS.660 million. This sharp increase has resulted from revision of cost estimates and the inclusion of additional projects.

1.7 Foreign Trade and Balance of Payments

Over recent years the balance of trade has been consistently in deficit. During the period 1964-1969 the level of imports remains relatively static but in recent years it has increased rapidly from LS. 108.3 million in 1970 to LS.247.5 million in 1974.(16) During the same period exports which consist mainly of agricultural produce have grown steadily in volume but have been affected by the recent slump in levels of cotton prices. Despite a 6 per cent per annum growth from LS. 68.6 million in 1964 to LS. 122 million in 1974, 1974 registered a trade deficit of LS. 125.5 million, the largest yet experienced by Sudan.

The Sudanese balance of payment has shown a deficit every year for the last five years. The deficit has increased from LS.20.7 million in 1961 to LS. 207.4 million in 1974/75.[17] This deficit has resulted in a continuous decline in the Sudan's net foreign asset position which by the end of 1975 stands at minus LS 207 million.

1.8 Sudanese External Public Debt Outstanding

Sudanese external public debt outstanding has also been increasing during the period 1971-1975 from 95.5 millions to 329.1 million. Much of the increase however is in the last year as a result of borrowing to finance the larger trade deficit. A major creditor is the IBRD with LS. 30.6 million in 1971 and LS.26.2 millions in 1975. Table 1.5 below shows the outstanding Public Foreign Debt.[18]

Table 1.5

(LS. Million)

Countries and institutions	1971	1972	1973	1974	1975
IBRD	30.6	29.9	27.3	29.0	26.2
IDA	4.1	4.1	4.9	5.9	13.6
W. Germany	4.9	3.8	5.0	11.6	14.7
United Kingdom	3.6	5.9	6.9	3.9	3.4
Italy	3.6	2.9	0.9	2.3	2.1
Denmark	0.2	0.2	0.2	0.5	0.5
Sweden	2.4	2.6	2.8	2.9	3.4
Holland	0.6	0.4	0.1	0.1	-
USA	-	3.6	2.5	15.8	21.3
Kuwait	18.3	21.5	26.4	52.2	76.3
Libya	6.1	6.1	6.1	6.1	6.1
Algeria	0.6	0.4	0.3	0.2	0.1
Yugoslavia	-	-	-	-	0.8
Soviet Union	4.8	4.6	4.2	5.2	4.6
Czechoslovakia	1.4	1.6	1.6	2.2	1.5
East Germany	1.5	1.8	1.7	1.4	1.0
Egypt	1.8	1.4	0.7	1.1	1.1
Abu Dhabi	-	3.5	3.5	19.1	13.9
Saudi Arabia	4.9	8.2	11.3	17.6	15.9
China	-	0.1	0.7	2.2	2.1
Union Bank of Switzerland	-	-	5.2	5.2	2.1
Euro Dollar Loan	-	-	-	6.9	69.6

Table 1.5 (continued)

(LS. Million)

Countries and institutions	1971	1972	1973	1974	1975
UBAF	5.6	0.6	0.5	0.5	-
African Development Bank	-	-	-	0.4	0.6
Bank of Chicago and UBAF	-	-	-	7.0	7.0
Quatar	-	-	-	4.5	4.9
Iran Oil Facility	-	-	-	10.9	15.2
Arab Fund Oil Facility	-	-	-	12.9	12.9
Iraq	-	-	-	-	8.2
Total	95.0	103.2	112.8	227.6	329.1

Source: Bank of Sudan

Table 1.5 does not include liabilities to IMF. It can also be noted that since the year 1974, Sudan has started borrowing from new sources other than the traditional sources which were tapped in the past. The most important of these new sources are: The Euro-Dollar Market, The United States, Iran, Abu Dhabi and the Arab Fund for Oil Facility. Kuwait comes on the top of the lending sources followed by the Euro Dollar Market and The World Bank/I.D.A., (International Development Agency).

Table 1.6 Repayment of Loans

(LS. Million)

Year	Principal	Interest	Total	Total % of Exports
1970/71	10.6	3.9	14.5	13.9
1971/72	12.3	4.2	16.5	16.1
1972/73	14.3	4.2	18.5	14.5
1973/74	11.5	4.4	15.9	11.2
1974/75	14.9	7.4	22.1	14.0

Source: Ministry of Planning and National Economy

Table 1.6 shows the value of repayments of loans and interests. These do not include the repayments of cash loans nor the repayments to IMF. This means that the actual value of annual repayments is much higher than is reflected by the figures of the Repayment Section of the Ministry of Finance, Planning and National Economy. Bank of Sudan figures shows that total repayments on a calendar year basis for 1975 amounted to LS. 35 million. The table also shows that with the exception of 1973/1974 the value of repayments of loans is continuously rising and this is inevitable due to the development effort. The coming years will witness higher increases which require making the best efforts to activate and diversify exports so that repayments of loans as a percentage of total export proceeds should not rise any further.(19)

1.9 Gross Domestic Product

The growth in the Gross Domestic Production was estimated to be 5.1% (calculated on an annual average growth rate during the period 1962-1971/72) In view of the population growth rate ranging between 2.5% and 2.8% and a general increase in the cost of living of 17.5% in 1973 compared to 1972, the growth rate was very low. The Gross Domestic Product in current prices increased by 2.9% during the period 1970/71 compared to the period 1969/70, while the costs of living for low and high income groups increased by a rate of 1.4% during the same period, thus decreasing the purchasing power of the Sudanese pound. Hence the real value of the GDP becomes LS. 524.3 million and not LS. 531.7 million as shown in Table No. 1.7. Therefore the actual growth rate in the GDP (during 1970/71 compared to 1969/70) was 1.5% and not 2.9%. If we take into consideration

Gross Domestic Product by Economic Activity at factor cost 1969/70 - 1973/74
(in current prices in million pounds)

	1969/70		1970/71		Compared to the previous year	1971/72		1972/73		1973/74	
	LS M.	Contribution %	LS M.	Contribution %		LS M.	Contribution %	LS M.	Contribution %	LS M.	Contribution %
1. Agriculture	207.6	40.18	217.3	40.86	4.7	241.4	38.17	253.7	38.17	266.7	38.17
2. Manufacture Mining	52.5	10.25	51.7	9.68	(1.5)	52.5	8.30	55.2	8.30	58	8.3
3. Electricity and Water	16.5	3.28	16.5	3.12	-	16.9	2.68	17.8	2.68	18.7	2.68
4. Construction	23.3	4.44	22.3	4.19	(4.3)	25.8	4.08	27.1	4.08	28.5	4.08
5. Commerce and Hotels	54.4	10.44	55.1	10.37	1.1	105	16.59	110.3	16.59	115.9	16.9
6. Transport and Communic.	50.6	9.86	50.4	9.48	(0.4)	50.9	8.05	53.5	8.05	56.2	8.05
7. Finance	23.2	4.44	22.5	4.25	(3)	40.6	6.40	42.7	6.42	44.9	6.42
8. Govt. Servs.	77.1	14.89	84.5	15.89	9.6	91.8	14.52	96.5	41.65	101.4	41.44
9. Others	11.4	2.12	11.4	2.16	-	7.5	1.19	7.9	1.19	8.3	1.19
Total	516.6	100.000	531.7	100.000	2.9	632.4	100.000	661.7	100.000	698.6	100.000

Source: Department of Statistics

the estimated rate of growth of 5.1% in the GDP during 1971/72 - 1973/74 and the increase in the cost of living of 17.5% during the same period, we find that the estimated rate of growth of GDP is rather inflated.

In spite of the fact that agricultural production showed a continuous growth during 1969/70 - 1973/74, Table 1.7 shows that the agriculture contribution to the GDP increased slightly from 40% in 1969/70 to 41% in 1970/71 then declined to remain at a level of 38% during the period 1971/72 - 1973/74. Government services comprised 15% of the GDP in 1969/70, 16% in 1970/71 and then continued at a stable rate of 14.5% during the period 1971/72 - 1973/74. The industrial sector which produces mainly import substitutes, is still relatively small accounting for a decreasing contribution to the GDP of 10.1%, 9.7% and 8.3% in 1969/70 - 1970/71 - 1971/72 respectively and remained stable at the level of 8.3% in 1972/73 and 1973/74. However in 1970/71 the industrial output showed a slight decline of 1.5% compared to 1969/70 followed by an increase of 3% in 1971/72 compared to 1970/71 and an estimated annual compound increase of 1% over the period 1971/72 - 1973/74.[20]

1.10 Direction of trade

As regards exports the European Economic Community (EEC) was the principal customer of the Sudan in the period 1971–1975. During the period 1971–1975 its share of the Sudanese total exports increased from nearly 29 percent to 41 percent by 1975. The share of the Socialist Bloc however declined during the same period to only about 21 percent by 1975. The share of individual countries tends to fluctuate from one year to another. For example that of India accounted for 18 percent in 1975. Such variations give some idea of the difficulties in securing the smooth flow of foreign trade of the Sudan.*

Details of the foreign trade of the Sudan are given in Appendix A7.(21) Cotton accounts for about 60 percent of the total exports followed by other agricultural products such as oilseeds especially groundnuts and sesame, another important commodity is gum arabic of which the Sudan is a leading producer. Dura is exported when there is a crop surplus but the trade is declining and in years of scarcity the export of dura is prohibited. Table 1.8 gives both the quantity and the value of the principle cash crop exports from the Sudan for the years 1964–1975. The two commodities which are the subject of the thesis feature as potential major exports of this country and details of the international trade in these together with the exports from the Sudan are described in Chapter 5 and 9.**

---

*India's share fell because that country was unable to pay for previous imports under a trade agreement (See Appendix A5 and A6).

**See Appendix A8 for exports of oilseeds, oils and oilcakes for 1974–1975 and Appendix A9 for exports of livestock, hides and skins for 1964–1975.

Table 1.8

Exports of Cash Crops from the Sudan

1964 –1975

Year	Cotton long staple		Groundnuts		Sesame		Cotton Medium & short staple	
	Quantity 1000 tons	Value	Quantity 1000 tons	Value	Quantity 1000 tons	Value	Quantity 1000 tons	Value
1964	115	32,470	156	9,181	101	6,454	54	6,788
1965	117	31,379	159	8,596	71	4,750	58	7,597
1966	143	34,998	108	7,255	168	5,650	56	2,188
1967	172	40,930	109	6,509	75	6,530	52	8,335
1968	184	48,562	88	4,598	85	6,217	50	7,849
1969	172	49,523	82	5,991	113	8,018	49	8,692
1970	232	65,062	69	5,466	82	9,722	48	8,976
1971	242	69,423	121	9,327	86	7,996	43	8,435
1972	249	74,331	115	9,212	86	8,756	44	9,124
1973	226	80,083	139	13,053	105	19,878	36	7,845
1974	103	57,804	130	18,055	108	21,200	31	14,438
1975	144	66,794	206	34,512	57	12,240	15	7,242

Quantity in thousands .tons

Value in thousands LS.

Source: Statistic Section - Department of Agricultural Economics
CAS. VOL. 1 No.2.

The Sudan's main trading partners as regards imports are the EEC which accounts for nearly 38 percent in the year 1975 while the share of the Socialist Bloc including China was only about 10 percent. Japan however was a significant source of imports in 1975 with 10 percent of the total.(22) So one can conclude from this rather cursory survey that the EEC is the main trading partner of the country. It is worth mentioning here that the Sudan has not entered into any form of associate membership unlike such trade rivals as Nigeria and the Francophone West African countries.

The composition of imports includes not only those commodities associated with less developed countries machinery,construction materials and imports of agricultural inputs but also agricultural products. These include commodities, alternatives to which could be produced in the Sudan, such as wheat, rice, sugar, tobacco, tea and coffee.(23) Also a study of the most recent figures reveals a very disturbing tendency in that by the early 1970s Sudan had become a net importer of cereals. Sales of dura grain and other millets did not offset the growing imports of wheat grain, flour and rice. Full details of imports of food grains, agricultural requisites and sugar and beverages for the years 1964–1975 are given in appendices A10, A11 and A12. (24)

1.11 The objectives and hypothesis of this thesis

Dura (sorghum) and sesame are export crops of the Sudan and are means of diversifying the economy from the present overdependence on cotton and cottonseed exports as a source of foreign exchange. Such dependence leaves the economy "open" to fluctuations in world market conditions. Since independence sudden adverse conditions in cotton prices would often lead to a change in the regime, there have been four changes by force since 1956, each of which has had some disruption of the economy. Consequently for the sake of continuity and stability in Government, there is much to be said for diversifying the exports away from cotton.

Another disturbing trend is that scarce foreign exchange is being increasingly used for grain and grain product imports. At present in September 1978 only a desperate shortage of foreign exchange prevents imports of dura, the basic grain of the country. World prices are now below prices in the Sudan. This situation is very worrying since great emphasis has been given by Sudanese planners for increasing dura production. There is plenty of land available and also capital from the Arab oil producing countries. In fact the Sudan features as the bread basket of the Arab world in the plans of the Arab Organisation for Agricultural Development (AOAD).

The writer is justly alarmed at the failure of the Sudan to meet not only production for the home market but also the new potential for increased exports. This thesis is concerned with reviewing the constraints on both production and marketing of dura and sesame which are the potential alternatives to cotton. The research reviews existing production patterns especially in the mechanised farming sector of the South East of the Central rainlands, an area which produces whatever surpluses are available for export. The writer has done intensive fieldwork in the Gedaref and Damazine areas which in 1977 were responsible for 86 percent of the total cultivated land under mechanised rainfed agricultura. The writer also visited the auction markets in the two areas and carried out surveys of the marketing channels. In all five months were spent on intensive fieldwork.

The hypothesis of the thesis is that there are major constraints both on production and marketing efficiency. As regards marketing producers receive insufficient price incentives to improve their farming standards, the lack of incentives is due to imperfections in the marketing structure. Another major constraint is the standard of management especially in the public sector as opposed to the private sector. These lower standards lead to costs being higher than they would otherwise be,both in production and in marketing.

CHAPTER 2

Production of Dura in the Sudan

2.1 Introduction

Dura (sorghum vulgaris) a millet is the main staple food in the Sudan and is grown throughout the country both as a rainfed and irrigated crop. Gedaref, Dali, Mazmoum, Habila and Damazine are regions specializing in rainfed production. The crop is grown under gravity irrigation in the Gezira scheme and by flood irrigation in Tokar/Gash Delta. Dura is also grown and irrigated by sagias and pumps in the Agrarian Reform Schemes and Northern province. In the rainland dura was grown under traditional shifting cultivation system mainly for family subsistance, but since 1950 the area under mechanised commercial cultivation has increased steadily.(25)

In the past Sudan suffered from periodic famines when, due mainly to lack of rainfall or a poor Nile flood, the crop was poor or even failed. Under the Condominium the spread of irrigation and more control of the Nile flow led to greater stability in the annual levels of dura production and the threat of famine was largely removed, but by the Second World War the population increased and a growing shortage of grain production led the Sudan Government to explore further ways of increasing dura production. The approach chosen was the mechanised cultivation of dura in the rainland of the Sudan on large tracts of land hitherto used by nomadic pastoralists. In 1945 the Government started experiments with mechanised dura production in the Gedaref area. The eventual cultivation system which emerged by 1950 was based on tractor drawn disc harrows for land cultivation, hand weeding, hand harvesting and threshing; the three latter operations being carried out by hired casual workers. Land was divided into thousand acre units and let at a nominal rent to private entrepreneurs who met certain capital stipulations to ensure that they had sufficient resources to cultivate the land. Under this system the cultivated area rapidly increased. Private entrepreneurs cleared the land at their own cost, provided tractors and later combine harvesters, besides organising the recruitment and transport of casual workers, often from considerable distances away from the production area. The private entrepreneurs provided the workers with food and water. The success of Gedaref led to expansion in other areas of the clay plains of the Sudan rainlands.[26]

Table 2.1 shows the increase in the area under dura and the total production of the crop from 1952 to 1975. The great increase in area from 1.6 million feddans in 1952 to nearly 5.9 million in 1975 is largely a result of the expansion of mechanised dura production in the rainlands. The increase in production has largely been achieved by the increase in the area grown but crop yields have been disappointing. The main reason for this trend in average yields is that crop yields in the rainlands are lower than those experienced under flood conditions. The mitigating factor is that (as will be seen later) the costs of production in the rainlands are much lower than in the irrigated areas. The dependence on rainfed crops is subject to considerable risk mainly from climatic conditions. This area of the Sudan is semi arid, subject to a strong probability of drought, consequently both production and prices are influenced by annual rainfall.

Table 2.1 Area, Production and Average Yield of Sorghum (Dura) 1952/53 - 1974/75. Area in 1,000 Feddans Production in 1,000 M.T. Average Yield in metric tons per feddan

Year	Area	Production	Av. Yield
52/53	1636	515	.315
53/54	2075	635	.306
54/55	1934	613	.317
55/56	2135	860	.403
56/57	2492	1067	.428
57/58	2607	1139	.437
58/59	3252	1372	.422
59/60	3251	1313	.404
60/61	3067	1051	.343
61/62	3516	1,434	.408
62/63	3517	1,266	.360
63/64	3,277	1,349	.412
64/65	3,158	1,137	.360
65/66	3,199	1,095	.342
66/67	3,183	851	.267
67/68	4,700	1,980	.421
68/69	2,823	870	.308
69/70	4,229	1,453	.344
70/71	4,894	1,535	.314
71/72	4,555	1,591	.349
72/73	4,095	1,300	.317
73/74	5,301	1,638	.309
74/75	5,863	1,744	.298

Source: Year Book of Agricultural Statistics 1974.
Department of Agric. Economics.

The Sudan is now self sufficient as regards dura in normal rainfall years and in a good year has an export surplus. On the whole,the Sudan is a net importer rather than a net exporter of grain, despite the large expansion of the private sector into dura production in the rainland.[27]

Table 2.2 gives details of the area of production and average yield of dura under the irrigated, flood, and rainfed conditions. The basic points of the table are the great expansion in the rainfed area and that crop yields are higher under irrigated and flood conditions.

The demand for dura in the home market is increasing with rising population and although wheat is now replacing dura as the basic cereal of the higher income groups, the natural rate of increase in the population in the Sudan (nearly 3% a year) is such that the loss of part of the market to wheat is offset by the increasing demand from the rise in population. The market for dura is also increased by the movement of the rural people to the towns; the rate of urban growth is greater than the overall population growth of the country as a whole.

Consequently the position of the Sudan as a net exporter of dura may well be only a temporary phenomenon, unless production rises through a combination of increased area and rising crop yields. Government policy, however favours the former and ambitious plans have been made to increase the area cultivated in the rainlands. In fact Sudan has been hailed as a potential bread basket of Africa, partly to encourage external investment in rainland areas especially from oil producing countries from the Middle East.[28]

Table 2.2 Area, Production and Average Yield of Sorghum (Dura) by type of irrigation 1961/62 - 1972/73

Area in 1,000 Feddan
Production in 1,000 M.T.
Average yield in M.T.

	IRRIGATED			FLOOD			RAINFED			TOTAL		
	Area	Prod.	Av. Yield	Area	Prod.	Av. Yield	Area	Prod.	Av. Yield	Area	Prod.	Av. Yield
1961/62	415	269	.648	68	29	.426	3,033	1.136	.375	3,516	1.434	.408
1962/63	399	149	.373	41	16	.390	3,077	1,101	.358	3,517	1,266	.360
1963/64	425	303	.713	65	31	.477	2,787	1,015	.364	3,277	1,349	.412
1964/65	416	224	.538	49	23	.469	2,693	890	.330	3,158	1,137	.360
1965/66	393	214	.545	22	6	.273	2,764	875	.314	3,199	1,095	.342
1966/67	419	209	.499	31	15	.484	2,733	627	.229	3,183	851	.267
1967/68	419	244	.582	72	34	.472	4,209	1,702	.404	4,700	1,980	.421
1968/69	441	118	.268	21	11	.524	2,361	741	.314	2,823	870	.308
1969/70	531	218	.411	61	28	.459	3,637	1.207	.332	4,229	1,453	.344
1970/71	520	233	.448	109	40	.367	4,265	1.262	.296	4,894	1,535	.314
1971/72	468	195	.417	43	20	.465	4,044	1.376	.340	4,555	1,591	.349
1972/73	451	337	.747	55	26	.473	3,589	938	.261	4,095	1,300	.317

Source: Yearbook of Agricultural Statistics, Department of Agric. Economics, Sudan.

Table 2.3 gives dura area, production and yield statistics from the years 1961/62 - 1975/76 by Provinces. To relate these figures to those of Table 2.2 it is necessary to define which system of cultivation predominates in each province. The Northern Province's production is based on riverain irrigation, the Southern Province's (Upper Nile, Equatoria, Bahr El Ghazal) production is entirely based on rainfed crops grown by small subsistence cultivators. In the Western provinces (Darfur and Kordofan), production is based on shifting agriculture carried out by small subsistence farmers. Kassala and the Blue Nile Provinces which produce the bulk of the national crop, are the areas of mechanised rainland production, Kassala Province is also the main region for flood production of dura. Consequently, the figures on a provincial basis cannot be taken to represent those for mechanised rainfed production. They merely emphasise the importance of the Blue Nile and Kassala Province in the dura economy of the Sudan.

Traditionally the domestic consumer in the Sudan prefers the white varieties of dura which give white flour. Consequently, the yellow and brown varieties are more difficult to sell locally so go largely for export in years of surplus production. The coloured varieties however are higher yielding than most of the white varieties, especially the widely grown popular "Feterita" which has the additional disadvantage of being unsuitable for combine harvesting because of the multi headed long stalks. Consequently white varieties will cost more to produce which is to some extent compensated by the fact that they enjoy a price advantage on the home market over coloured varieties. The

Table 2.3 Area, Production and Average Yield of Sorghum (Dura)
By Provinces: 1961/62 - 1975/76
Area in Thousand Feddans

Province Year	61/62	62/63	63/64	64/65	65/66	66/67	67/68	68/69	69/70	70/71	71/72	72/73	73/74	74/75	75/76
Northern	100	93	97	138	46	43	122	46	116	109	41	30	16	19	18
Khartoum	34	15	6	30	2	1	7	1	3	4	-	-	20	25	51
Blue Nile	1188	1316	1256	1081	1199	1034	2041	1025	1373	1517	1503	1436	1791	1680	1998
Kassala	1349	712	777	772	865	1108	1676	793	1301	1780	1506	1136	1457	1718	2101
Kordofan	418	481	529	486	502	389	468	484	923	936	968	1048	1140	631	937
Darfur	110	518	280	348	340	310	142	159	146	172	148	118	175	306	384
Upper Nile	221	197	175	140	145	206	115	186	166	166	170	182	353	435	512
Bahr El Ghazal	45	135	133	146	96	90	125	120	197	201	200	85	180	196	200
Equatoria	50	50	24	16	5	2	4	8	6	9	20	60	170	219	210
Sudan	3515	3517	3277	3157	3200	3183	4700	2822	4231	4894	4556	4095	5301	5229	6411

Production in thousand metric Tons

Province Year	61/62	62/63	63/64	64/65	65/66	66/67	67/68	68/69	69/70	70/71	71/72	72/73	73/74	74/75	75/76
Northern	73	40	61	54	23	31	38	19	51	38	22	16	7	9	6
Khartoum	6	1	2	2	*	*	2	*	*	1	-	-	1	2	1
Blue Nile	541	462	626	434	509	371	989	403	490	556	602	692	642	538	668
Kassala	537	289	237	291	271	250	709	227	372	471	470	234	472	591	731
Kordofan	158	171	184	158	153	82	145	113	310	234	244	200	234	264	236
Darfur	35	189	139	110	71	71	51	42	84	88	50	45	57	76	99
Upper Nile	50	42	43	31	27	30	20	24	29	29	79	78	137	128	161
Bahr El Ghazal	16	59	48	53	40	16	25	40	114	121	118	20	39	31	32
Equatoria	18	14	9	4	1	*	1	1	1	1	5	15	51	57	58
Sudan	1434	1267	1349	1137	1095	851	1980	869	1451	1534	1590	1300	1638	1696	1992

* = less than 0.5

Table 2.3 continued on next page

Table 2.3 continued

Average yield in metric tons/feddans

Province Year	61/62	62/63	63/64	64/65	65/66	66/67	67/68	68/69	69/70	70/71	71/72	72/73	73/74	74/75	75/76
Northern	.730	.430	.629	.391	.500	.721	.311	.413	.440	.303	.537	.533	.438	.490	.333
Khartoum	.176	.667	.333	. 67	.150	.200	.286	.100	.100	.250	-	-	.050	.438	.150
Blue Nile	.455	.351	.498	.401	.425	.359	.485	.393	.357	.367	.401	.482	.387	.362	.494
Kassala	.398	.406	.305	.377	.313	.226	.423	.286	.286	.265	.312	.206	.347	.359	.300
Kordofan	.378	.356	.348	.325	.305	.211	.310	.233	.336	.250	.252	.191	.226	.226	.266
Darfur	.318	.365	.496	.316	.209	.229	.398	.264	.575	.512	.338	.781	.326	.226	.254
Upper Nile	.226	.213	.246	.221	.186	.146	.174	.129	.175	.175	.465	.429	.347	.291	.295
Bahr El Ghazal	.356	.437	.361	.363	.417	.178	.200	.333	.579	.602	.590	.235	.217	.158	.160
Equatoria	.360	.280	.375	.250	.200	.200	.250	.125	.167	.111	.250	.250	.300	.260	.280
Sudan	.408	.360	.412	.360	.342	.267	.421	.308	.343	.313	.349	.317	.369	.312	.270

Source: Current Agricultural Statistics CAS VOL I No. 2
Statistic Section June 1976

growing shortage of labour however may well curtail production of the popular white type. Obviously it is up to the plant breeder to solve this problem and produce white varieties which can be combined and will meet the requirements of Sudanese housewives.

The irrigated areas supply the white dura demanded by the domestic market while the role of the rainland is to provide the residual of the domestic requirements and then to export the balance of the local crop.

Three simple linear regression equations using the data in Table 2.1 have been constructed to discover the general trends in areas, production and yield of dura in the Sudan. The equations and their solutions are:

$$y = a + b_t \tag{1}$$

where y = Areas of dura in 1000 Feddans

t = A time trend factor ranging between 1 and 23 with 1952/53 = 1

The solution of the equation (1) is as follows

$$y = 1677.798 + 145.7994_t$$
$$(16.0122)$$

A R^2 of 0.7979 suggests that nearly 80% of the variation in the crop area is due to the time trend.

$$y = a + b_t \tag{2}$$

where y = production of dura in 1000 m/tons

t = time trend

The solution of the equation is as follows

$$y = 740.7707 + 39.0227_t$$
$$(272.025) \qquad R^2 = 0.50$$

Equation (2) indicates that production of dura increases and most of the increase in production results from area expansion.

$$\dot{y} = a + b_t \qquad (3)$$

where y = yield in kilograms per feddan

t = time trend factor

The solution of equation (3) is as follows

$$y = 389.1106 - 2.7737_t$$

$$(47.94) \qquad R^2 = 0.14$$

the low R^2 indicates the fluctuations in annual yields cannot be explained by a trend over time. The figure taken from table 2.1 refer to the whole country. A similar exercise for the Gedaref region shows that there is a negative correlation between crop yield and time.*

Figures 2.1 and 2.2 show graphs of area and production over time together with linear trend line. For detailed calculation of the three equations see Appendices B_1 B_2 and B_3.

---

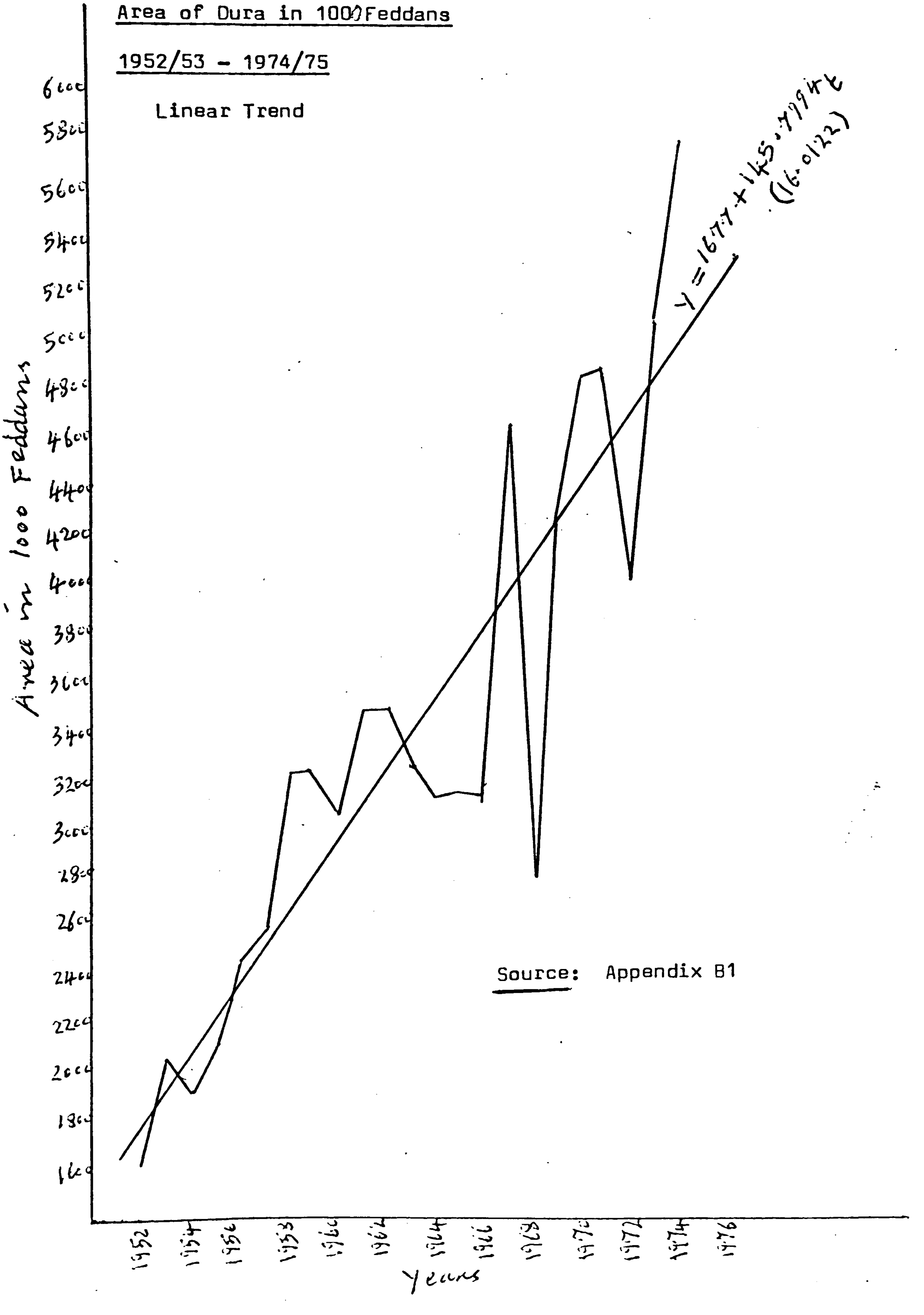
*See G.M.Hamed "The utilisation of public funds mainly originated from the agricultural sector and its impacts on the economic development of the Sudan" unpublished Leeds Ph.D. thesis, January 1977, page 227.

Figure 2.1

Area of Dura in 1000 Feddans

1952/53 - 1974/75

Linear Trend

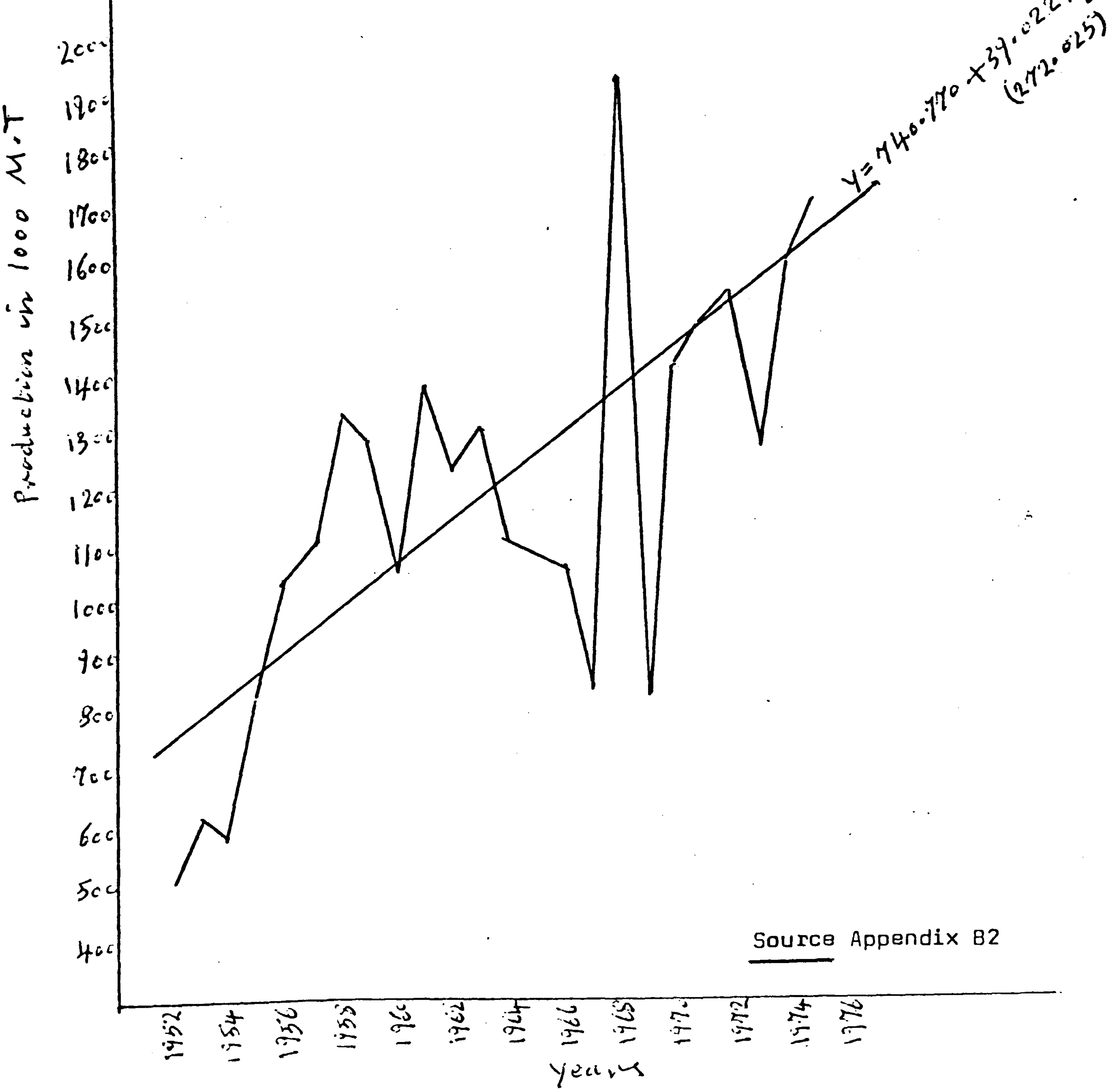


Source: Appendix B1

Figure 2.2

Production of Dura in 1000 M.T.

1952/53 - 1974/75 Linear Trend



Source Appendix B2

2.2 The Production of Dura in the Rainlands of the Sudan

Normally the first operation for the next crop is to burn the rubbish left on the field from the previous crop before the onset of the rainy season. Before the rains start in early June, the scheme owner stocks up with tractor fuel, machinery, spare parts, seed, food, water and all the other materials necessary for starting cultivation. Grass huts are constructed for lodging the owner, staff and labourers. All this is done before the rain starts because with the heavy clay soils. Farm tracks and dirt roads become impassable through thick mud. There are very few tarmac roads, and a farm during the rainy season may be isolated for a period of three months. Consequently, much of the success of a season may well depend on the farmer's ability to stock up well in advance.

The operation of burning the rubbish left on the field from the previous crop kills a proportion of the weeds, seeds and pests. It destroys crop and weed residuals which if ploughed it would add to the humus of the soil.[29]

When rain starts, the soil becomes softer so first discing starts about the middle of June and it takes about ten days to disc 1000 feddans if it is not delayed by heavy showers. Then, depending on the rains the second discing follows and the seed is sown mechanically by seed boxes attached to the disc. The seeds, often taken from the crop of the previous season, are cleaned and chemically treated against the smut diseases of dura. Resowing, if necessary, takes place later after the emergence of the plants.

Fertilizers are hardly ever applied. One constraint at this time of year is the number of days the land is in a fit staté for working by a tractor. Too many storms reduce the soil to a morass and tractors can be bogged down to the axle if used unwisely. Consequently, too little rain can delay cultivation and reduce seed germination. Too much rain, on the other hand, also delays cultivation and can lead to flooding which if continued for too long a period can kill the emerging crop.(30) Given the annual fluctuation in rainfall and the fact that rain,when it comes, comes in thunderstorms, it will be appreciated that the area sown in each year on a particular farm may well vary considerably.* Another factor which follows is the effects of delays in sowing dates on crop yield. Experimental evidence shows that,other things being equal,the crop yield will fall if the crop is sown late.(31)

Weeding and thinning the dura starts after the emergence of the plant. The work is usually done by hand by casual workers working on piece rates. The crop is thinned to allow sideways branching of the grain heads. Consequently,plant populations are relatively low, leaving plenty of space for weeds. Also,allowing the crop to branch sideways, adds to the difficulties of using combines at harvest.

Second weeding is more an optional operation. It is done only if the crop looks good. If the crop looks poor, the second weeding is not carried out on the grounds that the cost of the operation will not be met by the extra crop yield obtained. So a poor crop is left to become heavily infested with weeds so building up trouble for next year.

---

* See Appendix B_4 "Rainfall at selected Centres During Production seasons".

Herbicides are not used at all. The writer discussed the possible use of herbicides with farmers but was told that little or nothing was known about them. The introduction of such an innovation would be a job for the research and extension workers. Weeding itself required about 300 labourers for a scheme of 1000 feddans for about a period of a month. The labourers had to be recruited and transported to the farm, housed in grass huts or straw shelters and pr ovided with all their food and water, (this is done also during harvest time). Consequently ,the costs of labour, both in cash and kind ,represent a major component of production expenses. In the writer's survey of growers, the general complaint made was that the labourers wages were rising rapidly together with the costs of food and transport. Part of the rise in direct cash wages was ascribed to shortages of labour due to the great expansion in employment opportunities ,resulting from agricultural development in both rainland and irrigated areas. These developments will continue and a growing shortage of labour can be envisaged. It would seem therefore that the extension services should give some consideration to methods of reducing the peak work periods for manual labour at weeding and harvesting times.

Harvesting time depends on the varieties sown and the time they were sown, together with the climatic condition during the growing season. Most farmers plant more than one variety of dura to stagger out the harvesting season and as crops are generally sown over a time period of around two months, all the dura on the farm does not come to harvest at the same time. Early crops can be cut in October and harvest continues until January.

Crops are mainly harvested by hand. The usual practice is to cut off the dura heads, leaving the stalks standing (the latter are usually burnt off next summer or sometimes fed to livestock). The heads are collected and either are threshed by hand or fed to a combine harvester, used as a stationary threshing machine. Occasionally, short strawed, one headed, American varieties are grown, which can be combined directly. After threshing, the crop is sacked up and transported to the local town by lorries for sale either by auction or direct to a merchant.

The mechanised cropping schemes are not entirely mono cropping.* Dura is the principal crop but not the only crop. Sesame, (Sesamum indicum) known locally as Simsim, is the other main crop while a few schemes cultivate cotton and to a very limited extent Safflower, and Sunflower seed.[32]

A common rotation followed on a mechanised cropping scheme is dura, sesame followed by occasional fallow when the weed population builds up and reduces crop yields. Strict rotations are not adhered to because of the varying areas of land which are available for cultivation every year because of fluctuations of rainfall. In most years for example there is either too little or too much rain to sow the entire scheme. Consequently, when conditions are ideal at sowing time, the whole area is planted. This was a point strongly stressed by farmers and officials interviewed by the writer.[32]

Most scheme owners kept no livestock, but often outside livestock owners grazed the crop residuals with or without the owner's permission. Broadly speaking however, the crop residuals are not fully utilized for other farm enterprises and finally the remains

---

*See Appendix B_5 for number and Areas of Mechanized Crop Production schemes by Province (as of April 1976).

are burned off before the beginning of the next season.

Since there are no permanent livestock on the farm and farm work on the crops is confined to a period from June to January, the farms are left uninhabited for a considerable part of the year. Machinery is removed to the towns. It is a common sight to see the owner's tractors parked outside his house in the local town. This type of seasonal occupation of farm has led to the name "suitcase farmers" being applied to the scheme owners. The use of the term is also strengthened by the common practice for a farmer to move onto new land when his crop yields fall below an economic level over a period of time. For reasons not fully understood, crop yields fall over time, other things being equal. Then after ten to fifteen years cultivation, schemes are often abandoned and the owners move on elsewhere because there is plenty of land. Consequently, it would seem that the pattern of mechanised cropping of rainland is following that of traditional agriculture, shifting agriculture. What is more controversial is the damage to the long term fertility of the land. Land recuperates under a rest period in traditional shifting agriculture. What is more uncertain is whether land will recover quickly after a period of mechanised farming. However, while there is plenty of land this problem will receive little attention.(33)

2.3 Cost of production of Dura under mechanised farming

Costs of production are determined primarily by the costs of inputs and the crop yields obtained. The main inputs consist of manual labour, imported machinery, spare parts and fuel. The cost of manual labour has been rising together with the cost of foodstuffs with which the farmer supplies his labour force.[34] These rising costs are a result of both internal inflation in the Sudan and the growing shortage of labour. Imported machinery, spare parts and fuel are also increasing in price. The supplying countries are having inflationary trouble which in turn is reflected in the prices of their products. What is important for the producers of dura is whether or not the price of dura keeps up with the prices of the inputs required for its production. This unfortunately from producer's point of view is not happening. He has to sell more and more dura to purchase a given quantity of inputs. In other words his terms of trade are deteriorating. The trends in dura prices will be discussed together with prices indices for selected machinery and labour inputs.

Although crop yields on the same piece of land tend to fall over time, yields even on new land are low by western standards. There is no underlying tendency for them to rise. For example, in a World Bank investment appraisal for sesame and sorghum, the assumption is made that with increasing experience on the part of the growers crop yields will rise; an optimism which is not justified by the subsequent results.[35] A similar optimism still exists among planners judging from the pre-investment survey of the "Triad" Company.[36] This assumes a crop yield of a ton of dura per acre, compared with the average national yield which is .322 kg per feddan average given for the last ten years (see Table 2.1).

In fact, as has been mentioned earlier, yield tends to fall over time rather than rise. Various theories have been advanced to explain the long term tendency for yields to fall. The explanations given range from more frequent droughts resulting from climatic changes to the exhaustion of the humus of the soil. Consequently, whatever the reasons, the output from the land is falling while the price of inputs is rising. The farmer's response is to move on to new land. This involves additional direct costs of land clearance, building of Haffirs for water supply and possibly soil levelling for the construction of dirt roads. The social costs may be high in that the abandoned land may have suffered irreparable damage. In addition of course, this tendency towards shifting agriculture precludes the development of infrastructure; tarmac roads, piped water supplies, schools and clinics, which would encourage the settlement of a permanent population.

So the prosperity of rainfed mechanised farming would seem to be in question with the terms of trade moving against producers together with the unsolved problem of how to keep the land in permanent cultivation. These two factors are additional to the risk facing producers in an area of uncertain rainfall. Production in semi arid areas is a speculative proposition at the best of times without further major complications.

Table 2.4 summarizes the existing material on the costs of dura production in the rainlands of the Sudan. The figures are taken from detailed cost of production surveys carried out between 1968 and 1976. The first four sets of figures in the table shown that average yields did not exceed 3.75 sacks of dura per feddan while between 1968 and 1976 production costs per feddan rose substantially. Consequently, with low yields and rising production cost, cost per m.t have roughly doubled. In other words, the increase in production cost per feddan is indirectly reflected in production cost per ton as there has been no compensatory

Table 2.4

Comparative Costs of Production
per Feddan, per ton*

Year	Cost Per Feddan LS	Yield Per Feddan in sacks	Cost per sack LS	Cost per ton
1968 (1)	4.975	3.75	1.33	13.30
1974/75 (2)	7.035	3.70	1.90	19.00
1975 (3)	7.809	4.00	1.95	19.50
1975/76 (4)	9.561	3.50	2.73	27.30

* Yield expressed in sacks assumption 10 sacks = 1 metric ton
Weight of sacks differ slightly according to variety of dura.

1. Abdel Rahman El Hadri
2. Leeds Survey 1974/75
3. MFC 1975
4. Leeds Survey 1975/76

rise in crop yield. It should be remembered that these surveys are based on samples of farmers which comprise schemes where the land has been in cultivation for varying periods of years. For the individual farmer who was cultivating the same land in 1968 as in 1976 the situation may well be much worse. He is faced with rising cost per feddan at the same time as falling crop yields. During the period 1968-1975, the purchase price of tractors has more than doubled and diesel oil has more than tripled (details of price increases are given in Appendix B_6). Excluded from the table are estimates made in 1976 for the Arab Organisation for Agricultural Development.[37] These give production costs of LS 4.6 per feddan and LS 11.5 per m.t In the writer's view, such figures are unrealistic and give too optimistic a picture of the potential profits for dura production. One reason for the low costs is that land clearance expenses, the costs of labourers' food and other significant items have been excluded.

Table 2.5 gives a detailed breakdown of the cost of production per feddan. These are the latest figures available at the time of writing which are broken down into the component cost items at given yields. Cultivation costs as can be seen from the table consist of, in order of magnitude, tractors and machinery cost, (fuel, repairs, wages, and food for drivers, greasers and mechanics), labour cost for weeding. Cultivation costs are not directly related to yield, although other things being equal, careful second weeding should increase yields. If the crop looks not very promising farmers do not normally weed a second time. The figures given in Table 2.5

Table 2.5

Dura

Mechanised Crop Production Schemes

Cost of Production/Feddan

Based on 478 schemes, N. Gedaref, Dali, S. Gedaref, Renk - Habila, Agadi, 1975/76

ITEMS	Cost/Feddan LS	% total cost
i) Land Preparation & Sowing:		
Fuels & Oil	550	
Wages of drivers	,525	
Greasers wages	,125	
Maintenance and spare parts	,600	
Depreciation	,400	
Seeds	,105	
Weeding	,881	
TOTAL	3,186	% 39.9
ii) Harvesting Operation:		
Cutting & collecting by hand	1,675	
Threshing by machine	0,719	
TOTAL	2,394	% 29.9
iii) Transportation:		
Loading during harvesting	0,188	
Transportation to Market	0,401	
Labour transportation to schemes	0,242	
TOTAL	0,831	%10.4
iv) Materials Used:		
Sacks	,763 (1)	
Rations of labour	,800	
Depreciation of Kotia (huts)	,020	
TOTAL	7,993	% 100

(1) No crop yields given. Crop yield entered here at 2.45 sack per feddan, figure obtained by assuming that a sack + strings costed 31 pt in 1976 (Leeds Survey Figure for Damazien) therefore given a charge of 76.3 pt a feddan for sacks, yield = $\frac{76.3}{31.0}$ or 2.45 sacks.

are average costs from a sample when the crop was normally only weeded once. This sample relates to the crop year 1975/76 where rainfall was much above average and crops were affected by flooding. Harvest costs comprise the expenses of cutting the crop together with threshing and the purchase of sacks and strings. The cost of cutting is not primarily related to the yield, since if the crop is poor the harvesters have to cover wider distances between the individual plants when cutting and collecting heads of grain. A thin crop usually goes with a very thick stand of weeds. The costs of cutting are the major harvesting expense. The work is done by hand and the charge given in the table covers, not only the direct cash payments to the labourers but, the expenses incurred for transporting and feeding. The costs of threshing, sacks and string, are directly related to the crop yield. In this sample the average yield is estimated at 2.45 sacks per feddan. The average cost for threshing relates to farms where the crop was threshed by a combine, which is used as a stationary threshing machine. The heads are cut by hand and fed directly to the machine. The stalks remain standing in the field. The marketing costs comprise the cost of transporting the grain to the local market and loading and unloading the sacks. The cost of transport is obviously related to the distance from the market. Not included in the costs are produce taxes like "Gibana". Payment of these is often evaded by unrecorded private sales.

The final category of costs shown in Table 2.5 cover such items as sacks, food for labourers and depreciation on huts. No charges are allowed for a share of initial land clearance costs, construction of roads, haffirs and huts nor is any allowance included for managerial expenses. If such charges are to be included, an additional 10 percent charge could be added to the total of approximately LS 8 per feddan giving a final figure of around LS 8.80 per feddan, more comparable with the Leeds figures quoted in Table 2.4

Enterprise costs are always somewhat of a controversial business, as regards what costs should be included or excluded and with capital inputs which last over a period of years how these costs should be spread over the estimated lifetime of the input.

All this is somewhat academic in the eyes of the actual producer. As far as the individual farmer is concerned, expenditure relates to the year on which it is incurred. Once incurred, the idea of apportioning the charges over future years does not occur to him From the writer's experience of interviewing farmers, they were concerned solely with the cash flow in a particular season and regarded profit or losses as the difference between outgoings and incoming cash in a particular crop year. While an overhead charge of one pound a feddan or approximately 30 piastres per sack is more realistic from the accounting aspects, the farmer would ignore overheads in his conception of profitability. Consequently the production cost given in Table 2.4 overstates the cost from the point of view of the farmer. It is the farmer's conception of cost which influences his production decisions. In other words once he has cleared his land and purchased his machinery he will continue to produce provided that his cash flow remains favourable over a period of years. It would seem that he will continue until his land and machinery are worn out. The only factor which would lead to him giving up farming, before this would be a continuing deficit in his cash flow. This situation is likely to be more pronounced if the present trend for input prices (machinery, spare parts, fuel, food, transport and labour) increase at a quicker rate than dura prices.*

* See Appendix B_7 for Average Cost of Production/Feddan in Gedanef Mechanized Crop Production Schemes 1975/76 season. (38)

See Appendix B_8 for Average Cost of Production/Feddan in Mechanized Crop Production Schemes in Blue Nile Province 1975/76 season. (39)

See Appendix B_9 for Average Cost of Production/Feddan in Blue Nile Province 1976/77 season. (39)

See Appendix B_{10} for Average Cost of Production/Feddan in Two Districts of Northern Kordofan 1976/77 season. (39)

See Appendix B_{11} for Average Cost of Production/Feddan in Southern Kordofan Province 1976/77 season. (39)

See Appendix B_{12} for Average Cost of Production/Feddan in Two Districts of Southern Darfur Province 1976/77 season. (39)

CHAPTER 3

Marketing of Dura — Internal

3.1. Removal from the farm

The dura harvest marks the end of the farming year and in the period after harvest from January to June nearly all the large farms are deserted with even the machinery removed. Consequently all dura crops are removed from the farms as quickly as possible, the usual method of haulage is by lorry either hired or owned by the farmer.(40)

The larger lorry operators use powerful vehicles; the most popular make is the large Fiat wagon complete with trailer. Some of these vehicles are owned by a Khartoum based haulage company.(41) The removal of the entire sale crop of the area within a relatively short period of time must impose a strain on the available transport.*

Once the crop is removed from the farm it is either sold immediately or stored by the owner for sale after the post — harvest price low. Storage by the owner can vary from keeping sacks in his house, shop or office or by hiring a storage pit on the outskirts of the local towns or at Gedaref where grain can be stored in the silo owned by the Agricultural Bank.

---

* Wear and tear on these vehicles on the unmade dirt roads is very high and the working life must be short judged by a number of wrecked lorries seen by the writer in Gedaref; a major primary market for rainfed dura.

Another alternative is to store grain in the open yards belonging to commercial banks; a common practice when the farmer is in debt to a bank.(42)

Normally a farmer who has a high debt liability does not store grain himself for any length of time, his need for cash is too great and pressure from his creditors forces him to sell immediately after harvest. Consequently the bulk of the crop will be delivered straight to an auction market or to a merchant and sale follows with the new owner assuming the liability for storage.

3.2 Marketing channels

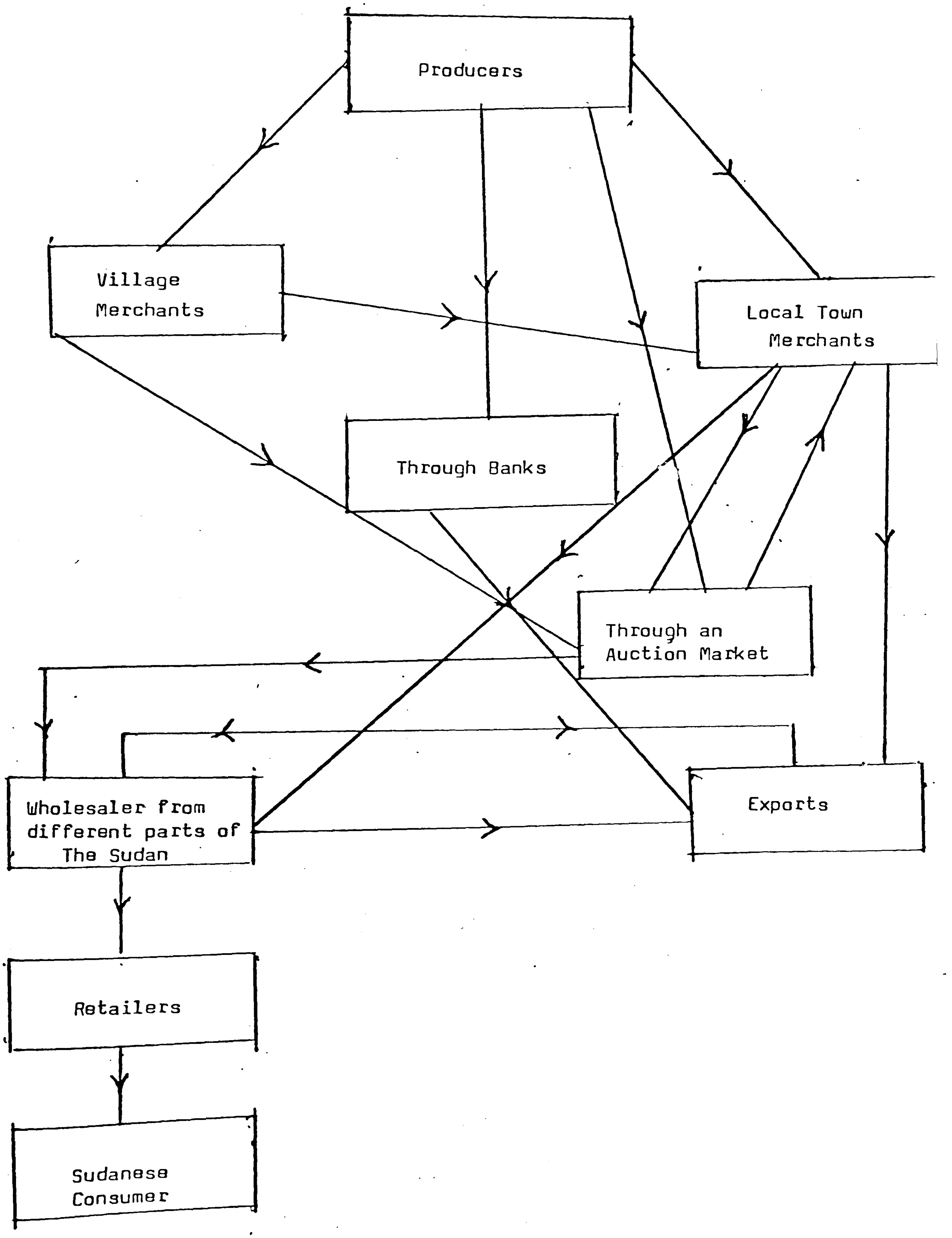
Broadly speaking the crop is sold in one of three ways, either by private bargain with a merchant, or through auction at a specialised market, or delivered to a bank. This latter arrangement is usually associated with a preharvest credit transaction, a condition of which will be the delivery of the crop to the bank, which will dispose of it on the owner's behalf. Not all growers use bank credit despite the lower rates of interest charged since the procedure for borrowing is rather more complex. There is also a limit on the amount of money which can be advanced to a single customer. Large merchants on the other hand are more flexible in their lending policies but the borrower pays a high rate of interest either in the form of a straight interest charge or a discounted sale price (Sheil).(43)

The grower who is not tied to a particular outlet by his indebtedness can either sell through an auction market or by private bargain to a merchant. Chart 3.1 shows channels of dura marketing in the Gedaref area.

The largest auction market for dura is found at Gedaref and the writer has made a detailed study of its operation. The bulk of the trade is from November to January in the harvest and the immediate post harvest period.

Chart 3.1

Marketing Channels of Dura



3.3 How the auction market functions:

Under the Local Government Ordinance 1951 local authorities are empowered to set up auction markets at which specified products must be sold under conditions laid down by the local council.* This system was designed to satisfy two objectives, firstly to provide conditions under which the producer can be sure of receiving a fair price for his produce and secondly that the auction market system should provide a ready mechanism for the collection of an agricultural produce tax. The second objective however acted as a deterrent to the use of the market and consequently weakened the fulfilment of the first objective.

Auction markets however are set up by individual local authorities.(44) Guidance on their establishment and operation is provided in model local orders but each authority has considerable freedom in deciding where and when these markets should operate and how they should be organised.

A wholesale primary market commonly consists of a large space surrounded by walls or fences. Inside are small buildings including offices for the market superintendent and his assistants. The market space is divided up into a number of pitches, each pitch has a number displayed on a small iron plate. Inside the market compound a purpose built auction hall is provided and weighs are sited at convenient places. The whole is guarded day and night, not just for security reasons but to ensure that the market users pay their dues.

---

* Normally dura, sesame, gum arabic, groundnuts and live animals

Normally sales are transacted in the following way. Producers take their dura in their own containers to the auction market early in the morning. The gate clerk allots them a numbered pitch on which each seller unloads his produce. If the farmer has plenty of grain he may be allotted several numbers. The clerk then registers the name of the producer and his district, what type of produce he is selling, the number of bags, the variety and the number of the pitch in which it has been placed.

To buy in an auction market a buyer must have a licence issued by the local authority, a certificate for taxation purposes and a bank guarantee. Buyers usually inspect the grain before sale for the presence of dirt, leaves and stalks. Early in the morning the auction starts. In the front stands the auctioneer and immediately in front of him sit the buyers at desks, usually numbered, and each buyer has the same desk each time the auction is held. At the back on benches sit the sellers. In between the buyers and sellers sits the auction clerk. Bidding starts from the lowest price upwards and the grain goes to the highest bidder. The buyer is responsible for providing sacks, the payment of Ushur tax,* weighing fees, marketing dues, and transporting produce from the market.

---

* Ushur is a product sales tax levied by the local government authority. The level of the tax is determined locally.

In many cases merchants buy produce outside the market to avoid the payment of Ushur, some of them take their trucks to the main producing areas and buy direct from farmers who can not afford the high transport cost to the markets. Some of the merchants who own big trucks manage to smuggle dura to neighbouring countries where they can get higher prices for their produce than on the domestic market. Only big merchants with substantial cash resources can afford to keep grain for a considerable period. Consequently it is this category who benefit from price rises in the months after harvest. Holding grain incurs storage cost and the loss of alternative earnings from the capital locked up in the grain beside the risk of price falls. Broadly speaking however prices rise considerably after the immediate harvest period. Some fluctuations in this rising trend are inevitable but provided that the time of sale is chosen carefully profits can be made by holding grain back from the market.*

3.4 The activities of the Agricultural Bank

One of the most important marketing and storage operators in the dura trade is the Agricultural Bank of the Sudan, founded in 1957 with prime objectives of financing crop production and

* One of the merchants interviewed by the writer was in daily touch with the Mincing Lane, London price for dura beside local prices in other parts of the Sudan.

marketing. The bulk of the loans are short term (under one year) to finance a crop until it is sold. Medium term loans are given for the purchase of machinery and long term loans for land clearance and the provision of infrastructure.* The Bank's main activity is giving short term loans for crop production so providing growers with their working capital for a particular crop season.(45) In order to secure repayment the Bank has entered the marketing field and will both store and dispose of its clients' produce. Farmers in debt to the Agricultural Bank are required to deliver the whole of their crops to the ABS stores , the same requirements also pertain to the debtors of a commercial banks . The requirements however are difficult to enforce in that the banks do not know the actual size of the growers,s crops , consequently the latter can hold back part of their crop for sale elsewhere. Growers will maintain that the crop yields are very poor and the banks especially the Agricultural Bank , do little to verify the claim .

---

* In 1974 of a total of LS 2.7 million advanced, LS 2.3 million were for short term loan while the bulk of the residual LS 0.4 million represented medium loans. (From the Economic Survey for 1974/75, Ministry of Finance and National Economy).

A further facility which is provided by the Agricultural Bank is silo storage *

3.5 The Gedaref Silo

The Gedaref silo was completed in 1967 at a total cost of 2 million Sudanese pounds, the Sudan Government raising 45% and the remaining 55% was met by a loan from U.S.S.R. The silo was constructed by Russian engineers and was equipped with Russian plant and machinery. At the time of the writer's visit the silo was owned and managed by the Agricultural Bank of the Sudan.(46)

Grain is brought to the silo by lorries or railway wagons, it is invariably packed in sacks, on delivery the grain is weighed, tipped out of the sacks and then handled in bulk. First it is cleaned and then fumigated, it is then blown up the central tower of the silo and then handled by a series of conveyor belts which move the grain to the cells in which it is to be stored. The Gedaref silo consists of ten giant vertical cylinders which form a landmark for miles. Inside each cylinder or silo there are three narrow cylinders with a space in the middle between them. Each of the smaller cylinders is divided into cells into which the grain can be moved and removed automatically. The space in the middle is also subdivided into storage units termed stars.

---

* For more details about the Agricultural Bank of the Sudan see Chapter 10.

The star cells are very popular because they are small enough to be filled with grain belonging to one owner. In the larger cells the grain from different owners is mixed up; a point of complaint where quality premiums are concerned. The silo is seldom full, in fact the manager confirmed (1976) that only in 1967 was the full capacity utilised. Normally according to the officials, the peak period of utilisation is directly after harvest when up to two thirds of the capacity is used. In most years the silo is more or less empty by October and there is little or no carry over at all to the next harvest. The accounts show that because of under utilization the silo is run at a loss. (See Chapter 10) The writer believes that the bulk of the grain stored in the silo represents security on loans issued by the Agricultural Bank. Farmers who are not in debt to the Bank appear to store by less sophisticated but cheaper methods; a course which is also adopted by many merchants. The charge at the silo for storage was 3 piasters per sack per month in 1976. One leading merchant told the writer that this was too expensive for him. Instead he rented a Matmora (this is a pit in the ground on the outskirts of Gedaref) for LS 13 a year in which he could store 3,000 sacks.*

---

* So the total cost of storing 3,000 sacks for a year in the silo would be LS1080 against the LS13 for the matmora. Obviously at this price differential the less sophisticated storage system, despite its higher wastage rate, is a more attractive proposition. For more details about the silo see chapter 10. Page 284.

3.6 Illegal marketing of Dura

It is of course impossible to quantify the extent of the illegal marketing of dura but judging from local comments there appears to be a flourishing illegal trade in existence. One motive for the black market is the evasion of local taxes. Some traders will send grain direct from the farm to distant urban centres of the Sudan by lorries, often at night. By moving the grain surreptitiously both the trader and the farmer avoid local taxes. To overworked taxation officials inquiring about crop yields the usual tale told is that the yields are very low and consequently taxes are paid on a lower assessment.

Another important illegal trade is smuggling grain to Ethiopia; where dura prices are usually much higher than in the Sudan.*

At the time the writer visited Gedaref in 1975 he heard from different sources that the leading merchant families had laid the bases of their personal fortunes from the profits of smuggling over the last fifty years, especially during the Second World War.

---

* The writer was told that there was considerable competition to get farms conveniently situated near the Ethopian border.

The trade was temorarily disrupted in 1975/76 by the Civil War in Ethopia. But by 1977, despite the armed forces deployed on either side of the border, the trade once again flourished with it is said the connivance of both armies. According to a spokesman of the Ministry of Commerce it is suspected that 100,000 tons of the 1976/77 crop were smuggled out of the Sudan to Ethiopia mainly, it is believed, from the Gedaref district.* By smuggling, local traders and growers not only avoided paying their taxes but also obtained a higher price than they would have done in the Sudan. In addition they also returned from Ethopia with other commodities, mostly goods in short supply in the Sudan, which also were usually subject to customs duties. So the illegal trade was two way with a high profit potential and the risk of being caught was apparently small.

3.7 Marketing the dura of small farmers

The small Bildat or traditional farmer has long been established in the production areas of the Central Rainlands.** The method of cultivation is very primitive. First the farmer

---

* Information supplied to a World Bank Mission 1976/77.

** Bildat is derived from the word Bildat which refers to a small parcel of land up to five feddans which is cultivated under a system of shifting agriculture. Cash costs are very low since normally all the work is done by unpaid family labour and few if any purchased inputs are used. Normally the cash payments would be largely for transporting the crop to the auction market if it were not sold in the village. The other cash liability would be for Gibana tax and sacks. Consequently it is a rather meaningless exercise to produce a cost of production schedule. If in the future labour acquires high opportunity costs because of alternative employment in the mechanised schemes, then obviously thought should be given to the contraversial question of how to cost subsistence labour.

clears the surface of the land by burning off the weeds and crop residuals in May at the end of the dry season. Then directly the rain starts, the crop is planted in the surface only (no soil cultivation) by poking seeds into little holes made by a traditional tool called Saloka.* The men uses the Saloka while the wives and children planted the seed. The crop is weeded by hand and then after harvest cut and threshed by hand also.

The main objective is to grow enough grain for subsistence for the family, with the split and undersized grain being used for feeding their animals. The seed is invariably home grown and saved from the previous harvest. Yields are very low, the writer visited many villages and the normal yield figures given were around one to two sacks per feddan.[47] In view of the small size of the Bildat plots and the poor yields a family of any size would have little grain to spare. In the past however many families were forced to sell part of their subsistence crop before harvest by the notorious sheil system. This involves selling the crop forward at a highly discounted price which is much lower than the harvest price and the difference between the two is in reality a disguised rate of interest. Having sold the subsistence crop the farmer may well buy part of it back at a greatly enhanced price on

---

* A wooden stick with a small ledge near the base to give leverage so that it could be easily driven into the ground by the operator's foot. Usually the tool is taken from a suitably shaped branch of a tree.

credit in order to feed his family until the next harvest. The writer however learned from the villagers interviewed that the sheil system was happily in decline, the reason for this was quite simple, many people were able to get casual work on nearby mechanised cropping schemes. This cash earning made them independent of the sheil merchants. This is an interesting point especially in view of the opinion that the extension of mechanised cropping in the area has had nothing but a bad effect on the local Bildat cultivation.*

When all the Bildat land was cultivated by hand, as the size of individual holding was very small, there was also little difference in the areas cultivated by each family. Now however tractors are available and individuals who can afford either to hire tractors or even buy their own machinery, are now cultivating larger areas. However the area actually cropped one season depends on the climatic conditions (whether the subsequent wet season has little, moderate or excessive rain). Whereas in the old bildat system the cultivators with only a very small parcel of land to crop were relatively independent of the climate. Another limiting factor to expanding the area cropped is the availability of money not only to obtain a tractor but also to pay the necessary casual workers at weeding and harvest time. Consequently the larger cultivators are generally the sheiks and the village merchants. Quite a few of these people have bought old secondhand tractors from the

---

* It is widely believed that these cultivators have lost land usage rights together with the rights to collect wild gum arabic. To the writer's knowledge no one before has noted the connection between

mechanised cropping scheme owners. The purchasers of these old machines planned not only to use the tractors on their own land but also to hire them out on contract work to the neighbours. Unfortunately many of the secondhand machines were in poor condition and the cost of repairs necessary to keep them in running order was beyond their means so the machines were left to rust away.* (48)

3.8 Co-operative marketing in Gedaref and Damazine

One of the main objectives of a co-operative is to secure higher prices for the farmers. (49) In Gedaref a group of producers had organized themselves into what they called the Gedaref Cooperative Union. The union was not a success and by 1970 it became moribund.** One of the reasons for failure was a quarrel between large and small growers. The union was granted priority on the railway and was allocated wagons to move dura from Gedaref to Port Sudan. (Rail transport between the two constitute a major bottleneck). It was alleged that the larger growers who are often merchants as well, monopolised the management committee and then allocated the wagons to themselves. This abuse led to a strike in

---

* The writer visited a tractor repair yard in Gedaref which was full of old broken down tractors which their owners could not afford to repair. All the owners were small village cultivators many of whom had spent their life savings on buying a machine in the hope of making money from contract work.

** See Khartoum Food Supplies by M.C. Simpson. A study in the production and marketing of six basic foodstuffs. Research Bulletin No. 2, Department of Rural Economy.

January 1966 after which the members generally lost interest in the co-operative.

When the writer visited the co-operative office in Gedaref December 1975 the inspector reported that cooperatives marketing farm produce, had collapsed and he blamed both the machinations of the leading local merchants together with the inefficiency of the Cooperative Department. The inspector rather pessimistically added — "cooperatives are much less efficient than private companies". He ascribed this to the ignorance of the members and the bureaucratic nature of the Cooperative Department whose decision making process is cumbersome and rather inflexible.(50)

The local office is now concentrating on short educational courses for would be members of new cooperatives. The philosophy behind this is that it is necessary to educate a cadre of potential cooperative committee members before starting a local society. The educational courses concentrated on book-keeping, the conduct of meetings, the keeping of minutes together with short lectures on the Sudan Co-operative Movement.

The writer also visited the local Damazine office of the Department of Co-operatives in January 1976 and discovered that there were no marketing cooperatives for dura or any other agricultural produce in the area.(51) The local activities of the Cooperative Department were confined to agricultural production schemes which in general were proving a disappointment. One of the troubles of the department was the lack of transport, consequently officials could not visit societies often enough to provide supervision. Damazine is in the Blue Nile Province in which all together there were five offices each with an inspector with his assistant, but for the whole province there are only four vehicles allocated for the use of officials visiting farmers. Three were out of service waiting for delivery of spare parts from abroad. The department had a budget of LS 28,000 a year for the province and by the time that the salaries and wages bills had been met little was available for anything else. The Blue Nile Province and Gedaref, as the statistics discussed in Chapter 2 show, are the major areas of dura production.

It would seem therefore to the writer that cooperatives were more or less moribund and are likely to remain so until the Cooperative Department has sufficient resources both human and financial.(52)

3.9 The activities of the local merchants

A survey carried out in Gedaref in 1966 covered 15 local dura merchants, the writer obtained the original questionnaires and re-analysed the data. The results of the new analysis are given in Table 3.1 This analysis showed that even in the small sample taken there is a wide variation in the size of the merchants' businesses as measured by the annual turnover in sacks of dura handled. Out of the fifteen merchants, two were responsible for 88% of the total turnover of the group. These two averaged 450,000 sacks each annually. The next largest to them only had a turnover of 200,000 sacks while the remaining 12 only averaged 10,000 sacks each, consequently even this small sample illustrate the dominating position of the large merchants.

Table 3.1 Gedaref Dura Merchants Survey 1966

Annual Turnover	Number of Merchants	Average per merchant in size group (sacks per year)
Under 5,000 sacks	2	2650 sacks
5,000 and under 10,000	2	5000 sacks
10,000 and under 20,000	8	13000 sacks
20,000 to 50,000	-	-
50,000 to 300,000	1	20000 sacks
Over 300,000	2	450000 sacks
	15	

Percentage of total turnover of the 15 merchants, contributed by the two largest merchants = 88%

Source: Extracted by the writer from the original questionnaires. This is the first time this data has been published.

The operations of the smaller merchants were mainly confined to the internal trade in dura and in the main activity was the supply of dura to the Khartoum market. The two large merchants on the other hand were primarily concerned with the export trade and concentrated on assembling supplies and organising their movement to Port Sudan. The main difficulty encountered by these large merchants was the transport bottleneck on the railway. (hence their interest in the defunct Gedaref Cooperative Union, see page 67).

The survey showed that the smaller merchants made modest profits but the larger merchants did very well indeed. The report comments that one rather wondered what the role of a smaller merchant was, presumably if he came into conflict with a major operator he would quickly be driven out of business. Hence his survival probably required following the price lead set by the two giants of the trade. Competition by most accounts seems to have been rather lacking at Gedaref.

The writer undertook a detailed survey in December 1975 of merchants at Gedaref. The export trade was in the hands of the same larger operators. The writer spoke to many of the smaller merchants attending the auction market and learned from them and from the inspector of the market that the small traders confine their activities to the trade inside the Sudan. Thus the situation suggested by 1966 survey still pertained in 1975/76.

3.10 The larger merchants 1975/1976

The writer was able to identify the largest merchants in Gedaref through the assistant of the auction market inspector who kindly provided details of amounts purchased in order to discover who are the major operators.

Five large merchants were identified and the writer was able to interview them.* Details of their turnover are given in Table 3.2. It will be seen that of the merchants who handled over 50 thousand sacks a year of dura three handled over 500 thousand and accounted for 91% of the turnover of this sub group of large operators. It is interesting to note that the largest merchants in the group (with a turnover of 800,000 sacks) was also the largest merchant in 1966 survey. His turnover has doubled between the two investigations and by 1975/76, would not be far short of ⅓ of the total quantity of dura passing through the Gedaref auction markets.**

---

* The writer would like to thank them for their cooperation,assistance and for their kind reception.

** He does not buy all his supplies from the auction market. The proportion (⅓) quoted is given in order to convey some idea of the scale of his business.

Table 3.2 Gedaref Large Dura Merchants December 1975

Turnover of over 50,000 sacks of dura a year

Size of Annual Turnover	Number of merchants	Average Turnover per merchant in size group
50,000 and under 100,000	1	53,000
100,000 and under 250,000	1	150,000
250,000 and under 500,000	-	-
500,000 and under 750,000	2	600,000
750,000 and over	1	800,000

Source: Calculated by the writer from questionnaires

All five merchants with an annual turnover of 50,000 sacks were concerned primarily with the export trade which on average accounted for around 70% of their turnover. The residual went to other parts of the Sudan with the exception of Khartoum. (The latter market appears to be the preserve of the small merchants).

The writer was able through the kind cooperation of merchants concerned to get some impression of the histories of the four largest businesses; the firms with turnovers of over 100 thousand sacks of dura a year. These firms were either second or third generation family businesses. They are run by people who were members of a small and well integrated community. Three of the families concerned inter-married and beside their trading activities, they have considerable family networks which included many of the leading personalities in the commercial life of Gedaref.*[53]

Four out of the five leading firms were started in the Condominium period with the founders being immigrants from Egypt. These men came to Gedaref as shop keepers at a point of time when Gedaref started to grow from a small village to a town after the railway came to Gedaref and the government made the town an administrative centre.

Starting as general store keepers they branched out into buying the main agricultural products of the area (sorghum, sesame and gum arabic). These were exported through family and other Egyptian connections. Minority immigrant groups tend to keep together and help one another. It is also interesting to know that Muslim Egyptians in the Sudan tend to work with Coptic Christians from Egypt because they feel 'kinship' with them on cultural grounds. Both groups are very different from the indigenous Sudanese.**

---

* The writer met many of them at a Christmas party at Gedaref to which he was invited.

** In the Mahadia many Egyptians were murdered by the ignorant soldiers who did not recognise fellow Muslims because they were white not brown.

The remaining large firm belongs to a Sudanese Muslim family. The founder started as the Gedaref agent for a large Khartoum company founded by Egyptian immigrants in the early days of the Condominium.*

The great rise in the growth of their businesses came from the Second World War. It is alleged that some of these firms did well out of the smuggling trade with Ethopia both before and after the reconquest of that country.

Whether the smuggling trade enabled these firms to obtain substantial capital resources or not is somewhat of a controversial and rather delicate matter, but one point is clear when mechanised farming started in Gedaref in 1945, these families had sufficient financial resources to exploit the new opportunities.

All the large merchants obtain their supply of dura mainly from the auction market in Gedaref and to a lesser extent from small auction markets in the region and also on a very limited scale from the actual producers mainly those with mechanised crop schemes.** (54) All five big merchants have schemes themselves

---

* The founder of this large Khartoum company came to Sudan as a pedlar selling china cups from door to door in Omdurman town.

** The existence of a social homogenity among a limited group of middlemen creates an environment which makes collusion easy, but of course it does not necessarily follow that collusion actually exists in practice. For example see the comment of G.R. Spinks and Edith Whetham (55).

and naturally market their own produce together with the produce of their relatives and friends. It is interesting to note no grain was purchased on sheil in 1977 by the group.

When the merchant receives the grain either from the auction market or from producers, he resacks the produce and if the grain is a poor sample it will be cleaned before resacking.(56)

For storage the large merchants did not rely on the Gedaref silo but instead used cheaper facilities such as matmora (pits) and open yards or even in their own houses.*

Normally the merchant is acting on his own account and is the legal owner of the grain. However, when he is in debt to a bank, he will be required to store the produce in the bank's own open compound in Gedaref.** Merchants borrow from commercial banks rather than the Agricultural Bank because the credit terms are both more favourable and more flexible.

The 1966 survey of Gedaref merchants showed that the larger operators held on to the grain for a longer period of time than did the smaller merchants. The reason for this is that the larger merchant is in a better position financially to take

---

* The writer conducted several interviews with merchants in offices piled high with sacks of grain with mice running in and out of the sacks. The merchants would have a table and chair plus a big safe, a filing cabinet and a telephone. Often a clerk or two sat by the doorway at ramshackle tables together with a strong man who obviously provided security. A few small boys who act as messengers and tea and coffee makers completed the staff. The whole premises did not give much impression of the wealth or the scale of the operation of its owner.

** The writer observed that a manager of the local bank was in the social circle of the leading merchants. It was very obvious that there was a strong link both on social and business matters.

advantage of any price rises after harvest while the smaller merchants are short of capital so normally resell the grain within a week or two. All agricultural produce which has a fixed harvest period tend to have seasonal price movements with the price lowest at harvest and then rising until the next harvest. This is a general trend but there are of course fluctuation and variations of this trend. Consequently to hold grain over time involves a speculative risk in addition to the costs of storage. The latter include not only the direct charges for storage but allowances from the loss of weight in storage caused by dehydration and wastage through damage by insects and rodents, together with the opportunity cost of the capital locked up in the stored crop.

Usually it is the large merchant who has the expertise and resources to store and sell at the right moment. The merchants visited by the writer in 1975 were fully conscious of the possibilities of gains and losses from storing the grain bought from producers at harvest time.

The other function which influences the length of time merchants hold grain at Gedaref is the logistical problem of moving it to Port Sudan, a distance of 768 Km by rail. The rail services were a constant source of complaint both in 1966, 1975 and 1976. One problem is the capacity of the line itself which is single tracked with infrequent passing places. As the track is laid on bare earth without ballast (for reasons of economy when built), trains are limited in speed and when the rainy season comes the service is subject to stoppages when the bed of the line is too soft to stand the weight of heavy locomotives. A problem at the time of dura harvest is the shortage of railway wagons. Priority is given to the movement of the Gezira cotton crop which is harvested in January and so partly overlaps with the dura harvest. Consequently, Sudan Railways concentrate on building up a stock of wagons in the Gezira district and too few are sent to Gedaref. A further difficulty is the high number of wagons out of service at any one time. All major repairs have to be done at the railway workshop at Atbara and rolling stock may well break down in the remoter areas of the Sudan which may be over 3,000 Km from Atbara. One particular trouble is hot boxes, often broken down wagons will remain stranded at the remoter end of the system for months on end.*

The alternative to rail transport is by dirt road to Port Sudan, and long distance haulage traffic is increasing rapidly. Despite the road conditions, private contractors maintain regular services which prove to be run satisfactorily judging from the lack of complaints about them from the merchants.[57]

---

* Overheating of moving parts which leads to excessive wear and eventual breakdown.

One major contractor is a Sudanese firm based in Khartoum (Sudanese Transport Company) who operate a fleet of modern heavy Fiat trucks each of which pulls a long trailer; these vehicles are a common sight in the district.(58)

There are proposals to expand the road network in Blue Nile Province by about 400 to 600 Km a year so that by 1985 the trunk road should have about 5,000 Km of paved roads, together with another 2,000 to 3,000 Km of gravel roads connecting important producing areas with Khartoum and Port Sudan. The Chinese are building a paved road from Wad Medani* via, Gedaref, Kassala and Haiya to Port Sudan. By the end of the decade the road should be completed and then local merchants at Gedaref believe that most of the logistical problems will be solved.

Normally the Gedaref merchants in the export trade pay for both storage at Gedaref and transport to Port Sudan. Once at Port Sudan, however, the crop changes ownership. The five large Gedaref merchants did not export the crop themselves but sold the grain at Port Sudan. The main buyer of this grain was a single company who in the writer's estimation was responsible for 80% of the total export of the dura from the Sudan.**

---

* Wad Medani already has a tarmac road to Khartoum.

** The writer interviewed this firm (1976) who were reluctant to give details about the size of their annual turnover. The estimate of 80% was based on observation and comments by the Agricultural Bank manager at Port Sudan who put the figure for market share at least 80% and possibly 90%.

This firm has been in business for two generations and the founder an Arab Muslim came from Aden.(59) The family links facilitated the building up of an export trade to the Arabian Peninsular.

The firm provide an example of the flexibility and initiative of an efficient large capitalist organisation, by the manner in which it organises the dura export trade to Saudi Arabia. The Port of Jeddah the main entrance to Saudi Arabia is very heavily congested and ships may queue for months outside the Port waiting for a berth In fact there have been food shortages in Saudi Arabia because of the congestion at Jeddah and the Saudi's have had to resort to unloading the ships by helicopters at great expense.*

The Port Sudan merchant however has found a way round th bottleneck and ships his dura over the Red Sea in small sailing dhows (colloquially called Sanbouki), With good winds the journey takes about twelve hours. The grain is unloaded either in small harbours outside Jeddah or at sea into smaller Saudi boats for unloading at different points along the coast. Dura from other countries, notably the United States, remains unloaded in large freighters queuing up outside the Port of Jeddah for possibly months.

---

* The system employed is to lift sacks by winch and fly with the sacks dangling below the helicopter; often sacks are dropped or damaged and the grain spilt into the sea.

This ability to deliver to Saudi Arabia may well result in larger profits as a result of local shortages there. A further source of profit is that by avoiding the Port of Jeddah, customs are by-passed and import duties avoided. In addition it is widely believed in Port Sudan that Saudi Arabia is the source of many goods smuggled into the country on the return journey of these dhows.

The peculiarities of the Saudi trade, however, give conditior where excessive profits could be made. One cannot, however, be but amazed at the initiative shown in overcoming the shipping bottleneck. The large firm too has a very strong bargaining position internally in the Sudan both regarding the producers and their distributors.

The large firm is also engaged in the export of sheep and actually owned three freighters to ship livestock, mainly sheep, to Saudi Arabia. Recently however the ships have been sold because they were rather old and needed expensive repairs and the export of sheep have been cut down. The firm also owned the large cotton growing Zidab Scheme in the Northern Province (now nationalised). It still owns a cotton ginning factory at Swakin on the coast. The cotton is grown on pump schemes and brought by rail and lorries to the coast where the lint and seed are separatec and then exported.(60)

3.11 Marketing Costs

The production costs given in Table 2.5 Chapter 2 include a charge for transporting sacks of dura to the auction market at

Gedaref. The cost given in the Table is approximately sixteen piasters a sack, this would include loading at the farm and unloading in the auction market. (This is an average cost of schemes at varying distances from the market). At Gedaref many merchants complained to the writer that the labourers hired for loading and unloading at the auction market had formed a union and had pushed up their wage rates accordingly.(61)

Grain is sold by auction the only charges incurred for services of the market are weighing fees at five piasters a sack of dura. No charge is made for the actual auctioneering process. When the produce goes through the market, however, local taxes are collected by the local council who also of course run the market. The first tax "Ushur" is ad valorem tax paid by the buyer and not the seller. In 1975 the tax on dura was 13% of its purchase price. Ushur represents the main source of income of the local council, who is responsible for roads, education and other services. The producer also has to pay another tax which for convenience of collection normally is levied at the auction market. This is "Gibana" which on dura is a levy of 12m/ms per Kantar or approximately 0.5 piasters a sack. The "Gibana" tax also goes to the local council. In all the two taxes represent a levy of approximately 16.5 piasters,* per sack given a purchase price of

* This 16.5 piasters comprise 16 piasters for Ushur and 0.5 piasters for Gibana.

LS.1.25 a sack; a representative price at the time of the writer's visit to the auction market in 1976. In the past tax evasion has been on a large scale and apparently is one of the reasons for smuggling grain to Ethiopia.

Grain storage costs differ according to the type of storage used. The most expensive at Gedaref was that at the silo. The charge in 1975 was 3 piasters a sack per month*. This charge includes cleaning and fumigating. The dirtier the sample of grain and the more efficient the means of cleaning, the greater is the weight loss. The average weight loss quoted by the manager of the silo, was 3% for dura.(62) One cause of complaint by local merchants was the silo based storage charges on the number of sacks delivered before cleaning and not the actual number stored after cleaning. Many did not use the silo and instead used pit storage which is practical during the long dry season.*

The merchants interviewed by the writer at Gedaref were anxious to move the grain to the port as soon as possible but transport presented a bottleneck. In 1975 because of the fear of shortage of food in Sudan itself, the export of dura was prohibited for a few months and consequently merchants had to keep the grain at Gedaref for a longer period than usual.(63) In a normal year, given the transport bottleneck, a merchant would expect to hold the grain at Gedaref for an average of two to three months.

---

* See comparative costs quoted for silo and pit storage, Page 62

Cleaning is also carried out by the merchants. Normally they buy after inspecting samples and discount the prices they pay to allow for a dirty sample. Consequently the farmer is penalised for having a dirty crop and the penalty may be greater than the actual cost of cleaning which in the writer's estimates was 15.5 m/ms a sack.*

Table 3.3 and 3.5 are concerned with the average costs of marketing between the purchase of grain at the Gedaref auction market and its arrival at the freight yard at Port Sudan. Tables 3.4 and 3.6 cover the costs incurred between arrival at the Port and when the grain is loaded onto the ship, ready for export. The Tables 3.5 and 3.6 are based on 1974 figures. From Tables 3.4 and 3.6 it will be seen that at 1970 — 1973 F.O.B. costs per metric ton was LS 25.705 m/ms and at 1974, LS 42.256 m/ms. This large rise in the F.O.B cost per metric ton was due to the increase in "Ushur" and "Gibana" taxes and the increase in transport, storage charges and handling costs

---

* There are two privately owned cleaning plants in Gedaref where most of the merchants send their grain. Assuming a charge of 1.5 m/ms a sack for cleaning and a weight loss of 3%, the total cost per metric ton of cleaning grain would be LS 1.55 or 15.5 m/ms a sack.

The costs given in Table 3.4 and 3.6 relate to grain privately stored at Port Sudan. If the silo was used as in (Table 3.7), the costs would be higher.* To all these costs the original purchase price at Gedaref must be added. On Table 3.7 figures this would give a F.O.B. cost of LS 60.143 m/m per metric ton.

The Port Sudan silo managed by the Agricultural Bank is strategically situated in the only port of the country, through which nearly all imports and some exports of grain have to pass. This silo has a capacity of 50,000 tons. For more details of the silo see page 284.

---

* Cleaning and storing grain at Port Sudan silo is more expensive than private stores. Normally exporters in debt to the Agricultural Bank are required to deliver their crop to Port Sudan silo.

Table 3.3 Average cost of Marketing of Dura in Gedaref during the years 1970 - 1973

First Stage from Gedaref to Port Sudan

	LS m/ms
Price per ton at the auction market	12.250
Ushur 12 percent	1.470
Gibana	0.270
Agent commission	0.330
11 bags at 24 piaster per bag	2.640
Handling and loading	0.500
Transport cost to railway station (2 piasters per sack)	0.220
Cleaning charge	1.000
Internal jute bags at five piasters per bag*	0.550
Storage cost	0.200
Railway freight to Port Sudan	2.980
Tot al cost per ton to Port Sudan	22.410

Source: Ministry of Agriculture, Food and Natural Resources. Department of Agricultural Economics 1970 - 1973

* An inner lining for sacks of grain which are to be exported.

Table 3.4 Export Expenses per ton of Dura

Second stage from the Port to f.o.b.

	LS m/ms
Storage at port for one month	0.200
Port and loading fees	0.690
Weighing fees, registration and telegrams	0.370
Brokerage	0.300
Bank interest	0.170
Bank expenses	0.230
Losses .5 percent from export price	0.160
Insurance	0.300
Fumigation	0.600
Transport cost to on board the ship	0.275
Total export expenses	3.295
F.O.B. Price per ton	25.705

Source: Ministry of Agriculture, Food and Natural Resources
Department of Agricultural Economics 1970 - 1973

* F.O.B. price consist of Total cost per ton from Gedaref to Port Sudan + total cost per ton from Port Sudan on board the ship LS 22.410 + LS 3.295 = LS 25.705

Table 3.5 Marketing Cost of Dura per ton at Gedaref Year 1974

First Stage from Gedaref auction market to Port Sudan

	LS m/ms
Price per ton at the auction market	22.727
Ushur and Gibana	3.300
Brokerage	1.300
11 sacks at 30 piasters per sack	3.300
Handling and loading	0.700
Transport cost to railway station	0.220
Cleaning charges	1.000
Internal jute bags at five piasters per bag *	0.550
Storage cost	0.200
Railway freight to Port Sudan	5.010
Total cost per ton to Port Sudan	38.307

Source: Ministry of Agriculture, Food and Natural Resources. Department of Agricultural Economics 1974.

* See footnote Table 3.3

Table 3.6 Export Expenses per ton of Dura 1974

Second Stage from the Port to f.o.b.	LS m/ms
Storage at Port for one month	0.200
Registration fees	0.150
Port fees	0.040
Loading	0.650
Weighing fees	0.220
Brokerage	0.300
Bank interest	0.277
Bank expenses	0.412
Losses .5 per cent of export price	0.275
Insurance	0.550
Fumigation	0.600
Transport cost from Port to ship	0.275
Total export expenses	3.949
F.O.B. price per ton	42.256 *

Source: Ministry of Agriculture, Food and Natural Resources
Department of Agricultural Economics 1974

*F.O.B. price per ton of dura consist of Total cost per ton from Gedaref to Port Sudan + total cost from the port on board the ship

LS 38.307 + LS 3.949 = LS 42.256 m/ms

Table 3.7 Marketing cost of Dura per M. Ton Gedaref to Ship Port Sudan. Year 1974/75

	LS m/ms
Purchase price per ton in Gedaref	36.000*
Sacks	3.157
Storing	2.200
Handling and loading	0.330
Fumigation	0.250
Insurance	0.126
Handling and unloading at the grain silo	0.400
Rail freight Gedaref to Port Sudan	9.136
Handling from silo to quay	0.500
Total cost per ton before profit	52.099
And 5% bank profits	2.604
Price per ton on the silo quay	54.703
Expenses from silo to f.o.b.	5.440
F.o.b. price per ton	60.143

* From the purchase price the ex — farm producer price has been estimated as follows:

Purchase price per ton in Gedaref		36.000
Local tax at LS 0.58 per sack of 90 KG	6.444	
Market fees at LS 0.555	0.555	
Transport farm to market at LS 0.40 per sack	4.000	
		10.999
less farm producer price		25.001

Source Agricultural Bank of Sudan. Grain sold by the Bank stored at both the Gedaref and Port Sudan silos.

CHAPTER 4

DURA

Prices, Supply And Internal Demand

4.1 Introduction

The main constraint on the expansion of commercial modern agriculture is transportation which is deficient throughout Sudan especially in the western and southern regions. The railway network is not adequate. All season roads are scarce and the cost of road transport is high. Credit facilities are also inadequate. The loans granted by the Agricultural Bank of the Sudan (ABS) are hardly accessible to small farmers who are thus forced to seek credit from private traders at interest rates often exceeding 100 per cent per annum. These major constraints — regional disparities, deficient transport, lack of credit and marketing — strongly influence the formation and functioning of agricultural prices in the Sudan. Thus there are considerable seasonal and regional fluctuations in producer prices.

Prices at harvest fluctuate from year to year a factor which creates a number of problems of uncertainty for farmers which may well reduce the use of purchased inputs and so slow down the rate of technological change.[64] Within a given crop year, price fluctuations are intensified by inadequate credit facilities and farmers in need of ready cash, are forced to sell their crops immediately at harvest and consequently depress the price. After harvest, prices rise and producers in a strong financial position (large farmers and companies) are able to dispose of their crops at much more advantageous prices. These temporal price differences (seasonal variation in price at the same location) are a marked feature in the Sudan and indicate the lack of credit and farm storage facilities.

Dura markets are often controlled by a few powerful traders who have sufficient capital or access to credit facilities to form a price ring and thus exploit small producers and small traders.

There are regional or spatial price differences between various locations at the same point of time which persist for long periods due to inadequate, unreliable and costly transportation. Prices in different markets are not comparable, indicating that supplies do not flow freely from low price markets to high price markets, thereby equalising the prices. It is risky for merchants to shift the supply to the regions with higher prices since they are not certain whether the higher price will still hold by the time their consignments will have arrived.(65)

As has been mentioned in Chapter '3' sheil is a widespread marketing and credit institution under which farmers sell the crop forward before harvest to a private trader in exchange for credit. Normally sheil prices appear to be around half the wholesale price prevailing at the last harvest. This is the general level taken by the merchant as a basis for bargaining and as he is invariably in a stronger position than the cultivator, the latter has little scope for negotiation. The merchants bear the risk of a fall in prices but of course stand to make a handsome profit if wholesale prices rise. Because many rainfed farmers are also merchants with adequate working capital, they do not need to resort to the "sheil" system, but farmers without other sources of income or access to institutional credit often have no alternative.

The present marketing system of dura is far from being an effective link between producers and consumers. The deficiency of marketing channels can be illustrated by the extent of seasonal price fluctuations, regional price disparities and the gap between producer and consumer prices. The producer price for dura in the Central Rainlands reached LS. 8 per ardeb in 1950 and then abruptly fell to LS. 1.5 per ardeb in 1951. At the price of LS. 1.5 per ardeb, producers were not able to cover their production cost and some 30 per cent of dura producers in Gedaref did not harvest their crop and many did not prepare their land for the new season.(66)

Another crisis which came in December 1960 when for the first time the dura crop was over one million feddans in the Gedaref area (the main production area of dura) and the price collapsed. Some farmers decided not to harvest their crops and the Government then intervened and ordered the newly established Argricultural Bank of the Sudan to open an office at Gedaref and issue credit for the crop against delivery. Then the Bank faced a further problem. The grain was stored in open yards waiting removal by rail but owing to bottlenecks on the railway some of the grain was still in the open in June 1960 and was spoiled by the first rain of the year. This experience led directly to the decision to build a grain silo at Gedaref. The silo was finished in time for the 1967 harvest; the only occasion when its total capacity was utilised. Such fluctuations in prices of dura are the more serious in view of the fact that dura is the main staple food in Sudan and occupies some 40 per cent of the arable land.

Equally serious are regional price discrepancies. These differences are not transitional but persist for longer periods. The writer found that in Gedaref, the main production area, prices are on average around half auction prices recorded in other important markets, such as Nyala and El Fasher and a general complaint of producers and traders is shortage of transport to move their produce from the low to the high price markets.(67)

Prices received by producers are commonly said to vary considerably according to the variety of dura sold. It is claimed that white varieties generally are more in demand than yellow and brown ones and so command a price premium*. Yet the average price paid at Gedaref auction market shows little inter

---

* Generally the white variety has a higher production cost as it is tall growing (cannot be combined easily) and is relatively low yielding (lower plant population per feddan). The coloured varieties tend to be higher yielding short strawed types

variety variation except for one type "combinable" which is in poor demand because of its colour and its small grain size and is less favoured as food grain. Table 4.1 indicates average price per kantar of different varieties of dura at Gedaref in the year 1974/75.[68]

Table 4.1

Average price per kantar of
different varieties of dura in Gedaref
Year 1974/75

1974/75	Varieties			Price = LS/m/ms
	Mugad	Faterita	Dabir	Wadakar Combine
July 1974	1.015	1.05	1.05	.800
August	1.015	1.05	1.05	.800
September	1.015	1.05	1.05	.800
October	1.015	1.05	1.05	.800
November	1.015	1.05	1.05	.800
December	1.015	1.05	1.05	.800
January 1975	1.300	1.300	1.300	1.000
February	1.300	1.300	1.300	1.000
March	1.300	1.300	1.300	1.000
April	1.300	1.300	1.300	1.000
May	1.300	1.300	1.300	1.000
June	1.300	1.300	1.300	1.000

Source = Auction market, Gedaref

1 Kantar = 46 Kgs approximately.

Examination of output and price data over time shows that farm gate prices are more elastic when crops are good and less elastic when crops are poor. The converse holds at retail level. The Government was aware of the situation and in 1970 adopted a price stabilisation scheme operated by the Agricultural Bank of Sudan. Under the scheme the Bank was to buy up grain when prices were low, store and then resell when prices were higher. This it would hope would help stabilise both farm gate and retail prices.

Unfortunately the scheme was a failure and so was dropped after two years because of the financial losses incurred. Study of the records showed that the prices paid for grain were higher than those finally realised, let alone leaving a margin to cover storage costs, wastage and interest in the capital locked up in the stored grain. The actual margin between buying and selling prices showed a loss of LS10 a metric ton over the whole two years period. No figures are available for storage costs. As some 100,000 tons of grain appear to have been involved the losses on the buying and selling transactions (LS 10 a ton) give a total of LS one million.

The reasons given for the failure were storage and transport problems together with lack of buyers. On average grain remained in store for over a year and unknown quantities were spoiled. Transport difficulties often meant delays in sending consignments of grain from the stores to high price areas in the Sudan. In fact by the time some grain arrived at its destination, the prices had already fallen. Looking at the records the grain purchased by ABS had a high proportion of the combine variety which, because of its colour, is unpopular in the home market and usually goes for export.

4.2 Production and Price Cycle

Dura is an annual crop and the available evidence suggests that farmers when they decide what area of dura to grow, take into account the market price of dura in the previous year. This relationship can be expressed as follows:

$$dat \int Pdt - 1$$

where da equals the area of dura in the current year

Pdt — 1 is unit market price for dura in the previous year.

This relationship can result in a price/production cycle of a cobweb type.* Farmers respond to a low price in year t—1 by reducing the area grown in year t other things being equal. This will lead to a short fall of supplies in the market which in turn pushes up the price of dura in year t. In the next year, farmers respond to the higher price by planting a greater area, other things being equal a larger supply comes to the market which in turn depresses the prices in year t + 1 and another cycle begins. These price cycle are decernible in the production price statistics for the period 1969—1974. These movements are partly modified by the effects of rainfall on crop yields hence the expression other things being equal. The message of this is that a farmer should not plan his crop area according to the prices of the previous year. This policy will only result in a level of prices which are different to those he had expected. It would be more realistic to assume that the expected price would be closer to that prevailing two years before. If he based his production decision on the price t—2 and the rest of the producers continued

---

* Since the price of a given year is probably not a determinant of output of the same year, the identification problem is not likely to be troublesome. See for example Richard Stone, The Role of Management in Economics, Cambridge, England, 1951, pp.20,21,24.

using t—1 as a base; the farmer would be working against the cycle and all other things being equal, should make a higher profit. In other words if a farmer wants to make money, he should grow the crop the year after the price collapsed and avoid increasing his area sown the year after prices reach high levels.(69)

4.3 Supply and Farmers' Response to Price Change

T.W. Schultz* maintains that "the rate at which farmers who have settled into a traditional agriculture accept a new factor of production depends upon its profit, with due allowance for risk and uncertainty and in this respect the response is similar to that observed in modern agriculture. The doctrine that farmers in poor countries either are indifferent to or respond perversely to change in prices is patently false and harmful. Price policies based on it always impair the efficiency of agriculture."(70)

A number of other economists agree with Schultz that under — developed agriculture has a significant positive response to price rises. M.L. Dantwala and W.P. Falcon for example emphasise that the composition of output responds to relative price changes.(71) J.W. Mellor suggests that short run responses may be greater in agriculture in LDCs than in DCs because of the greater flexibility in respect of factor inputs and in respect to distributio channels.(72) P.T. Bauer and B.S. Yamey cite as evidence the response of Nigerian cocoa and palm oil producers to increased

---

* Schultz (11—43 p.49)

price differentials for various grades of produce.(73) C.R. Wharton suggests as an example the expansion in world coffee production after the high prices in the early 1950s.(74) With specific reference to Thailand, B. Misra and R. Sinha have joined Schultz in attributing the expansion of foodgrains production to a remarkable price response.* (75)

Other economists like R.N. Mathur and E. Ezekiel maintained that food grains prices are dependent not only on total output of grain but on the size of the marketable surplus which is normally defined as the residual left over after the grain requirements of the family farm for seed, human consumption and for feeding to livestock are met.(76) The writers attack this conventional view of the marketable surplus and argue instead that this is not the determining factor as regards the amount sold, instead they argue that the level of market prices partially determine the amount of grain retained on the farm.**

> ... Farmers sell that amount of the output which will give them the amount of money needed to satisfy their cash requirements and retain the balance of their output for their own consumption. The residual is

---

* Dantwara (1-26 p.87) Falcon (1-29 p.324), Mellor (11-29 pp.199-200), Bauer and Yamey (1-10, pp.300-305), Wharton (VI-44, p.3,14), Brown (V-7, p.18), Platinius (VI-26, p.17) and Schultz (11-43, p.32)

**Mathur, P.N. and Ezekiel, Hanan, Marketable Surplus of Food and Price Fluctuation in a Developing Economy, Kylos 14: 396-408, 1961.

> thus not the amount sold but the amount retained. If prices rise, the sale of a smaller amount of food grains provides the necessary cash and vice versa. Thus prices and marketable surplus tend to move in opposite direction.

Also P.N. Mathur, D.R. Khatkhate and S. Enke* all argue that subsistence farmers may have fixed or relatively fixed monetary obligations and therefore only sell as much of their production as is necessary to obtain the desired cash level. This situation, the relatively fixed desire for money income, may exist because of relatively fixed monetary charges for rent, debt service and inescapable small amounts of consumption of non agricultural goods. Because of a high rate of propensity to consume extra foodstuffs by the farmers family and their livestock, the farmer maximises production within climatical and technological constraints.

The present writer would add that this movement is within a fixed parameter. Obviously if the price were very low the producer would not sell his entire crop, he would have to retain that part necessary for his minimum requirement. At the other extreme very high prices will not entirely stop sales, the producer has still to satisfy his minimal cash requirement.

An alternative formulation which could underlie the hypothesis of an inverse relationship between the marketed surplus of a

---

* D.R. Khatkhate and S. Enke:
Problem of marketable surplus in Indian agriculture. Indian Journal of Agricultural Economics 1960.

subsistence crop and the market price, is presented by R.O. Olson and T.N. Krishnan.* They do not concern themselves with a fixed demand for monetary income but merely argue that an increased price for a subsistence crop may increase the producer's real income sufficiently so that the income effects on production and consumption of this crop outweighs the price effects on production and consumption. The marketed surplus, therefore could within limits vary inversely with the market price.(77)

R.O. Olson also indicates that the inability to increase output in agriculture is not because producers are unresponsive to price, but their responses are inhibited by other factors such as the lack of knowledge, non-availability of fertilizer, lack of credit institution etc. Improvement in such circumstances requires government action in providing services such as more research, an aggressive extension programme, an efficient agricultural supply system, an effective credit system and the like.(

---

*Olson (1-88, p.104) and Krishnan (1-59, pp.325-328). R.Krishnan (1-59) also uses the same formulation but implies that the relationship between prices and the marketable surplus cannot be inverse. Krishnan's conclusion however seems to result from a questionable treatment of income in the demand function for on farm consumption of the subsistence crop.

To show that farmers in less developed countries are responsive to normal economic incentives, Professor Schultz (13, pp.64-65) stresses the fact that

> ... Studies of the observed lag in the acceptance of new agricultural factors show that these lags are explained satisfactorily by profitability.

To conclude there is considerable disagreement on the effect of product price on the supply curve of agricultural products in less developed countries. If farmers in less developed countries do not respond to price incentives as some economists claim, there are serious repercussions as regards the use of agricultural prices as instruments in increasing the size of the marketable surplus.

4.4 Influence of Supply on Prices - Domestic Market

The area sown under dura is not only influenced by the farmers response to last years' prices but also by the climatic condition in the land preparation and crop sowing season, with dura June to September, Farmers cannot start to cultivate their land until a certain minimum amount of rain has fallen.*
Once rain starts farmers are faced with the problem of fitting their cultivation into limited periods of time where their land

---

* Several farmers told the writer that they would not start cultivation until sufficient rainfall had fallen to close up the deep cracks in the clay soil.

is fit to work (see page 40). All this means that the area cultivated with all other things being equal, will be larger in a year of moderate rainfall than in years where the rainfall is either little or too much.

Once the crop is planted the subsequent rainfall effects the yield, too little rainfall in the next two to three months can stunt the crop and decimate yields, while excessive rainfall resulting in water—logging and/or flooding could stunt the crop or kill it. (79) In fact the relationahip between rainfall and yield is that of a parabolic function.*

Farm gate sale of dura is concentrated in the harvest months between October and February with the peak supply coming in November and December. The crops generally come straight from the field and in the Gedaref area the great bulk arrives at the auction market for sale directly at harvest. Table 4.2 indicates the dura supply to the Gedaref auction market in the two years 1973/74 and 1974/75.

---

* The writer discussed this point with one of the scientists at Abu Ni'ama research station during his field work.

Table 4.2

The Supply of Dura to Gedaref
Auction Market for 1973/74 and 1974/75

Month	Quantity 1973/74		Quantity 1974/75	
	Kantars	M.T.	Kantars	M.T.
October	283,245	12748	297,276	13377
November	456,073	20523	402,788	18125
December	778,557	35035	588,295	26383
January	369,201	16614	488,295	21973
February	316,303	14234	239,782	10790

Source: Gedaref Auction Market.

The Table above indicates also that the supply was small at the beginning of the crop season mainly from early maturing varieties of dura and rose in November and reached its peak in December when most of the farmers finish harvesting the bulk of their produce.

4.5 Influence of Demand on Prices

In the Sudan dura has an inelastic demand since as a basic food grain it has to be purchased almost irrespective of increases in its price.* However at lower prices large quantities of dura

*The Omdurman house hold budget survey gives an elasticity of demand coefficient of 0.04 for dura, 1965 while in a rural district an elasticity of demand of 0.7 was reported in 1965. See the Household Budget Survey in Omdurman and in the Gezira Managil area 1965.

might be ground up for animal feed. Thus demand for dura may be inelastic between a certain one price level and elastic at very low prices. Inelastic demand for dura will allow wholesalers to raise the prices without incurring proportional reductions in total sales. Sales revenues increase so increasing the profit margin. For this and other reasons, retail prices for dura have been fixed by the Government. However the official fixed prices are not enforced effectively and so are not observed by traders.

Dura Utilisation in the Sudan

Table 4.3.

Dura Utilization in the Sudan for 1970/71 - 1974/75

	1971	1972	1973	1974	1975
Total supply m.t.	1,535,110	1,590,913	1,299,789	1,628,290	1,704,853
Exports m.t.	18,910	55,261	58,010	105,149	78,399
Domestic utilization:					
Total m.t.	1,516,200	1,535,652	1,247,779	1,533,141	1,626,454
Feed m.t.	25,000	25,000	25,000	30,000	35,000
Seed m.t.	18,596	15,943	15,560	20,144	21,193
Waste m.t.	75,810	76,783	62,088	76,657	31,323
Gross Food:					
m.t.	1,396,794	1,417,926	1,139,131	1,406,340	1,488,938
Kg/caput	101.3	100.3	78.6	94.7	97.8
[illegible]					
m [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Kg/caput	101.3	100.3	78.6	94.7	97.8

Source: Yearbook of Agricultural Statistics Department of Agricultural Economics, 1975

Table 4.3 above indicates that the average net food supply for the five years was 1,369,825 metric tons while the average total supply was 1,553,791 metric tons. The surplus 183,966 m.t.

ent usually for export.[80] Domestic demands for dura have almost alanced with supply in recent years with a small margin for export. onsumption growth with 3% annual population increase, will soon bsorb this margin and if exports are to continue output must e increased. Since average yield is not rising and seems unlikely o rise in the present production areas, probably due to soil utrient depletion resulting from existing farming practices, new areas would have to be opened up and crop yields increased, and all this is under active consideration by the Government of the Sudan. One of the problems is that traditional long strawed multi headed varieties have limited potential for increasing yields through the application of fertilizers. Another complication (see also page 33) is that the consumer both at home and in the neighbouring Arab markets has a preference for the traditional varieties. The colour (white) is right and the grain has a distinct taste because of its higher protein content than the short strawed, single headed American type which is less favoured as food grain and can be exported to the world markets only for animal feed so competing with maize.

The expansion of intensive poultry production and of feed lots for fattening cattle and sheep have increased the demand for feed grains and ambitious schemes for expansion if realised, would greatly increase home demand. Also the demand for starch and glucose is growing rapidly as a result of the establishment of local industries such as textiles, sweets and fruit canning. Table 4.4 shows the amount and value of starch and glucose imported during the years 1968 — 1975.[81]

Table 4.4

Amount and Value of Starch and Glucose
Imports for 1968 - 1975

YEAR	Starch		Glucose	
	Amount M.T	Value LS	Amount M.T.	Value LS
1968	1600	102,128	4076	186,473
1969	1467	92,961	4047	187,428
1970	802	43,222	3061	171,904
1971	701	41,880	5848	332,858
1974	1969	-	5443	-
1975	1952	-	5183	-

Source: The Report of the Committee formed by the Council of Ministers, 1972, p. 29.

A policy of import substitution would help the chronic deficit in the Sudanese balance of payments and also provide employment for the growing population. With these objectives in view the Government is actively investigating the possibility of establishing a factory for the processing of starch and glucose from dura. An annual capacity of 11,000 tons of dura to give both 4400 tons of glucose and 2800 tons of starch is envisaged. A report published in 1972 by the Council of Ministers gives an account of the possibilities but none of the plans has yet materialised.

The extra demand resulting from population increase, industrial development and the spread of intensive livestocks enterprises will not be met at existing levels of production, let alone the requirements of an export trade.

The writer is of the opinion that given proper price incentives producers would expand the area under cultivation and so meet the deficit. Unfortunately when there is a shortage in the markets the Government normally steps in and bans the export of dura and with growing future deficits is likely to ban the use of the crop for all purposes other than for direct human consumption. Government action in the past has usually resulted in the fall of farm gate prices and there is reason to believe that any future bans would have a similar effect on producers' returns.

Other price disincentives to producers include taxation policies and lower farm gate prices resulting from the existence of imperfections in marketing.*

4.6 Imperfections in Price Formation

Imperfection in price formation results from the presence or absence of a variety of factors. In the Sudanese context the lack of knowledge of market conditions especially by producers is of importance. Also the absence of effective competition between the various buyers of agricultural produce is a common occurrence.

---

* When the writer was doing a field study in Gedaref 1975, the current ban on exports of dura was lifted and prices immediately rose at Gedaref auction market.

Under perfect competition each trader in the market expects to exert no influence on price because of his relatively small influence in the total market operations.(82) But the situation applies neither to dura nor sesame as has been shown in the study.

The fact that there is only one major exporter of dura and the internal prices are influenced by the export prices somewhat complicate the situation. With sesame the existence of the Government monopoly (The Oilseeds Company) makes the application of a free market model unrealistic. As is shown in chapter 8 producers tended to be underpaid for sesame as the Company made a handsome profit which largely went to the Government.

Imperfections in the first stage of the marketing process (sales at the primary markets or farm gate) are mainly due to concentration in the wholesale trade. The farmer faces relatively few potential buyers who may well operate a 'ring' in which tacit agreements are made about the maximum price they will pay farmers. In the writer's opinion such agreements are common in Gedaref. One tangible example of this is that for commodities which have a prescribed minimum price (sesame, groundnuts, gum arabic), this minimum price becomes the maximum as far as the primary market is concerned. The buyers obviously come together and agree not to exceed the minimum price. The writer was told of such practices by the market inspector in Gedaref while in Damazine the secretary of the local Farmer's Union also complained of such practices .

Another complaint of price abuse is the gains made by traders because of the uncertainties among producers about the actual floor price for sesame - an example of imperfect knowledge. Traders have a greater understanding of the pricing and grading system and so are able to turn their greater knowledge to profit by under paying producers. It is also alleged that corrupt practices are sometimes employed in that merchants bribe local officials not to display notices about floor prices and grades.

It would seem therefore that the system of floor prices does not operate in the way originally envisaged. The producers face a maximum rather than a minimum price due to collusion among traders. The extra money concerned goes to distributors rather than producers and traders will defend or improve on their position through unfair trading and even corruption. In the writer's opinion the operation of the floor price system needs to be very carefully monitored. If this cannot be done it is probably better not to intervene.*

---

*The writer witnessed an incident in Damazine when a producer brought in a consignment of gum arabic (commodity with a floor price) for sale. The trader manipulated the weight and underpaid the seller. As the producer was illiterate he accepted the price unquestioningly.

Marketing reform is a prerequisite to expanding production, producers need price incentives. One of the first objectives in any such reform programme should be the provision of adequate price information. This could include daily reports from the principal markets and periodic fuller information about the prospects for individual crops. The first type of information would enable farmers to improve their bargaining position when they sell and the second type would help them plan their future cropping programme. In view of the prevalence of illiteracy and the great distances in the Sudan, the choice of media is undoubtedly the radio. There are few if any local newspapers (even if the producer could read), national papers are usually out of date by the time they reach the main production areas. At present no marketing information is given in the press. It might be an effective way of spreading such information if the Sudan Farmers' Union published market reviews and price data which could be distributed through the local secretaries of the Union. In combatting the imperfection of the marketing system one obvious approach is to utilize the farmers own organisations, the Union.

The second objective of a Government price policy should be to adopt measures which alleviate the present fairly large oscillations in producer's prices which in turn affect retail prices. Inter-seasonal variations could be modified either by building more storage capacity and then buying the grain direct from farmers at harvest time for storage. Farmers themselves are usually hard pressed for money and unlikely to store the grain themselves. By building up buffer stocks government will be in the position to manipulate wholesale and retail prices. The earlier failure of such a policy (see page 96) should not divert attention from the possibilities of planning an effective buffer stock scheme.*

A realistic policy if implemented efficiently should help to remove some of the more violent oscillation in producer and consumer prices and perhaps increase the producer's share of the final consumer price by raising the farm gate prices at harvest; the time when the bulk of the crops are sold off the farm.(83)

4.7 The Internal Trade Wholesale Prices

The emphasis in this section is on the internal marketing of dura especially on the activities of local wholesalers in the consumption areas and the retailers to whom they supply grain.

The large wholesalers of dura in Gedaref, (see page 73) are concerned mainly with the export trade and only very peripherally with the internal trade. Gedaref itself supplies Khartoum and the Northern Province. It also holds the final reserve for deficit areas of the country when local harvests are bad. Outside Khartoum most of the supplies are produced locally. For example the Western Provinces of the Sudan are supplied with local grain, only when supplies are short is dura moved from Gedaref. Shortages in the Southern Provinces are met by the Renk and Damazine areas of the Central Rainlands. Any surplus from these two areas after the Southern Provinces' requirements are met, will be sent to Khartoum or the Northern Province.

---

* As will be seen from section 4.1, the Agricultural Bank of Sudan failed to manage its buffer stock efficiently.

In the areas other than Gedaref, the wholesalers operate on a much smaller scale. They normally buy either from auction markets or direct from the local villages often, if the latter, dealing through their local agents who could well be village shop-keepers.

These wholesalers are primarily engaged in supplying grain to retail shops normally situated in the local small towns of the area. In the case of the South and other deficient provinces the grain will also be retailed in shops in numerous villages. These wholesalers are expert in buying dura and retailers depend on their organisational skills in supplying them with grain at the required times and of standard variety and quality. Different areas of the Sudan have different preferences as regard varieties. Given the transport difficulties in the country, the fact that supplies normally move smoothly is a tribute to the wholesalers logistical skills.

These wholesalers often are concerned with providing credit both to producers and retailers. The producers who cannot easily obtain credit from elsewhere will resort to sheil. This involves selling the crop forward before harvest at an agreed price which is usually represented by a heavy discount on the prevailing price at harvest time. The sheil system is discussed on page 92. Its main disadvantages are a distortion of market prices and that the producer is tied to a particular sale outlet, the one that supplies the credit.

The wholesalers also provide credit to their retailers who then take the risk that supplies arrive undamaged. The sacks of grain arrive unopened and the retailer is debited with the cost of the whole sack whether the contents are damaged by insects or contain impurities. If he pays cash after delivery he is in a stronger position to make deductions for short weight and damage than if he buys on credit. Small retailers lack sufficient capital to finance the purchase of their stocks and so are in a weak bargaining position regarding the wholesalers.

Table 4.5 shows the wholesale price of dura in three selected towns of the Sudan, Gedaref, which has the lowest price as befits the main surplus area, Um Ruwaba in North Kordofan Province where in years of low rainfall the province is a deficit area and may in a year of great scarcity, have to be supplied from more distant areas including Gedaref. The West because of its remoteness is associated with both higher transport costs and with great difficulties in actually moving commodities. The third town Wad Medani is the capital of the Gezira scheme, the major production area for irrigated dura. This irrigated grain commands a price premium in the Khartoum market and large quantities of the Gezira dura are sold there. Consumption levels in the Gezira are maintained by bringing in the cheaper grain grown under rainfed conditions. So the Gezira is both a production area and a market for grain grown elsewhere. The figures in Table 4.5 are based on averages for all the varieties. Consequently the Gezira prices of Table 4.5 represent the prices of both the more expensive irrigated dura and the cheaper rainfed varieties. This is the reason why the Gezira prices are higher than the other two series since the latter all refer to rainfed varieties.*

Table 4.5 also shows a twenty years time series 1955—1974. The prices normally fluctuate from year to year, as also do the differences between prices at the three markets. For example, as regards inter-year price differences, the price at Gedaref ranges from 289 m/ms per kantar in 1960 to 996 m/ms in the year 1967. Examination of MFC unpublished statistics shows the reason for this fluctuation very clearly. The basic reason for fluctuation is the amount of grain produced. Where a large area sown coincide with a higher than average crop yield, then the market tends to be flooded with grain and the prices depressed. The reverse happens where a lower than average area sown coincides with a lower than average crop yield. 1960 was a year of higher than average area

---

*The irrigated dura is more expensive per feddan than the rainfed dura because canals and irrigation ditches are needed. The Government also charge water rates from farmers .

sown and higher than average crop yield and 1967 a year of the reverse situation. In 1960 the Government had to intervene both to prevent the collapse of the market and to ensure that farmers continued harvesting the dura crop.

Table 4.5

Wholesale Prices of Dura in Selected Towns

Annual Averages

Years	Gedaref per Kantar m/ms	Wad Medani per Kantar m/ms	Um Ruwaba per Kantar m/ms
1955	552	556	710
1956	540	574	566
1957	469	760	621
1958	614	649	586
1959	533	588	650
1960	289	568	336
1961	430	505	419
1962	408	602	637
1963	523	852	615
1964	689	854	836
1965	437	733	600
1966	550	628	683
1967	996	1,579	710
1968	335	944	552
1969	581	965	984
1970	764	1,343	1,118
1971	664	700	985
1972	483	600	800
1973	458	732	637
1974	849	1,353	1,200

Source: Department of Statistics

Inter-years variation for Wad-Medani time series range between a peak of LS 1.579 m/ms per Kantar in 1967 (the peak year also for Gedaref) and 505 m/ms in 1961. A Similar range for Um Ruwaba shows a peak of LS 1,200 m/ms per Kantar in 1974 and a low of 336 m/ms in 1960.(84)

The comparisons between market prices in the three markets in the same years show considerable differences in the sizes of the margin between these three localities. Marketing theory postulates that under perfect competition the spatial price difference at the same time between the markets should not exceed the transfer cost. Such spatial comparisons are difficult to make between Wad-Medani and the other two towns because, as has been mentioned, the grain is not homogeneous as regards variety and quality. A comparison between Gedaref and Um Ruwaba dura is more meaningful since both refer to rainfed varieties. Examination of Table 4.5 suggests that the margins between the two series fluctuate very widely from year to year which suggests the presence of imperfections in the marketing system since the transfer cost would not be expected to vary so much between years. For example the margin between the two series is 351 m/ms per Kantar in 1974 compared with 179 m/ms in 1973 and 317 m/ms in 1972. Given the poor state of internal communications in the Sudan such differences would be expected.(85)

The statistical examination of price series data of Table 4.5 page117 was subjected to a standard regression analysis to determine the relationship between wholesale prices and time. The dependent variable taken is wholesale prices per Kantar in all three localities and the independent variable is time. The first year 1955 is given a value 1 and the other years are numbered in sequence with 1974 being year 20.

The results from Um Ruwaba are significant (see Appendix C3 for details) and show that 59 per cent of the variation in prices between the years is due to the time factor, in that prices rise over time. The Gedaref and Wad-Medani figures show no significance between prices and time but the sign in the statistical calculations is positive. The rising trend of prices over time is broken by large year to year oscillation over time especially the high prices for 1967. If this year was excluded then the relation between time and price would be greatly strengthened. Gedaref and Wad-Medani are relatively close together while Um-Ruaba is remote even by Sudanese standards. The rainfall in Gedaref was low in 1967 so affecting local prices.

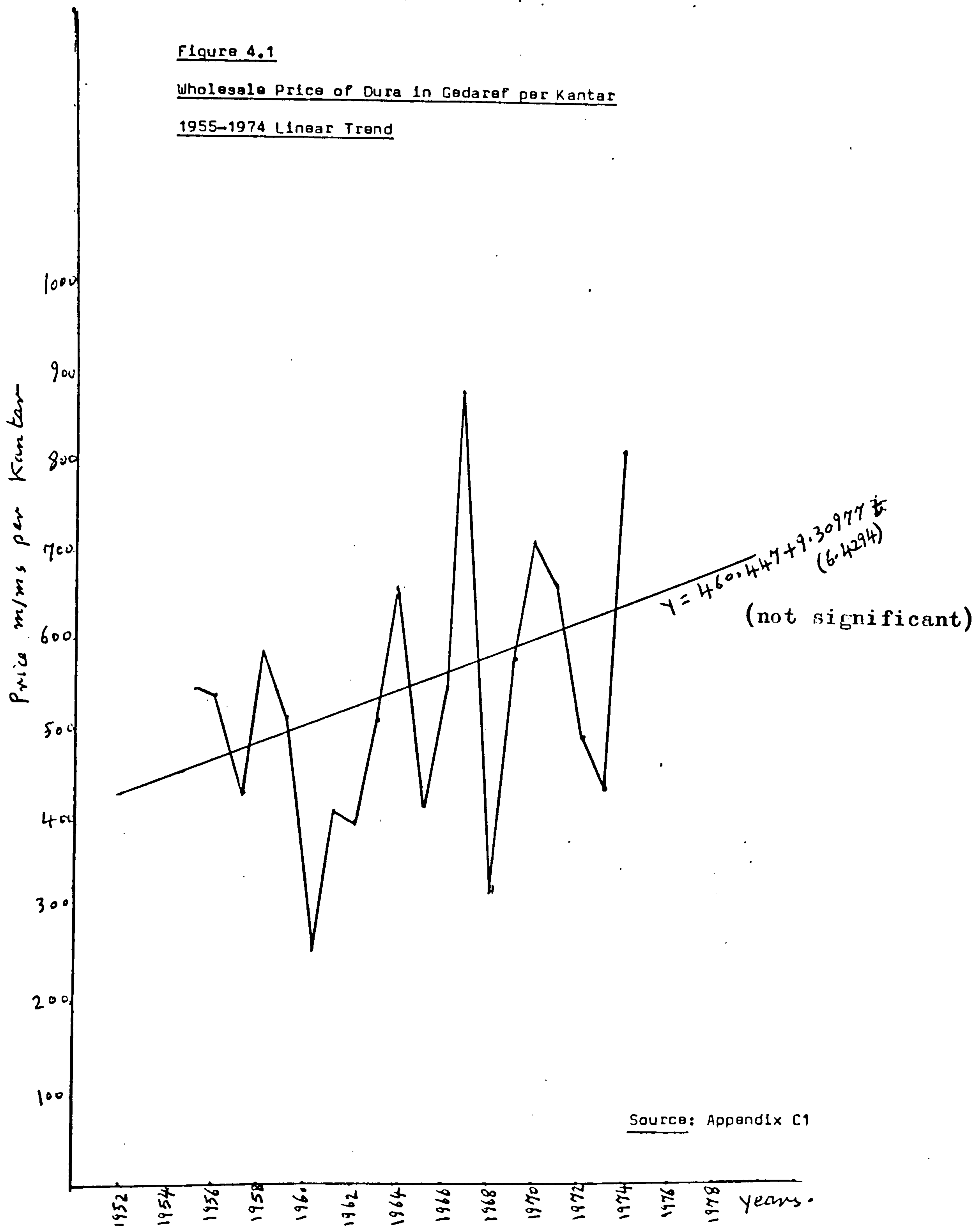
It could well be argued that there is nothing noteworthy in rising prices over time, given the present inflationary situation in the Sudan. What is more surprising is that the relative annual increases in dura prices between the three localities are dissimilar. The figure of Um-Ruaba 23.03 m/ms per Kantar is given by the regression coefficient of the model for that locality. The figure suggested for Gedaref is much lower around 9 m/ms per Kantar annually, while that for Wad-Medani could be in the region of 26 m/ms.* (See Figures 4.1, 4.2 and 4.3)

*The last two figures are based on the results of the two non-significant models. For details see Appendix C1 and Appendix C2.

Figure 4.1

Wholesale Price of Dura in Gedaref per Kantar

1955–1974 Linear Trend



Source: Appendix C1

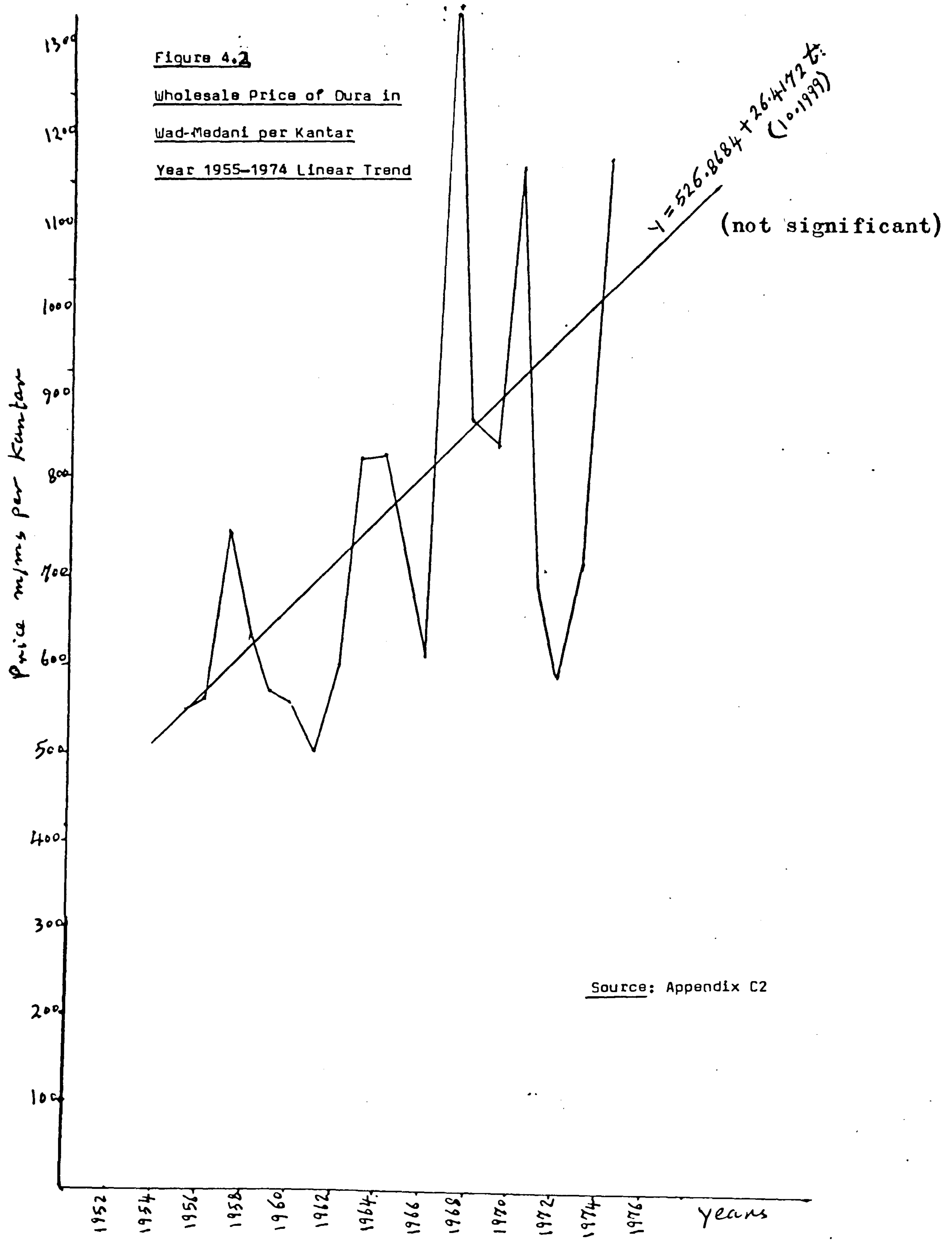


Figure 4.2
Wholesale Price of Dura in
Wad-Medani per Kantar
Year 1955–1974 Linear Trend
Y = 526.8684 + 26.4172 t
(1.1999)
(not significant)
Price m/ms per Kantar
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
Years
Source: Appendix C2

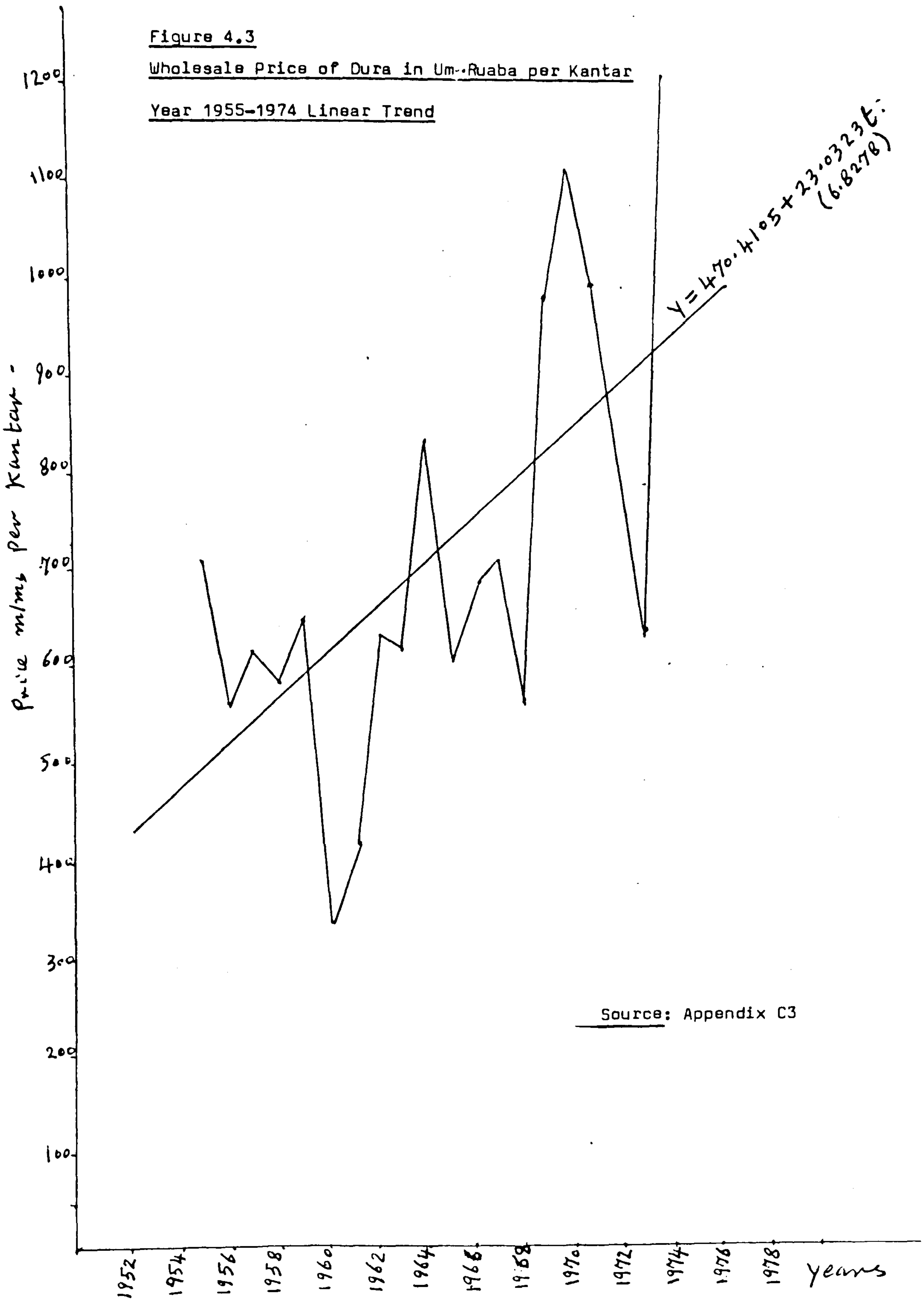


Figure 4.3

Wholesale Price of Dura in Um-Ruaba per Kantar

Year 1955–1974 Linear Trend

Source: Appendix C3

These wide differences suggest that factors other than inflation influence the movement of local prices over time.

Gedaref of course is the largest production area in the Sudan and the main supplier to the export markets. Prices in Gedaref are influenced by world prices. When exports are temporarily stopped for a few months as in 1975 and 1977, because of national shortage, then prices in Gedaref tend to fall. The writer was in Gedaref in December 1975 when the ban on exports was lifted and the wholesale prices in Gedaref market immediately rose steeply. There was considerable excitement among merchants that day; some of whom had bought up stocks during the period of the ban and then were anticipating considerable profits when the export markets were reopened. A recent report shows the effects of stop-go policy regarding dura exports on local prices at Gedaref.** Such large price variations offer opportunities for speculative profits.*

4.8 Retail Prices

Retail prices and retail margins are important aspects in any marketing study. Retail prices in the Sudan refer not only to the prices charged to consumers in shops but also to prices prevailing in the Suq the open retail market complete with market stalls. Most of the consumers buy the grain whole and have to make their own arrangement for grinding.***

---

*Differences between producer and consumer prices in 1977 can be partly explained by changes in the Government export policies. Dura which was sold by farmers in Damazine in January 1977 for around LS 2.2 a sack retailed in Khartoum in December 1977 for around LS 9.50 a sack.

** Report by the economic division of the Ministry of Agriculture 1979.

***In Khartoum, the capital of the Sudan, this is the general procedure specialised shops for flour milling are found even in the first class residential area like Khartoum 2.

Table 4.6 gives monthly average retail prices per ton for dura in Khartoum from January 1966 to December 1973. It is obvious this is not the unit consumers buy in. Table 4.7 gives a similar time series for Kassala town from January 1968 to May 1973 (Kassala is the capital of its province which also includes the Gedaref district and itself is on the boundary with Ethiopia). Table 4.8 gives time series data from January 1968 to December 1973 for Wad Medani the major town in the Gezira. Comparison between tables show considerable spatial variations between the three towns. For example in January 1973 prices per ton were LS 32.595 m/ms, LS 23.850 and LS 29.080 in Khartoum, Kassala and Wad Medani respectively. Temporal differences are by comparison relatively minor as the study of the table will show. For example in Khartoum the retail price remained the same for the whole year and the same situation was found in Wad Medani while in Kassala there were monthly differences, usually relatively minor but in 1973 the price rose from LS 22.260 a ton in March 1973 to LS 31.800 in April 1973; perhaps the proximity to Ethiopia and the thriving smuggling trade could account for these differences.

The spatial variations indicate imperfection in the market. For example the difference quoted between Wad Medani and Khartoum retail prices at the same periods of time, are greater than the transport cost. To take 1973 for example the average difference between the two markets LS 3.515 per ton, is greater than transfer cost between the two towns. It will also be seen from tables 4.6 and 4.8 that retail prices in the two towns are very 'sticky'.

Table 4.6

Monthly Consumers Prices of Dura in Khartoum for 1966 - 1973 LS/Ton

Month	1966	1967	1968	1969	1970	1971	1972	1973
January	17.600	27.200	18.285	25.440	32.595	32.595	32.595	32.595
February	17.600	27.200	18.285	25.440	22.595	32.595	32.595	32.595
March	17.600	32.800	18.285	25.440	28.620	32.595	32.595	32.595
April	19.200	35.200	18.285	25.440	28.620	32.595	32.595	32.595
May	19.200	35.200	18.285	25.440	28.620	32.595	32.595	32.595
June	19.200	35.200	18.285	23.850	28.620	32.595	32.595	32.595
July	22.400	41.600	19.080	34.980	32.595	32.595	32.595	32.595
August	23.200	44.800	19.080	27.825	32.595	32.595	32.595	32.595
September	23.200	48.000	19.080	26.235	32.595	32.595	32.595	32.595
October	28.800	30.400	19.080	27.825	32.595	32.595	32.595	32.595
November	30.400	24.800	19.080	33.390	32.595	32.595	32.595	32.595
December	30.400	18.400	19.080	33.390	32.595	32.595	32.595	32.595

Source: Department of Statistics

Table 4.7

Monthly Consumer's Prices of Dura in Kassala for 1968 to 1973 LS/Ton M.T.

Month	1968	1969	1970	1971	1972	1973
January	15.900	17.790	23.850	23.850	20.670	23.850
February	15.900	17.790	23.850	20.670	20.670	22.260
March	15.900	17.790	27.825	20.670	20.670	22.260
April	15.900	22.250	27.825	22.670	25.440	31.800
May	15.900	23.850	27.825	21.465	25.440	32.595
June	15.900	23.850	32.595	21.465	21.465	-
July	15.900	23.850	32.595	21.465	21.465	-
August	15.900	23.850	32.595	20.670	21.465	-
September	15.900	23.850	32.595	20.670	21.465	-
October	15.900	23.850	32.595	20.670	20.670	-
November	19.080	23.850	32.595	20.670	20.670	-
December	14.490	23.850	32.595	20.670	20.670	-

Source: Department of Statistics

Table 4.8

Monthly Consumer's Prices for Dura
in Wad Medani City from 1968-1973 LS/Ton M.T.

Month	1968	1969	1970	1971	1972	1973
January	15.900	23.850	31.800	31.800	23.850	19.080
February	15.900	23.850	31.800	31.800	23.850	19.080
March	15.900	23.850	31.800	31.800	23.850	19.080
April	15.900	23.850	31.800	23.850	23.850	19.080
May	15.900	23.850	31.800	23.850	23.850	19.080
June	15.900	23.850	31.800	23.850	23.850	19.080
July	15.900	23.850	31.800	23.850	23.850	19.080
August	15.900	23.850	31.800	23.850	23.850	19.080
September	15.900	23.850	31.800	23.850	23.850	19.080
October	19.080	31.800	31.800	23.850	23.850	19.080
November	19.080	31.800	23.850	23.850	23.850	19.080
December	19.080	31.800	23.850	23.850	23.850	19.080

Source: Department of Statistics

In 1973 for example the same prices are shown for each month LS 29.080 per ton for Wad Medani and LS 32.595 in Khartoum. Such stickness is an indication of the presence of imperfect competition.

The fact that prices remain constant over a period of time in retail markets, provides an example of price levelling; a practice which results from the knowledge that producers' prices reach a season low at harvest and then rise until the next harvest is imminent. Consequently many traders and retailers will operate a system of inverse margins; prices being levelled at the retail end while wholesale prices fluctuate. Levelling means that the retailers make a higher profit when producers' prices are low and lower profit when they are high. Normally this practice gives larger overall profits than the normal pricing policies followed by the employment of either constant or percentage margins.*

Under conditions of perfect competition one would expect retail prices, wholesale prices and farm gate prices to be correlated. Under a system of price levelling the prices charged to consumers will bear no relationship to the movement in producers' prices. At harvest time for example when producers' prices normally reach their seasonal low the consumer does not get his grain any cheaper.

---

*
PR = retail price
PW = wholesale price
n = retail margin

Percentage margin
PR = n (PW)
n a constant

Constant margin
PR = PW + n
n = a constant

Inverse margin PR = PW + n

Where PR is a constant and n and PW fluctuate

CHAPTER 5

Dura in the World Markets

5.1 Introduction

The international market for dura is an integral part of the world grain trade. The price of the various grains tends to move together over a period of time since one grain can be broadly substituted for another especially in the compounding of animal feeds. Wheat is generally regarded as the price leader and variations in the prices of wheat on the world market affect those of the coarse grains. Dura on the world market either goes for direct human consumption or for animal feed. It is the staple food grain in many hot semi-arid and arid countries, while it is used for animal feed in Western countries together with Japan.

The role of wheat as a price leader both in the markets for grain for direct human consumption and in those for animal feed was dramatically illustrated in 1973. This was the year when the Russians bought up the American wheat surplus. This action triggered off a large rise in wheat prices which in turn led to major increases in the prices of all grains. As far as Sudanese dura is concerned the f.o.b. prices per m.ton rose from LS 26 in 1973 to LS 42 in 1974.* (See Table 3.4 and 3.6)

Table 5.1 gives details by continents of the total production of dura, crop yield and areas sown. It will be seen that Asia has the

---

*This increase is not reflected in a similar rise in farm-gate prices. This is yet another indicator of the presence of imperfect competition in the Sudanese internal trade.

Table 5.1

Production of Dura by Continents 1961/65 – 1973-1975

	Area Harvested 1000 HA				Yield Kg/HA				Production 1000 M.T.			
	1961/65 Average	1973	1974	1975	1961–65	1973	1974	1975	1961–65	1973	1974	1975
Africa	11653	12404	13869	13687	730	692	706	729	8502	8588	9797	9971
N.America	5568	8073	7278	7959	2658	3388	2701	2907	14802	27357	19661	23138
S.America	880	2727	2850	2493	1591	2224	2563	2406	1400	6066	7305	5998
Asia	20266	18717	17580	19723	512	578	670	661	10372	10822	11777	13043
Europe	55	128	119	134	2292	3985	4047	3563	126	509	483	477
Oceania	140	699	541	513	1590	1462	1967	1764	222	1022	1065	905
U.S.S.R.	79	90	132	90F	845	1089	1659	1111	66	98	219	100F
World	38641	42838	42370	44599	918	1271	1187	1203	35492	54461	50306	53632

Source: Production Year Book 1975 FA-O largest area but as regard total production the output is considerably less than that of North America, an indication of the difference in productivity. Africa also has a larger area sown than North America but the output is less than half of that of North America. Crop yields in both Asia and Africa are approximately a quarter of those of North America. While both Africa and Asia are in deficit, this deficit will be largely in grains for human consumption. The other deficit continent is Europe, which imports course grain for animal feed and dura is a major component of the trade. Other surplus areas are South America and Oceania but their overall total is considerably less than that of North America.(86)

Table 5.1 shows that the world area harvested is growing but that total production still fluctuates independently of the rise in area due to annual variations in crop yields. Dura is a grain of the semi-arid tropics where rainfall can fluctuate annually and droughts are an ever present risk. Even North America is affected; it will be seen from Table 5.1. that crop yields vary from year to year. Variations in yield however do not transform a continent from a surplus to a deficit position except in the case of Africa. From Table 5.2 it can be seen that in the six years from 1970–1975 Africa was surplus in half and deficit in half. Consequently it can be said that this continent is in a marginal position. The deficit and surplus position is of course the basis for the world trade. North America is the major surplus area. Asia is the main deficit area while Africa is marginal.

Table 5.2

Surplus and Deficit of Dura by Continents for 1970 – 1975

Quantity in M.T

Continent	1970	1971	1972	1973	1974	1975
Africa	– 34329	+ 91641	+ 211327	+ 171854	– 166763	– 75954
N.America	+3802959	+2909895	+3634549	+5591717	+5130996	+4914465
S.America	+1935552	+2063771	+ 297795	+1777171	+2639998	+1795937
Asia	–4395238	–4428983	–4098601	–5663012	–5818140	–4762995
Europe	–1078933	–1988928	– 781075	–1272392	–2799552	–2651082
Oceania	+ 72485	+ 536910	+1034867	+ 460190	+ 757123	+ 833638

Source: Compiled by the author using Data from U.N. F.A.O. Trade Year Book

U.S.A. is the largest single exporting country followed in order by Argentina, South Africa and then the Sudan. The South African grain, because of the trade boycott by African countries, goes largely to Europe.

Table 5.3 shows the intercontinental export trade for the years 1970–1975 and Table 5.4 indicates the imports of dura by continents for the same years. It will be noted that continents record both exports and imports, since they contain both surplus and deficit countries. Table 5.5 gives for each continent the average annual export f.o.b. prices per m.ton for 1970–1975. It will be seen that prices have increased over time and that they are lowest for those continents (South America and Oceania) furthest away from the deficit regions. This differential presumably reflects differences in transport costs. Why in 1975 Asia should return the lowest prices is not clear.* The Sudanese figures are included in Table 5.5 for comparative purposes and it will be seen that in the six year period 1970–1975, in half the years the Sudanese f.o.b. prices were lower than the overall African average and in the other half higher. In fact there is a considerable difference between the prices for the Sudan and the prices for Africa as a whole. The latter are reflected in those received by the two

---

* Figures for Asia are based on F.A.O. estimates.

Table 5.3

Export and Value of Exports of Dura by Continents for 1970–1975

	Quantity M.T.						Value 1000 $					
	1970	1971	1972	1973	1974	1975	1970	1971	1972	1973	1974	1975
Africa	203657	377216	459082	264557	321102	414650	15560	24869	33424	31305	49508	58576
N.America	3858733	2953010	3913100	5658982	5747943	587746	203158	174332	228573	475522	697405	710444
S.America	2139147	2442936	737658	2294368	3331886	2338801	94099	119263	41802	186674	342232	237287
Asia	119863	190991	257588	191233	234687	313493	8935	12811	13678	18946	28043	27209
Europe	290383	160698	210481	302896	740357	774068	23155	14918	23145	40915	103988	112038
Oceania	74527	539438	1036983	762306	783371	881576	5285	29028	59177	49383	85875	105956
Developed	4168496	3809711	5439655	6768576	7379093	7770517	226566	225462	324816	571043	903884	954422
Developing	2400685	2823777	1149233	2659040	3737301	2763447	115171	147420	72925	227084	396892	287160
Centr. Planning	122044	34693	30682	53166	53726	70617	9041	2809	2795	5836	8273	10747
World	6691225	6668181	6619570	9480782	11170120	10604581	350778	375691	400536	803963	1309049	1252329
Sudan	2031	39965	61674	108063	102066	55077	180F	3597	5099	9397	14332	7675

Source: Trade Year Book 1975 Food and Agriculture Organization of the United Nations, Rome.

Table 5.4

Imports and Value of Imports of Dura by Continents for 1970–1975 *

	Quantity = M.T.						Value 1000 $					
Continents	1970	1971	1972	1973	1974	1975	1970	1971	1972	1973	1974	1975
Africa	237986	285575	247755	436411	487865	490604	20720	24472	23030	47530	73927	81664
N.America	55774	43115	278551	67265	616947	962981	5314	5794	22356	10172	85531	149078
S.America	203595	379165	439863	517197	691888	542864	12819	23249	29841	47090	90866	72476
Asia	4505101	4619974	4356189	5854245	6131633	5076488	279460	317794	280131	571799	845260	733483
Europe	1369316	2149626	991556	1575288	3539879	3425150	98400	151767	88275	185476	504728	496656
Oceania	2042	2528	2074	2116	26248	47938	516	368	343	493	4862	9427
World	6373814	7479984	6315988	8452522	11494460	10546025	417229	523444	443976	862560	1605174	1542784

Source: Trade Year Book 1975 Food and Agriculture Organization of the United Nation., Rome

* These figures are the best available but it will be noted that there are inconsistancies between table 5.3 & 5.4

Table 5.5

Export Prices of Dura per M.T. by Continents

F.O.B. $ U.S.

Continents	1970	1971	1972	1973	1974	1975
Africa	76.403	65.928	72.806	118.329	154.181	141.266
N.America	52.645	59.036	58.414	84.029	121.330	120.885
S.America	43.992	48.818	56.642	81.375	102.711	101.448
Asia	75.084	67.073	53.015	99.194	119.332	86.929
Europe	79.845	92.658	110.214	135.079	140.524	144.752
Oceania	70.467	53.855	57.121	64.807	109.674	120.131
Sudan	90.000	92.230	82.242	87.009	140.509	139.545

Source: Compiled by the author using Data from U.N.F.A.O. Trade Year Book largest exporting countries and the fact that in three years out of six years the Sudanese obtained lower average prices than those for the continent as a whole suggest that South Africa obtained higher ones despite its geographical position and trade boycott.*

To turn to the Sudanese trade it will be seen from Table 5.6 that the Sudan exports dura for direct human consumption to nearby Arabian countries and exports dura for animal feed to Western Europe and Japan. (87) The division between the two trades is approximately equal over the last decade. It will also be seen from Table 5.6 however that the trade is somewhat irregular both as regards the countries concerned and the total volume exported. For example, Japan only imported dura in 1973, but in that year took 23 percent of the total exports. The total overall exports of the Sudan fluctuated widely from year to year,(88) not so much due to fluctuation in demand but rather to the quantities available inside the Sudan for export. Total production varies from year to year according to climatic conditions and when grain stocks are low the Sudanese Government will move in to safeguard internal food supplies by banning exports. This policy has been criticised by merchants on the grounds that it forces them to dishonour export contracts so not only causing them financial losses but detracts from the public image of

---

* If this is indeed so it implies considerable skill in placing South African exports or conversely relative inefficiency on the part of the Sudanese exporters. The South African dura goes presumably for animal feed while part of the Sudanese exports goes for direct human consumption.

Table 5.6

Sudan Dura Exports by Countries for 1970 - 1975

1 = Quantity in ~~tonnes~~ M.T
2 = Value in Sudanese pounds

	1970		1971		1972		1973		1974		1975	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Saudi Arabia	-	-	29040	87033	31436	909522	17111	463695	43018	2037995	25377	1286047
Egypt	-	-	-	-	-	-	-	-	138	39500		
Yemen Democratic	1961	60707	-	-	9610	267084	-	-	9554	509447	7	328
Yemen Arab Republic	-	-	-	-	5834	185301	9141	246059	16153	765716	2394	116550
Jordan	-	-	-	-	208	4997	-	-	-	-		
Gulf Estates	-	-	-	-	17	336	-	-	494	19845		
Ethiopia	-	-	-	-	-	-	2735	51076	6022	299961	4427	236650
Somalia	-	-	1483	55178	-	-	-	-	8702	531993		
French Somalia	-	-	1497	46942	-	-	-	-	500	39500		
U.K.	-	-	25	684	360	11360	812	26735	99	4600	440	25281
France	-	-	-	-	294	8850	342	10400	518	24600	346	16400
West Germany	-	-	59	1635	120	2960	50	1088	192	9375	133	5807
Belgium	-	-	2138	65774	4092	106657	2186	49831	3651	182021	4911	251315
Holland	-	-	3112	95247	4486	119478	3320	73579	8586	372343	9793	427101
Italy	-	-	-	-	113	2528	147	3332	365	16400	167	7128
Japan	-	-	-	-	-	-	10604	319837	-	-	-	-
TOTAL	1961	60707	37354	352493	56570	1619073	46448	1245632	97992	4817827	47995	2372607

Source: Foreign Trade Statistic

the Sudan as a dependable exporting country. Between 1975—1977 there have been three such bans each lasting several months.[89] It is alleged that these bans are based on insufficient knowledge of the true position inside the country. Officials who are criticised for imposing these bans proclaim that the lack of knowledge about the size of stocks is due to the merchants witholding information about the size of the stocks held. It is further alleged that merchants give a distorted figure in order to raise internal prices. All this is indicative of the general lack of accurate marketing information.*

In addition the Sudan has a considerable illicit export trade in which either grain is smuggled by dhows across the Red Sea to Saudi Arabia or over the land border to Ethiopia (see Page 63 and 64). Naturally no figures are available for these illegal transactions but their size would seem to be considerable.[90] The authorities are aware of smuggling but find it almost impossible to guard effectively the long land frontier with Ethiopia where the country is wild and roads are few.

The writer has examined several cost schedules relating to marketing costs of dura which have been compiled by experts both Sudanese and foreigners. These appear to be somewhat misleading since they omit certain items or do not specify the breakdown of an aggregate figure. The resultant estimates vary considerably as regards the overall distribution costs. Variations were difficult to interpret especially since it was not clear what costs had been included in the schedules. Table 5.7 gives these

---

* The writer in discussion with local officials and merchants gained the impression that a lot of grain was stored in pits whose existence, let alone sizes and contents are unknown to the officials. One merchant showed the writer a pit in his back garden safely away from prying eyes.[91]

figures, the basic material has been collected from a leading merchant in Gedaref who also is a producer. (91) The distribution costs amount to LS 25/m. ton and this price does not include either profit margins or production costs. It will be seen that the largest item is for railway transport followed by cleaning and resacking the grain. Handling charges at both Gedaref and Port Sudan cover loading and reloading. The grain is first moved from the auction market to a Gedaref cleaning plant and then taken to Gedaref station and loaded into railway wagons. At Port Sudan the grain is then unloaded from the train and taken to the quay and then loaded into the ship. Taking the charges for both Gedaref and Port Sudan together these handling costs account for 29 percent of the total. All the loading and unloading is done by hand and with the rising cost of labour in the Sudan, perhaps consideration should be given to alternative methods.* To make Sudan grain competitive in the world market, efficiency is required not only in production but in distribution. It seems to the writer that the present system of loading and unloading is in need of improvement.

5.2 Profit Margins

A very broad approximation of profit margins can be gained from using Table 5.7 . It will be seen that farmers made very little in the way of profit on the production of dura because of low crop yield. The University of Leeds survey suggests

---

* When the writer visited Port Sudan in 1975/76 the dockers were on a strike for more money.

Table 5.7

Distribution Costs at Gedaref Market
to Port Sudan

F.O.B. 1976 - 1977

Total distribution cost per m. ton LS. 25.00

Percentage Breakdown

	%
Handling charges - Gedaref	10
Cleaning and rebagging	22
Rail freight Gedaref	36
Handling Port Sudan, office Expenses and Agent fees	32
	100

Source: Leading Gedaref Dura Merchant

that an average producer price of around LS 25 a m. ton gave little or no profit to producers given the average level of yields. Included in the farmer's production costs* are the expenses of transporting dura to market, the initial purchase of sacks**, and payment of the nedessary taxes. Consequently the LS 25 of distribution costs does not include the initial transfer from farm-gate to the primary market.

Assuming a price of LS 25 a m.ton at Gedaref market, then the cost f.o.b. Port Sudan would be LS.50 (distribution costs LS.25 + producer price LS.25). The profit made by the distributor is the difference between the latter and the prevailing world price. In that world prices have been considerably over LS.65 m.ton in recent years (see Table 5.5), the distributors should have been able to earn a handsome profit. In that producers normally sell directly at harvest, the distributors can buy cheap grain which by the time it reaches Port Sudan should have increased in value as a result of internal seasonal price rises. The writer suspects that it is these seasonal rises which are the major source of the distributor's profit. Consequently in order to hold on to the grain and finance its handling, the distributor would have ample capital resources.

It can be categorically stated that at prevailing yields and production costs, any profits in the production and marketing of dura tend to go to the distributor rather than the producer. In that world price has increased dramatically since 1973 (see Table 5.5), the profit made by distributors must have risen considerably

---

*Producers' marketing costs are shown in Table 3.3 page 86

**Dura is marketed by the producers in new sacks and then resacked by distributor if the crop is to be exported.

while the unfortunate producer especially in the mechanised sector was squeezed by declining yields and rising input costs. It is this latter tendency which is under scrutiny by the third Mechanised Farming Mission of the World Bank to the Sudan in 1978.*

The writer studied export trends over time. Figure 5.1 indicates exports for 1951-1975 (see Table 5.8) and illustrates the point made earlier on the wide fluctuations in the quantity exported between one year and another.(92) The writer carried out a regression analysis between time and the quantity exported and discovered that there was a tendency for a trend of rising exports over time, but that this tendency was not statistically significant because of the wide movement between years, which masked the effect. The peak in 1960 especially distorted a significant relationship.**

The writer performed a similar exercise with the total value of dura exported and time. Since the value of exports is determined by the physical volumes and export prices, both of which fluctuate widely from year to year, it is not surprising that again no significant statistical relationship was found between the value of exports and time. Figure 5.2 shows the movement in

---

*A confidential document which the writer has been able to see.

**In 1960 there was a record harvest in the Gedaref area and producers prices slumped, hence much of the crop was exported very profitably.

Table 5.8

Sudan Dura Exports (1951-1975)

Quantity in Thousand m.tons

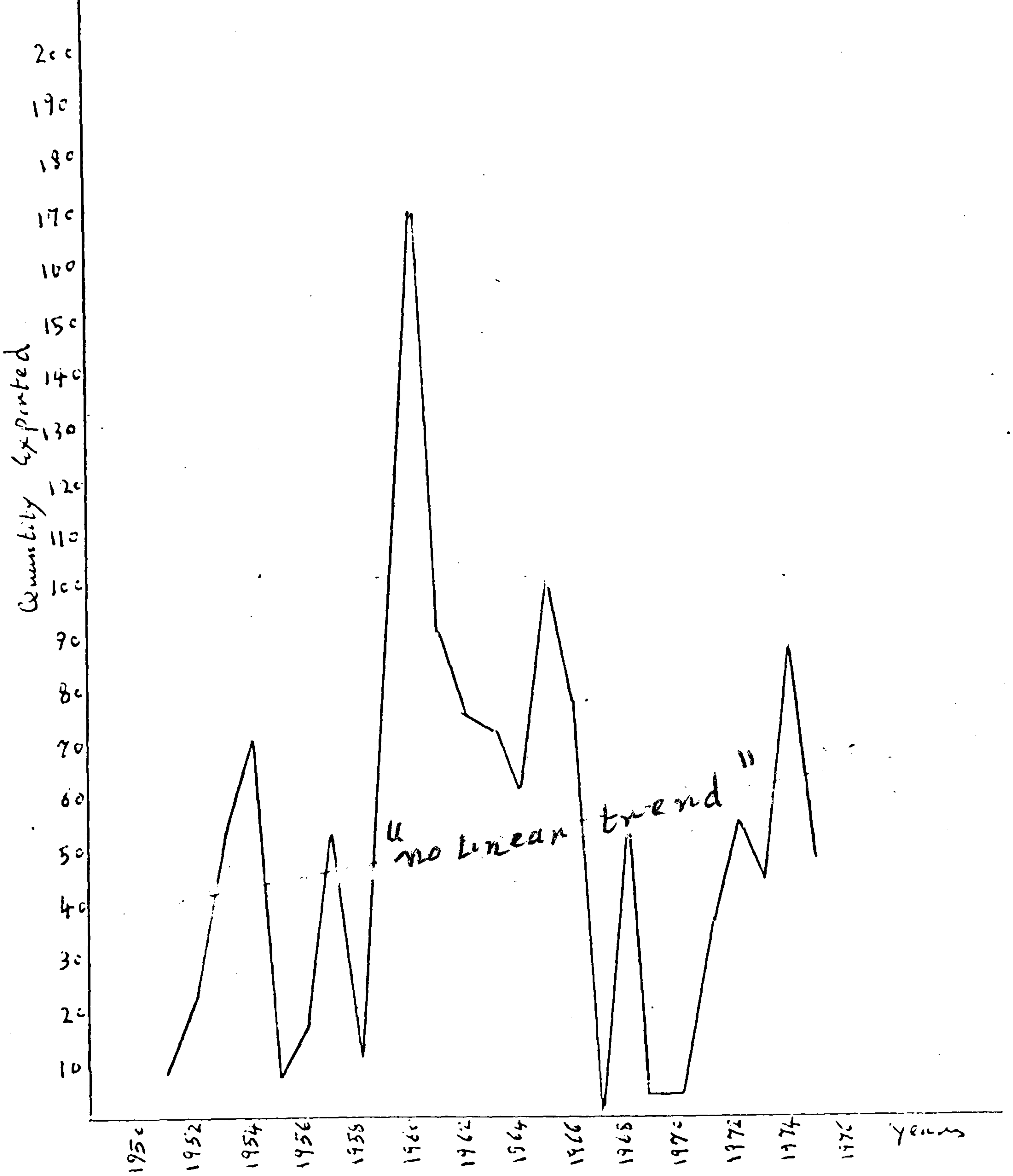
Value in LS.

Year	Quantity	Value
1951	10	175,46
1952	24	439,139
1953	55	1,075,405
1954	72	1,135,562
1955	8	158,029
1956	18	356,364
1957	55	1,124,877
1958	12	294,917
1959	73	1,657,343
1960	171	2,793,270
1961	93	1,844,904
1962	76	1,479,245
1963	74	1,619,766
1964	61	1,539,860
1965	112	1,441,915
1966	79	1,871,784
1967	1	16,000
1968	55	1,071,000
1969	2	43,000
1970	2	61,000
1971	37	1,136,000
1972	56	1,619,103
1973	46	1,245,622
1974	98	4,817,000
1975	48	2,366,000

Source: Department of Statistics, Sudan

Figure 5.1

Quantity of Dura exported in 1000 M.T. 1951/52 - 1974/75
linear trend



Source: Appendix D

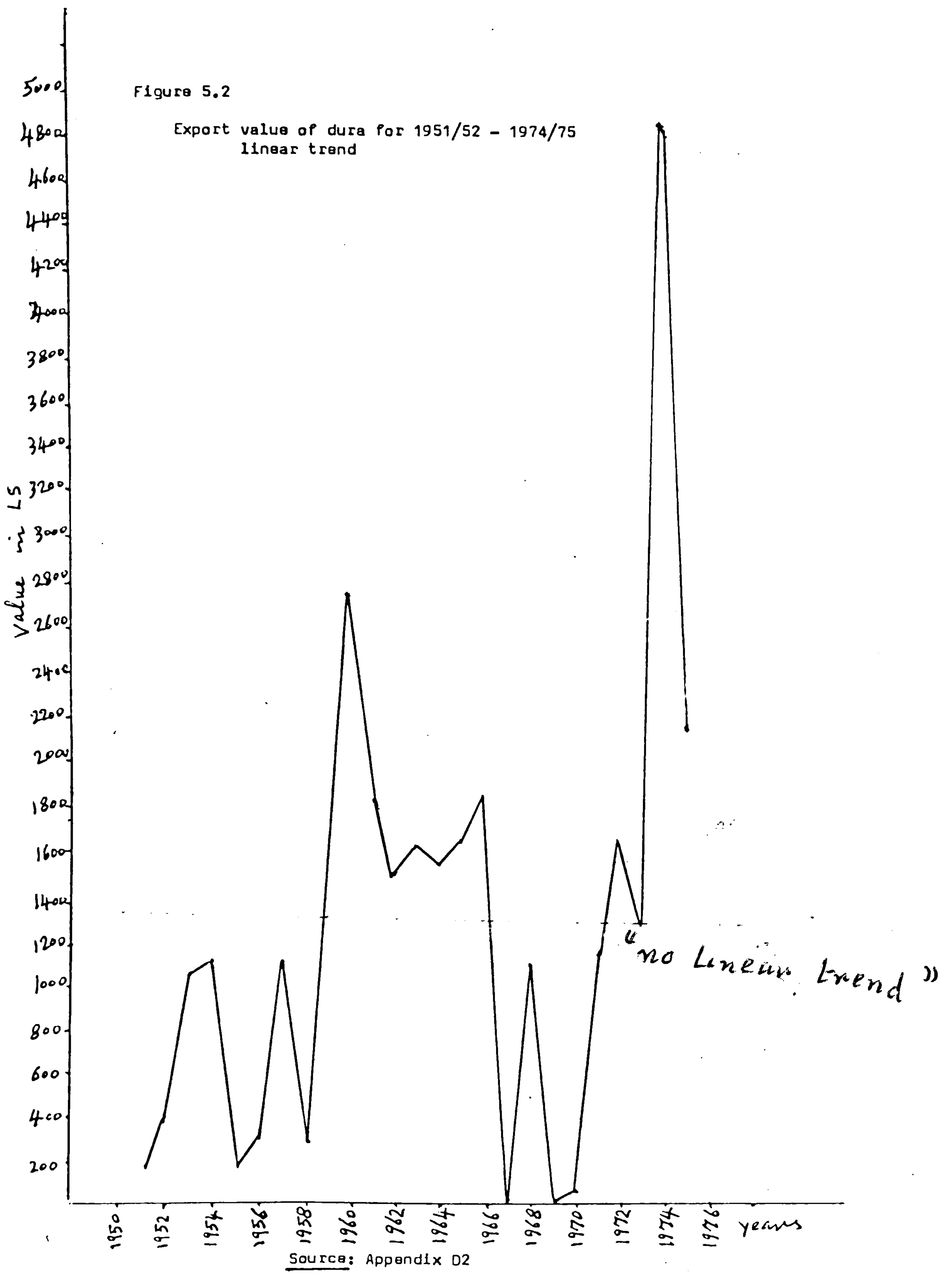


Figure 5.2
Export value of dura for 1951/52 - 1974/75
linear trend
Value in LS
"no Linear trend"
years
Source: Appendix D2

the value of exports from 1951–1975. Again it will be seen there are wide movements with a peak in 1974 when world dura prices exploded. Referring to figure 5.2 it will be seen that this explosion did not result in a major increase in the quantities exported. 1960 was the peak year as regards the volume of exports and 1974 the peak for value of exports. (For details see Appendices D1 and D2).

5.3 Sudan Exports Potential

Following recent publicity about the possible role of Sudan as a bread basket, it is necessary to examine very briefly the future possibilities of this potential being realised. The first point to make is that the Sudan's population is rising by 2.7 percent annually,* and that dura is the basic grain for human consumption. This means of course that given no great increase in production, the Sudan will have little to spare for exports. The question then is can production be rapidly expanded? In the past twenty years, expansion in production has been through increase in the area cultivated (horizontal expansion) rather than increasing crop yields (vertical expansion). As regards production cost, a very important facet as regards the competitive position in the world market, vertical expansion would be expected to reduce costs

---

* See Growth, Employment and Equity, the report of the ILO/UNDP Employment Mission 1975, a United National Inter-Agency team organized by the International Labour Office.

while horizontal expansion would be expected to increase them. It is obvious that higher yields reduce the incidence of fixed costs per ton of grain produced. Horizontal expansion in the Sudan has a further cost disadvantage since it means the lengthening of the lines of communication between the production areas and the port. This is true not only of exports but also of the costs of imported inputs such as machinery, spare parts and petroleum products. A recent Sudanese application to the World Bank for a loan to develop mechanised farming in Western Sudan focused attention on these disadvantages.* The Bank now recommends consolidation rather than expansion, and is to consider the possibilities of raising crop yields in existing cultivated areas especially Gedaref the major production area near the port.

If this policy is officially adopted then there will be a time lag between the introduction of new inputs (fertilizers, improved seeds, better machinery control of pests, disease and weeds, better cultivation techniques) and their adoption by the great majority of farmers.

The future prospects for exports depend in the writer's opinion on the successful diffusion of the necessary inputs and techniques. If the average yield of dura can be raised from its present miserable level to say half of the national average of U.S.A. then the prospects of both feeding the growing Sudanese

*A confidential report which the writer had access to.

population and increasing the export of grain would be very promising. The problem is how to do this within say the next ten years. If there are serious delays in securing significant increases in dura yields then there is a strong possibility that many farmers will be forced to give up dura production because at present yield and the prices of inputs and outputs, dura does not pay (see cost of production Table 2.5 page 49). In that adjustment to both the structure and logistical aspects of the present marketing system could help, then such changes might be able to alleviate part of the problem. The introduction of more competition in the market should help the producer to secure a larger proportion of the final export price while cost reductions in the actual marketing process would help Sudanese dura to be more competitive.

CHAPTER 6

Sesame Production in the Sudan

6.1 Introduction

Sesame (known locally as Simsim) grows to a height of 2–4 feet. The seed head is about one inch long, pointed at one end. It splits on ripening into two halves which again subdivide into four pods. The seed is small and flattened and the colour varies according to variety from black to red–brown, yellow and white. The oil content of the seed varies from 45 percent to 58 percent which compares favourably with the oil content of sesame in other countries.[93]

The Sudan grows mainly white and red–brown sesame practically all under rain cultivation. Kordafan Province grows the red variety which comprises the bulk of the produce. The white variety is grown in Kassala, Fung and the Southern Gezira as well as in some parts of Equatoria and Bahr El Ghazal. Sesame needs 20" to 25" of rainfall in clay soil and 15" rainfall in "Gozland".*

The seed is normally sown by hand broadcasting as soon as possible after the rainy season starts. The early type matures in 80 to 100 days, while the late maturing types take 100 –120 days or longer. Yields are very sensitive to sowing dates and any appreciable delays in sowing leads to a lower yield.[94] The seedlings are very small and if there is a

---

* Gozland is a local expression for a sandy soil in Western Sudan

shortage of water then the young seedlings shrivel and die.* Sesame is also exceedingly sensitive to water-logging and if flooding results, the crop is also badly affected.** Harvesting also presents a major problem since when the seed ripens it shatters very quickly and most of the crop may be lost by delay in harvesting. Combine harvesters are no help since the models available in the Sudan are not equipped with the right attachments and consequently shatter the seed when the plants come in contact with the reel and cutterbar.*** Farmers are therefore forced back to the employment of casual labourers. So great is the demand for labourers and the urgency of the work increases this demand, that labourers command high wages for their services.

---

* Gedaref farmers interviewed by the writer remarked that Gedaref was not really sesame country since often there was insufficient rain in the first crucial months of the plant's life.

** In Damazine which has a higher rainfall than Gedaref, many farmers complained to the writer that the land is too wet for sesame. One remarked that he had lost his crop because "the water had eaten it".

*** Recent trials suggest that a possible solution to this problem is to spray the crop with a chemical which delays maturity and then combine the crop using a special attachment. Trials are proceeding in the Damazine area.

These constraints often deter many farmers from growing sesame and consequently many engage in the monoculture of dura which is of course bad for the fertility of the soil.*

Sesame yields fluctuate widely. They are determined by such factors as rainfall distribution, delays in sowing and harvesting, the incidence of pests and diseases, the state of soil fertility and the level of weeds. Like dura, sesame yields in the mechanised schemes of the Central Rainlands decline over time, mainly due to the depletion of the soil fertility and the build up of weeds and pest populations.(95) The principal pest of sesame is the sesame bug (Aphanus litorlalis - elasmolomus sordiehus) named locally "Kaook". This insect attacks the ripe seeds when the crop is lying in the field awaiting threshing. The insect sucks the oil out of the seeds using long suckers attached to its head. An attack of these insects can ruin the crop in a matter of a few days. The only remedy adopted widely is to sprinkle gammoxene onto the ground on which the sesame bundles are placed to dry out. The principle disease is bacterial leaf spot disease caused by Xanthomonas Sesami known locally as Marad El Dam, the disease of the blood because affected plants show characteristic deep red stains on the stalks and leaves. Normally no control measures are taken.(96)

* Sesame and dura are said to be complementary to one another as regards soil fertility. Dura is shallow rooting while sesame which has deep tap roots helps in the circulation of soil nutrients.

Most of the varieties grown are indigenous but trials are proceeding at research stations to improve yields and reduce losses from shattering. Work is also proceeding to improve the strains of white sesame. The colour of the oil is determined by the colour of the seed and it is the white colourless oil which commands the highest prices in the world market since it can be used easily for blending. Unfortunately the indigenous white varieties are lower yielding than the coloured ones. Progress is likely to be slow owing to the general lack of facilities and the shortage of trained staff. When improved varieties are available further delays can be expected before they are widely grown since seed propogation facilities in the Sudan are inadequate.*

These constraints are indicative of the many problems awaiting solution in the agricultural sector of the Sudan. These problems of course add to the risk and uncertainties facing the agricultural producer and the success of an export trade depends in the long term on overcoming some of these obstacles.

Sesame oil is one of the principle vegetable oils in world trade and the colourless variety is a perfect substitute for olive oil. Sesame is also used for confectionary purposes. The seed is used whole as a decoration for cakes and bread. More mundane uses of the oil include soap, paint, varnish, linoleum manufacture

---

*The seed propogation centre at Tozi in the Central Rainlands is very poorly equipped and even lacks a cleaning plant to separate weeds from the seeds. Consequently farmers who used Tozi seed are reluctant to buy further stocks since they claim that the Tozi seed brought new weeds onto their land.

and in straight form as lubricants. The culinary market demands better quality colourless oils and pays a higher premium for these types of oils than manufacturing industries such as paint and soap.

Modern oil pressing mills are situated at Tandalti, Rahad, Um Ruaba, El Obeid, Dueim and Khartoum North. (See oil mills in Appendix E1). A valuable residual cake is exported together with unprocessed seed.

Sesame is widely used in the Sudan for food consumption and little price differential is paid by local consumers for the various colours.

6.2 Areas, Production and Yield of Sesame

Sesame is traditionally the cash crop of the Central Rainlands of the Sudan. At the end of the nineteenth century a British observer noted that in the Gedaref area villagers grew primarily dura and sesame, the first for subsistence and the latter for sale to cover their modest requirements and obligations to the world outside their village. Sesame with dura became the two crops of the mechanised farming development in the Central Rainlands since the end of the Second World War. Primarily as the result of these development the area of sesame increased from 326,000 feddans in 1952/53 to 2,199,000 feddans in 1974/75 (see Table 6.1). The average yields in both the mechanised farming sector and the traditional Bildat sector are very low and tend to decline over time (see page 163)

Table 6.1

Area, Productiom and Average Yield of Sesame 1952/53 - 1974/75. Area in 1.000 Feddans, Production in 100 M.T. Average yield in metric ton per Feddan for the whole Sudan

Year	Area	Production	Av. Yield
52/53	326	670	.206
53/54	422	690	.164
54/55	378	990	.262
55/56	636	1500	.236
56/57	793	1530	.193
57/58	563	1410	.250
58/59	747	1540	.206
59/60	991	1750	.177
60/61	693	1270	.183
61/62	981	2330	.238
62/63	776	1420	.183
63/64	1,184	1740	.147
64/65	1,116	1840	.165
65/66	948	1600	.169
66/67	924	1340	.145
67/68	1,234	1870	.152
68/69	1,321	1540	.117
69/70	1,359	1750	.129
70/71	1,857	2970	.160
71/72	1,921	2960	.154
72/73	2,847	3400	.119
73/74	2,192	2380	.109
74/75	2,199	2810	.128

Source: Yearbook of Agricultural Statistics 1974.

The overall national average yield for the country was 117 Kg/Feddan for the latest available year 1976/77 while for the mechanised sector the corresponding figure is 142 Kg/Feddan. Differences in yields between the mechanised (rainfed) and traditional sector are not very great, a very disappointing situation which must be remedied if the Sudan is to maintain its export position.[97]

Figure 6.1 shows the increase in the area from the year 1952/53 - 1975/76 together with the calculated linear regression line showing the relationship between time and area. The R^2 for the regression is 0.80 suggesting that 80% of the change in the area of sesame grown is due to time. The fit of course would have been much better if freak year 1972 had not been included.*

---

*1971 saw the opening of major new production schemes as a result of a World Bank loan. Sesame is included in the recommended rotation. But many new farmers after growing it once and obtaining disappointing results switched over to monoculture of dura. By 1977 83% of the area cultivated in mechanised cropping schemes was devoted to dura.

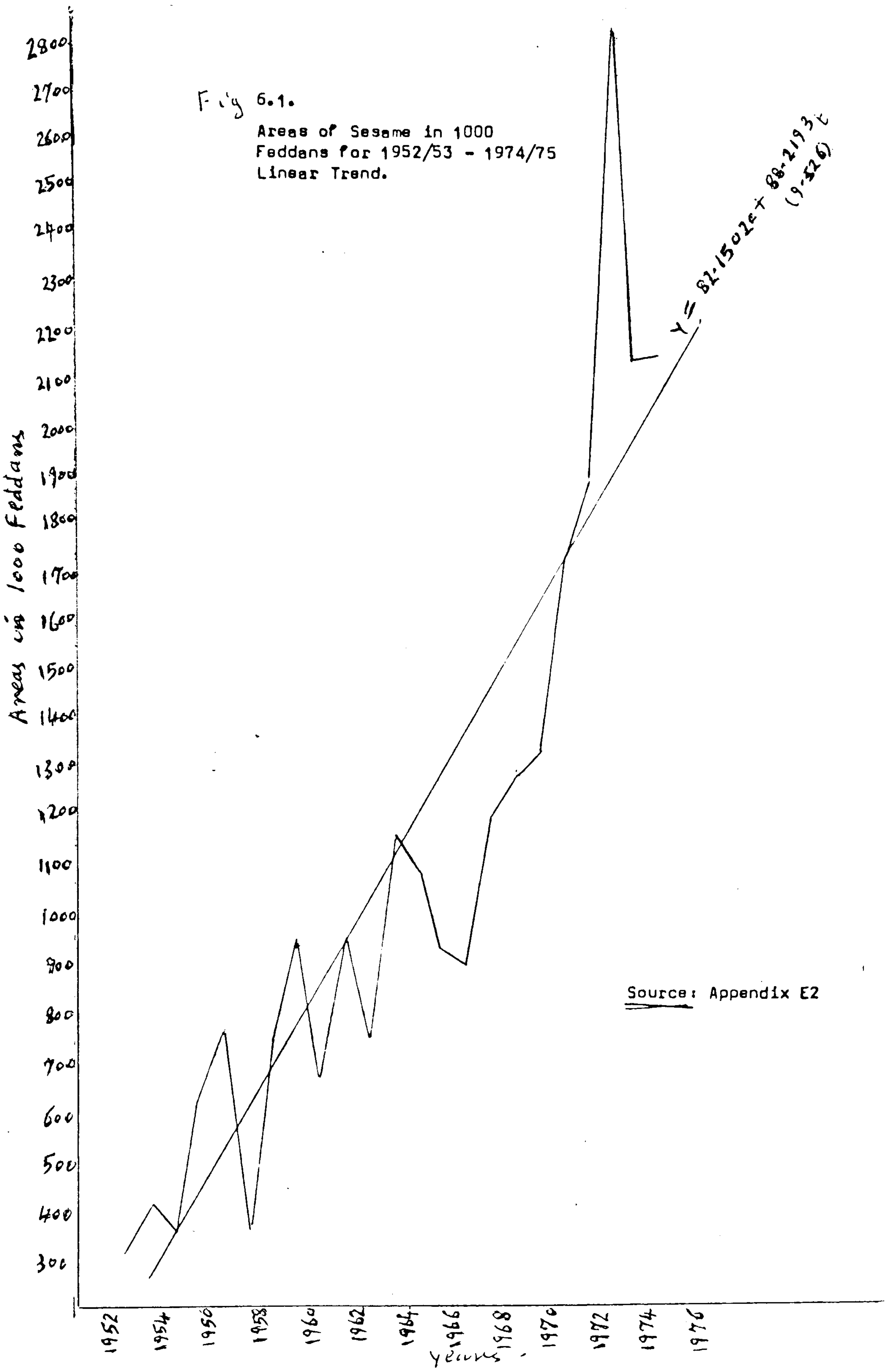


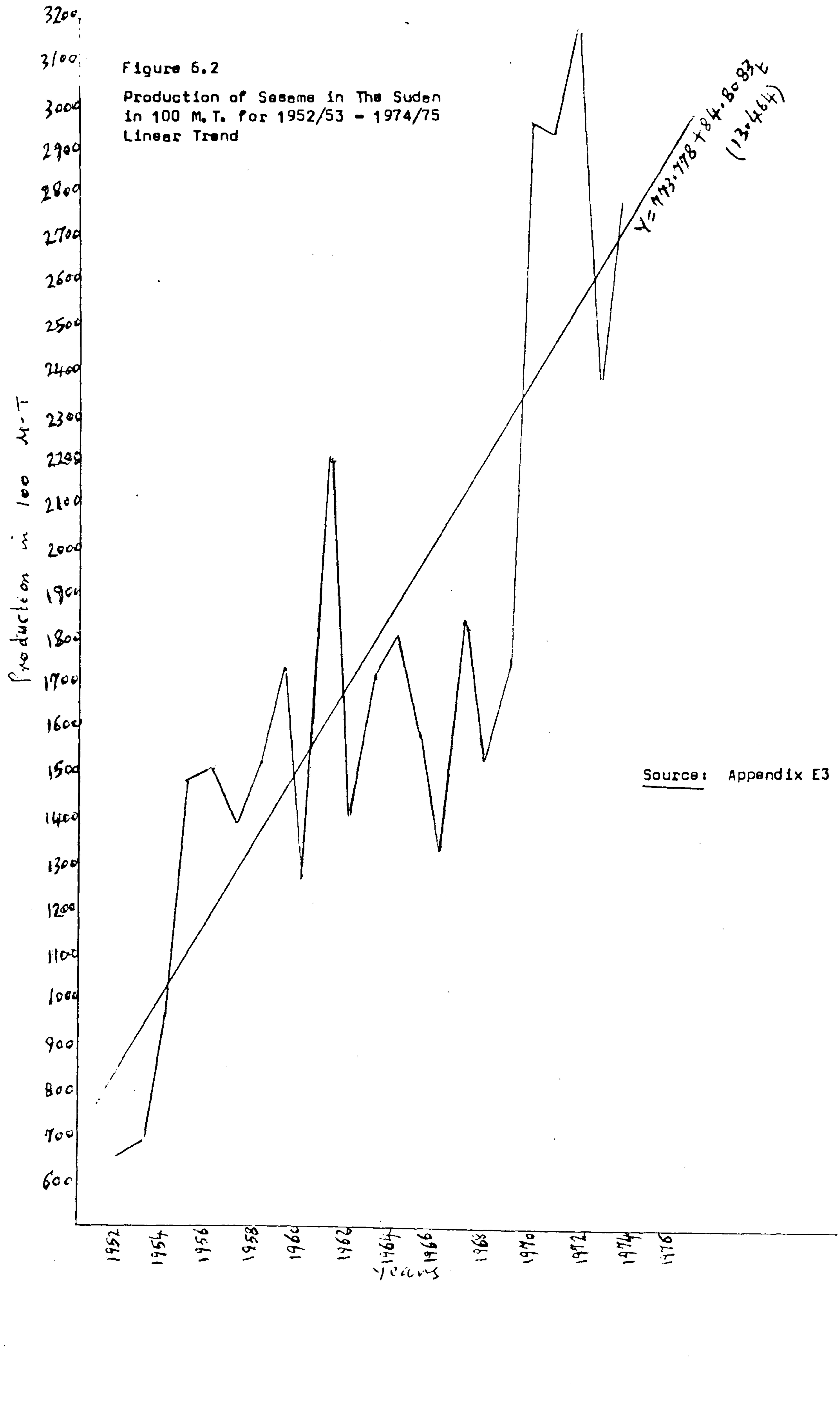
Fig 6.1.
Areas of Sesame in 1000 Feddans for 1952/53 - 1974/75 Linear Trend.
Y = 82.1502t + 88.2193t
(9.526)
Areas in 1000 Feddans
2800
2700
2600
2500
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
Years
Source: Appendix E2

Figure 6.2 illustrates the production of sesame for 1952/53 - 1974/75. It will be seen that there is a very marked tendency for production to increase over time as the consequence of the increase in the area sown and the trend line based on a linear regression has been included on the figure. The relationship between production and time is of course weaker than that between area and time since area is not the sole determinant of production - yield also enters in. It will be seen from the figure that production oscillates from year to year around the trend line.

Figure 6.3 shows the relationship between yield and time. It will be seen that the trend line has a negative slope - a slope which would have been more pronounced if yields had not slumped in 1953 - the second year of the time series, a year of drought. The figure for yield over time is very disturbing since it indicates the productivity of the land is falling, a point which has already been discussed in chapter 2 page 37 with regard to dura.

6.3 Provincial Distributions of Sesame, Area Production and Average Yields

Table 6.2, 6.3 and 6.4 respectively give details of area, output and yields of sesame for the period 1965/66 - 1976/77. It will be seen from Table 6.3 that production of sesame has moved both northward and southward. The principle production provinces in the mid 1960s - Blue Nile and Kassala had been over taken by Kordofan in the Western Sudan and the further western



<u>Source:</u> Appendix E3

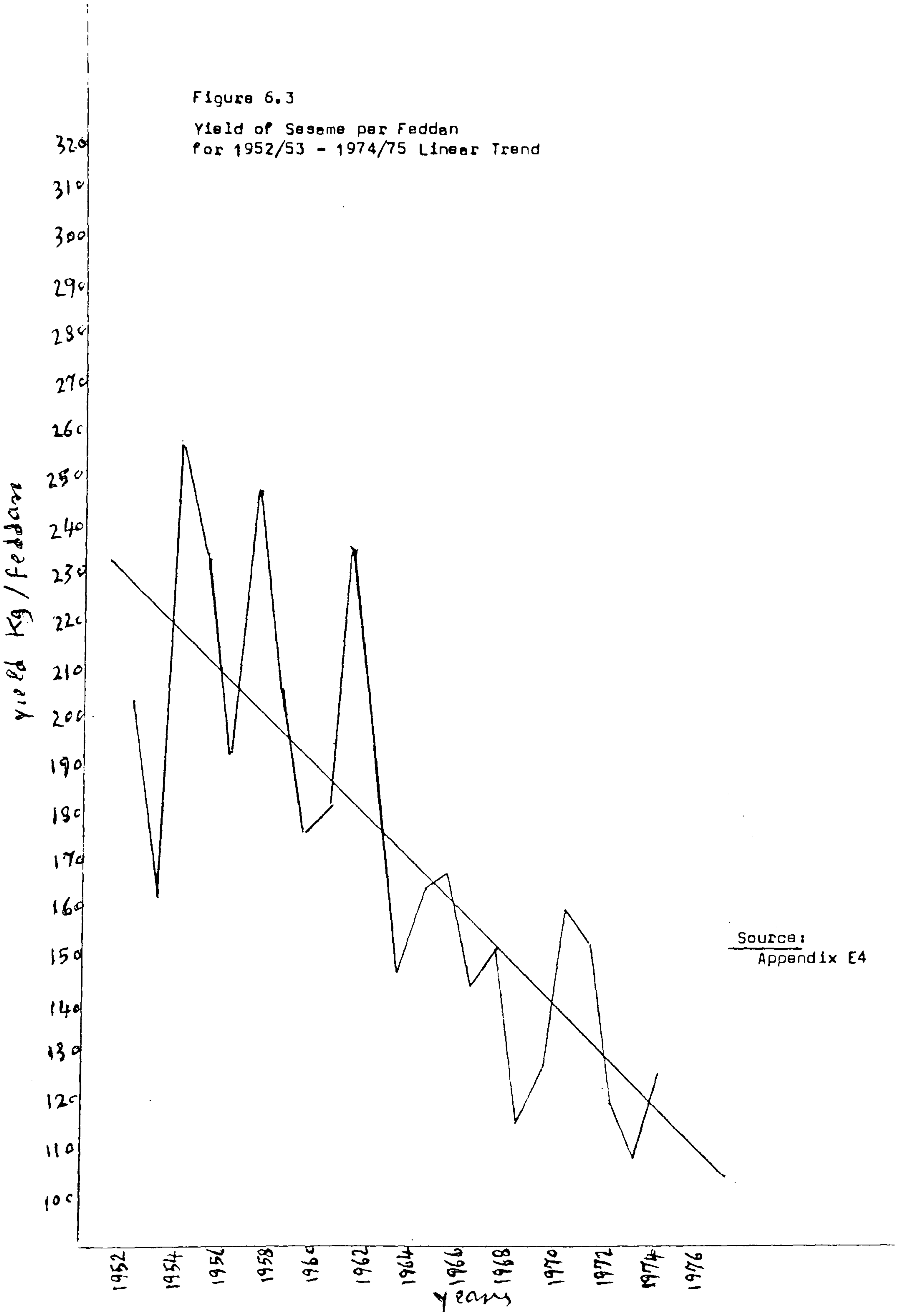


Figure 6.3
Yield of Sesame per Feddan
for 1952/53 - 1974/75 Linear Trend
yield Kg / feddan
320
310
300
290
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
years
Source:
Appendix E4

Table 6.2

Area of Sesame Seed in the Sudan by Province
1965/66 - 1976/77
Area 1000 Fedd

Province	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77
Northern	-	-	-	-	*	-	-	-	-	-	-	-
Khartoum	-	-	-	-	-	-	-	-	-	-	-	-
Blue Nile	326	156	295	334	403	291	288	433	468	456	415	272
Kassala	106	220	322	299	322	285	373	370	442	374	347	400
Kordofan	404	449	554	464	557	1180	1117	1891	1061	1154	1092	1015
Darfur	81	87	56	46	59	60	84	84	88	69	198	191
Upper Nile	6	-	4	3	13	8	11	32	48	51	51	28
Bahr El Ghazal	24	11	4	175	6	30	27	22	69	70	75	88
Equatoria	-	-	1	*	-	3	22	14	17	25	38	60

* less than 0.5

Source: Sudan Year book of Agricultural Statistics, Department of Agricultural Economics, 1974-1977

Table 6.3

Production of Sesame Seed in Sudan by Province
1965/66 - 1976/77

Production 1000 M.T.

Province	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77
Northern	-	-	-	-	*	-	-	-	-	-	-	-
Khartoum	-	-	-	-	-	-	-	-	-	-	-	-
Blue Nile	77	41	78	60	55	59	123	78	65	74	51	37
Kassala	15	35	44	37	51	42	52	60	68	33	34	59
Kordofan	52	42	59	33	60	175	99	180	77	149	90	73
Darfur	12	12	6	3	6	6	7	8	12	9	17	19
Upper Nile	1	-	*	*	1	1	1	4	3	5	5	3
Bahr El Ghazal	4	3	*	21	1	14	11	8	8	9	11	10
Equatoria	-	-	*	*	-	*	3	2	2	3	9	7

* Less than 0.5

Source: Sudan Year book of Agricultural Statistics, Department of Agricultural Economics, 1974-1977

Table 6.4

Average Yield of Sesame Seed in the Sudan by Province
1965/66 - 1976/77

Average Yield M.T/Fedd.

Province	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77
Northern	-	-	-	-	.60	-	-	-	-	-	-	-
Khartoum	-	-	-	-	-	-	-	-	-	-	-	-
Blue Nile	.236	.261	.264	.180	.136	.203	.426	.180	.107	.128	.128	.132
Kassala	.142	.159	.137	.124	.158	.147	.139	.153	.176	.087	.097	.152
Kordofan	.129	.94	.106	.071	.108	.148	.089	.095	.107	.127	.082	.110
Darfur	.148	.138	.107	.65	.102	.100	.083	.095	.136	.132	.088	.100
Upper Nile	.167	-	.100	.033	.077	.125	.091	.125	.068	.139	.095	.104
Bahr El Ghazal	.167	.273	.100	.120	.167	.467	.407	.364	.118	.135	.140	.110
Equatoria			.040	.500	-	.067	.136	.143	.115	.120	.200	.112

Source: Sudan Year book of Agricultural Statistics, Department of Agricultural Economics, 1974- 1977 province of Darfur has also reported modest increases. The spectacular change in position is that of the Blue Nile Province where the area sown has actually fallen by 1976/77.* The Blue Nile has a higher average rainfall than most of the other provinces listed and in years with above average rainfall the crop may be a failure because of flooding. In Kordofan where the area sown has increased spectacularly from 40,400 feddans in 1965/66 to over a million feddans by 1970/71, Soils are generally much freer draining than the heavy soil of the Blue Nile. It would be expected that the movement westward in production areas would lead to a higher transport cost which in turn could inhibit the economical production in these more remote areas. Sesame however is a much higher value product than dura, so is able to bear higher transport costs.

Table 6.4 shows annual average yields for each province, the figures of course are averages for combined yields of both the modern and traditional sectors. All that can be said is that yield oscillates from year to year but the general level is very disappointing compared with yield in other major producing countries. Low yield of course has important implications as regard production costs. If yields are low ceteris paribus then cost per ton will be high.[98]

Table 6.5 (Part A) gives details of sesame production by province as percentage of total production of sesame in the Sudan in the year 1976/77. It will be seen that three provinces dominate

---

* See Table 6.2

Table 6.5

Sesame Production in the Sudan
1976/77

A) Provincial Distribution :-

Province	Percentage of Total Area	Percentage of Total Output
Kordofan	49	35
Kassala	19	28
Blue Nile	14	19
Southern Provinces	9	9
Other Western	9	9
Total Sudan	100	100

B) Sector Distribution:-

Province	Percentage of Total Area	Percentage of Total Output
Modern mechanised rainfed sector	38	39
Traditional sector	62	61
Total	100	100

Source: The writer's own computation

the sesame production - Kordofan, Blue Nile and Kassala. The year 1976/77 was a bad year for Kordofan Province which with 49% of the total area sown in the Sudan, produced only 35% of the total output. The yield was only 0.110 metric ton per feddan compared with 0.152 for Kassala. Part (B) of the Table shows the distribution between the modern mechanised rainfed sector and the traditional sector. The split between the two as regards both the share of total area and total output is very much the same, indicating that crop yields between the two sectors are very similar; a very disappointing result considering the wide differences in the level of inputs applied. On such yield level one almost wonders whether the production of sesame should be left entirely to the traditional sector with its abundant family labour and independence from expensive imported inputs such as tractors and petroleum products.*

6.4 Cost of Production of Sesame

Cost of production per feddan is determined by the production inputs used and the unit prices. Cost of production per sack reflects not only these factors but the level of crop yields

---

*Appendix E5 indicates areas of sesame seed by province as percentage of total areas in the Sudan years 1967/68 - 1976/77. Appendix E6 indicates production of sesame seed by province as percentage of total production of sesame in the Sudan years 1967/68 - 1976/77.

obtained. The main inputs consist of labour, machinery, sacks, transport and marketing expenses and various miscellaneous items. In recent surveys :-

Labour comprise 69 percent of total costs

Machinery comprise 25 percent of total costs

Other items comprise 6 percent of total costs.*

Total 100

Cost per sack depends partly on yields, all other things being equal high yields are associated with low costs and low yields with high costs per sack. As has been shown in Figure 6.3 page 160 the trend of yields of sesame is to fall over time. In addition to this the farmer is faced by rising inputs costs while the prices obtained for his sesame have not risen to compensate for these increases in costs. Consequently the farmer is being squeezed by inflationary pressures in the Sudan economy which are not reflected in the world prices for his products.

The high labour costs arise from the heavy manual work demands at weeding and harvesting. Total labour requirements to grow sesame have been estimated around 47 man hours per feddan of which 19 man hours is for weeding and 26 man hours for cutting and threshing. At a total of 47 man hours to grow one feddan of sesame for an average crop yields of one sack of sesame per feddan, a metric ton of sesame requires 611 man hours.

---

*For details see Appendix E7

Harvesting costs are more or less independent of crop yields. The worker merely cuts and bundles the weed together with the sesame, but the labour required for threshing depend partly on the size of the crop. The costs of labour not only include the direct wage paid (usually piece rates) but also the costs of providing water and food and shelter for the labourers beside the expenses incurred in recruiting and transporting the workers to the farms. As has been mentioned earlier with dura the fast rate of development in the Central Rainlands has led to a growing shortage of casual workers which is reflected in an increasing piece rates paid by farmers. A complication with sesame which is not experienced with dura, is that the crop has to be harvested immediately otherwise the seed will shatter. Consequently farmers have to engage sufficient workers to do the work if they wish to save their crop. The workers know this and will strike a hard bargain with the farmer. In fact the scarcer labour becomes the higher the price the farmer will pay to save the crop. Recently, however, in the Simsim district farmers have hired ordinary combines to cut their crop on the ground that it is cheaper to incur the inevitable losses resulting from the use of combine harvester than to pay the very high piece rate for hand cutting and threshing demanded by workers. In fact it could be said that labourers have over priced themselves. Farmers also compete for workers by offering them a greater variety of foods in their diets and other items such as free cigarettes and dura to brew their national drink All these additional items of course have increased costs while the prices of such staple foodstuffs as dried fish, onions, sugar and cooking oil have risen considerably in the last few years.(99)

The second major category of costs, machinery expenses, has also risen. The prices of new machinery of which all are imported, reflect the inflationary trends in the manufacturing western countries.* All the fuels and lubricants required for these machines also have to be imported and world prices have risen and continue to rise. One particular problem which is somewhat peculiar to the Sudan is the blackmarket for machinery spare parts. There was a very serious shortage of spare parts in the Sudan in 1978. A confidential report to the World Bank states that unless international assistance is rapidly forcoming, the entire machinery complement of the Sudan will slowly grind to a halt because of the lack of foreign exchange to import spare parts. Consequently some enterprising entrepreneurs have set up a very flourishing blackmarket in spare parts in which the farmer is forced to deal if he wishes to continue to keep his machines in running order.

Table 6.6 gives costs of production of sesame per feddan in different areas of the Sudan from a number of surveys carried out by the Ministry of Agriculture, Khartoum University, M.F.C. and Leeds University in the years 1974/75, 1975/76 and 1976/77. For more

---

* It is interesting to know that prices of machinery imported from Eastern Bloc countries have risen in line with imports from the West.

Table 6.6.

Cost of production of Sesame per feddan in different areas of the Sudan

Survey Date and Area	LS per Feddan				Yield
	Total cost	Total returns	Profit or Loss	Price per sack	No. of sacks per Feddan
Ministry of Agriculture					
Blue Nile 1976/77	10.52	6.37	-4.15	7.96	0.80
Gedaref 1976/77	12.10	16.49*	+4.39*	8.33*	1.98*
Khartoum University					
Gedaref 1975/76	16.00	17.50	+1.50	8.84	1.98
M.F.C.					
Semsim 1974/75	10.92	7.42	-3.50	9.16	0.78
Leeds University					
Damazine 1974/75	9.56	7.82	-1.74	7.81	1.00
1975/76	8.71	4.56	-4.15	7.87	0.58
Ministry of Agriculture					
Northern Kordofan 1976/77	4.996	6.244	+1.248	8.920	0.7
Eastern Kordofan 1976/77	4.249	5.560	+1.311	9.266	0.6

details about the average costs of production of sesame in different provinces see Appendices E8, E9, E10, E11, E12.*

---

*Appendix E8 indicates average cost of production per feddan in Gedaref mechanised crop production 1975/76 season.
Appendix E9 indicates average cost of production per feddan in South Darfur Province 1975/76 season.
Appendix E10 indicates average cost of production per feddan in Northern Kordofan Province 1975/76 season.
Appendix E11 indicates average cost of production per feddan in two districts of Northern Kordofan Province 1976/77 season.
Appendix E12 shows average cost of production per feddan Blue Nile Province 1976/77 season.

CHAPTER 7

Marketing of Sesame

7.1. Institutional changes in the marketing of sesame

The marketing of sesame differs from that of dura since the state through the operation of parastatal organisations dominates the internal and export trade, while as has been seen earlier the marketing of dura is in the hands of the private sector. The state intervention in the sesame market dates from 1970. Prior to that year the trade was in private hands.

The Government in 1970 had strong left wing leanings and among sectors which attracted ideological attention was that of the marketing of oilseeds largely groundnuts and sesame. The leading private sector trader was the Osman Salih Company which was nationalised in 1970. The owner left the country and established a new Company in London. This Company as will be seen became a major rival to the Sudanese parastatal organisations. The Government nationalised the Osman Salih interests within the Sudan, but was unable to gain control over the external outlets of the Company. The London Company was able to continue to supply their old customers with oilseeds not only from countries other than Sudan but also from Sudan itself.

On the 28th May 1970 the President of the Sudan issued an Ordinance establishing three new Corporations to deal with the export of oilseeds from the Sudan. These were [100]

1. Octomay Trading Corporation
2. El Shuhada Trading Corporation
3. The United African Corporation

The reason for having three Corporations is that the trade was dominated by three private Companies — the Osman Salih Company and two expatriate firms. Nominal compensation was paid to the latter, but the Osman Salih Company being Sudanese owned received no compensation. This was one of the reasons for subsequent feuds between the new London Company and the Sudanese parastatal organisations.*

The new Corporations enjoyed between them a complete monopoly in the export of oilseeds. Internally they were concerned with the fixing of floor prices, prices which were intended to be minimum producer prices. The Corporations did not buy direct from producers and only entered the wholesale markets when either the price fell below the floor price or where large surpluses of sesame piled up as a result of the failure of the market to move them, otherwise the Corporations only bought from licenced wholesalers who delivered oilseeds to the Corporations' warehouses at Port Sudan.

On the 29th of August 1974 the Sudan Oilseeds Company Limited was established in Khartoum. This organisation took over the

* The Osman Salih family not only had their oilseeds company nationalised but also other business interests including one large oil pressing mill in Khartoum North and one of the few major international hotels in the centre of Khartoum. The reasons for the non payment of compensation appear to be political. The family is associated with one of the right wing parties.

oilseeds activities of the three trading Corporations set up in 1970.[101] As has been mentioned previously each of these earlier Corporations was set up to take over the various activities of individual privately owned Companies. By taking away the oilseeds side of their business, the Governement presumably rationalised the oilseeds marketing activities by placing them directly under the control of one organisation. The new Company which is called "Sudan Oilseeds Company Limited" is given the complete monopoly of trading in oilseeds in the Sudan. The capital of the Company is LS 4 million of which 75 percent was directly contributed by the Government and the residual 25 percent by selling shares of ten pounds each to the public. As before the parastatal Company did not deal directly with the producers but operated through wholesalers who, in theory, obtain their supplies from the auction markets where, again in theory, a floor price was maintained of which the producer had perfect knowledge.

Exempt from the company's jurisdiction are the local oil mills who are allowed to buy direct from the oilseeds markets and even from producers. As regards the export trade, this is completely under the control of the Company. When sesame is delivered to the company's warehouses in Port Sudan consignments are inspected for impurities. A sample is taken in the presence of the seller or his agent and then sent to the laboratories of the Ministry of Commerce at Port Sudan for analysis. The samples are then tested for impurities and oil content.

Unlike dura there are stringent regulations on the grading of sesame (see Appendix Fl for details). There are three grades which are based on the percentages of oil, fatty acid, water content and impurities together with the percentage of different coloured seeds. Sesame is normally white, red, brown or black. Where a sample of sesame is labelled mixed colours there are prescribed regulations about the composition of the various colours.[102] The highest prices are realised by the white variety as it gives a colourless oil, while mixed colour samples command the lowest prices.

7.2 The marketing activities of the private sector

Before the state intervened in the marketing of sesame, the trade was largely in the hands of local wholesalers in the production areas who supplied both the home market and the major exporting companies. The setting up of the Oilseeds Company eliminated the role of the private sector in the legal export trade, but did not supercede the local wholesalers entirely.

Gedaref because of its proximity to Port Sudan concentrated on the export market and the merchants are primarily concerned with assembling the local produce for the export trade. In Western Sudan the local merchants are concerned more with the internal market. Whatever the ultimate destination of sesame however certain basic functions are performed by local merchants.

Legally merchants are supposed to buy sesame only from local auction markets where floor prices prevail. In practice however they also deal directly with producers especially when the sheil system is in operation. For example sheil transactions reported to the writer at Damazine in November 1977 show that merchants bought crops forward before harvesting at a price which was highly discounted in comparison with the floor price prevailing in the local market. Producers were forced to resort to sheil as they had exhausted their credit facilities at the local office of the Agricultural Bank of the Sudan and could not raise sufficient money to pay for harvesting their crops.* Such transactions are of course illegal as regards oilseeds but the sheil system is deeply imbedded in society and of course is a lender of last resort. It is indicative of the plight of producers that they are forced to sheil in order to harvest their crops.(103)

Merchants also bought directly from producers at discounted rates in relation to the floor prices on the pretence that if the producer dealt directly with them he would make a considerable saving because of tax evasion and a reduction in the cost of marketing as regards the expenses of taking sesame to the auction market. Whether or not dealing directly with a merchant rather than going to the auction market actually increases producer returns is

---

*Many farmers were unable to repay the outstanding debts with the Bank because of the poor crop yields obtained in the previous year and until these debts were cleared the bank would not lend them any more.

rather more questionable. Again these transactions are illegal, but despite this appear to be widespread especially where small Bildat producers are concerned.

Legally the merchant is supposed to buy from an auction market. As has been mentioned earlier a floor price is declared by the authorities * and merchants then compete for supplies and if there is sufficient competition, the market prices rise above the floor price. At the market the grower and wholesaler are subject to local produce taxes and various market dues. All these extra costs differ from one Province to another and also may differ from one year to another. It is because of those charges that both the merchants and producers are tempted to do transactions outside. In the market sales take place in a special building and the procedure is the same as that described for dura in Chapter 3.

On purchase the buyer cleans and resacks the crop and then arranges for its local storage until transport is available. Whether the produce goes for internal consumption or for export, it is the wholesaler who is responsible for the cost of removing the produce from the production areas. If it goes for export the wholesaler has to pay all the charges for delivery to the Oilseeds Company's warehouses at Port Sudan and he also has to bear the risk of losses on the journey and the possibility that the produce is not up to the grade he thought it was. A general complaint

---

* The floor price policy is given in Chapter 8.

reported to the writer was that the merchant has to give the Oilseeds Company a long period of credit since the latter takes time to settle accounts. No charge of course is made for this credit. In fact some wholesalers were reluctant to deal in sesame because of long delays in obtaining payment.

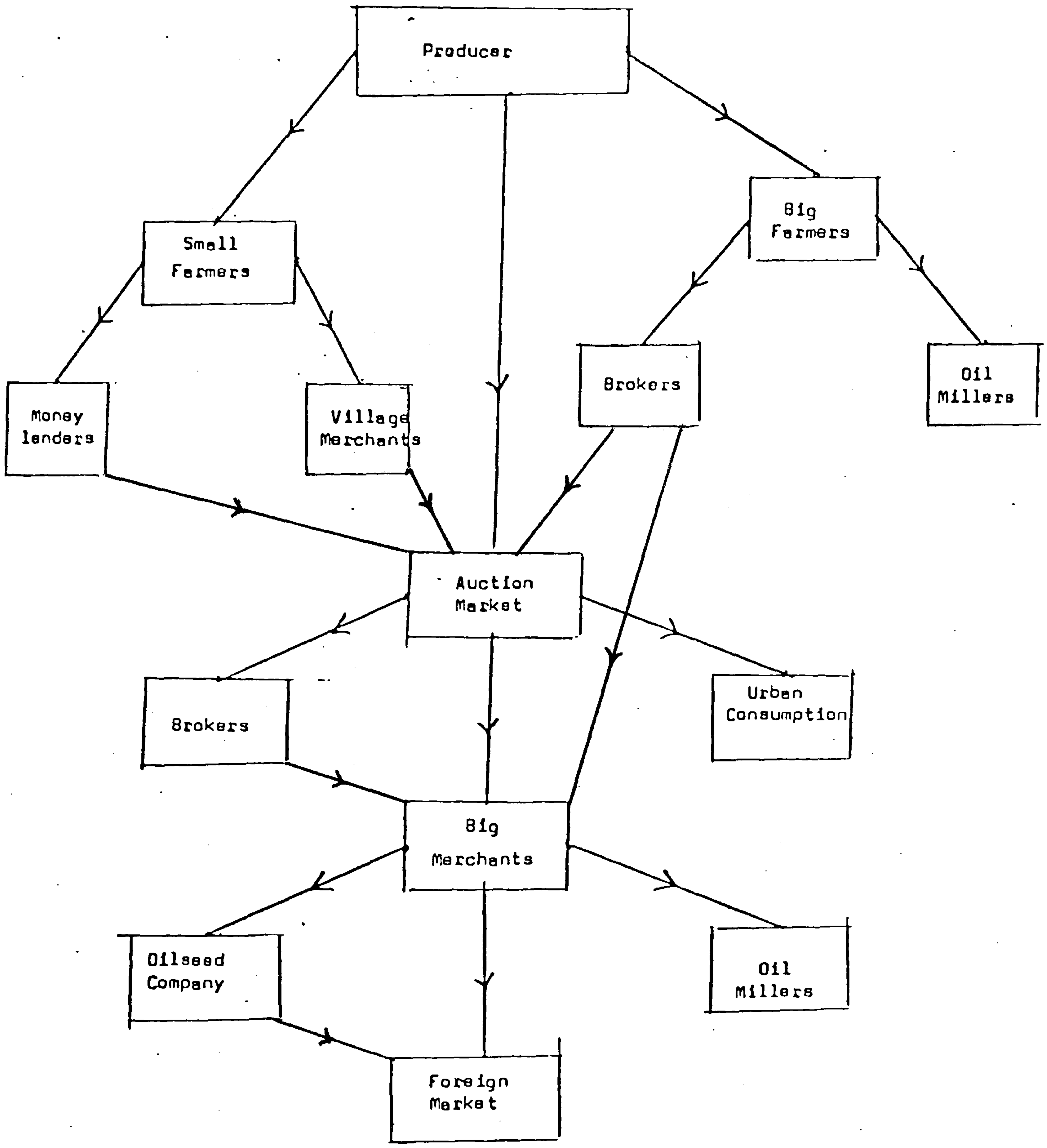
It is interesting to note that the Oilseeds Company and the Corporations in the past used to take responsibility for moving sesame to the Port, but after organisation difficulties and high costs, went out of transport and left the transportation function for the merchants. Experience with other crops has shown that the merchants are much more efficient in dealing with the Railway Corporation. Hence another important function of merchants is that of transporting the produce to Port Sudan.

7.3 Marketing channels of sesame

Chart 2 gives details of marketing channels legal and illegal. It will be noted that a small farmer does not necessarily follow the legal procedures of selling directly to an auction market but deals with local merchants also. The large farmer also has alternative outlets besides the auction market, he may well deal with a local wholesaler especially if he is short of money. The sheil system situation in Damazine in 1977 covered farmers with holdings over 1000 feddans beside being rife among the small Bildat cultivators.

CHART 2

Marketing Channels of Sesame



Source: From fieldwork January 1975.

The sheil merchants will either sell the sesame legally through an auction market or especially in Gedaref area they may dispose of it to smugglers who are engaged in a lucrative trade with Ethiopia.*

At the auction market the main buyers are the large merchants who are obtaining supplies for the export trade. As has been mentioned earlier these supplies are delivered to the stores of the Oilseeds Company in Port Sudan. Other purchasers at the auction market include buyers from the Khartoum oil mills and merchants operating in other areas of the Sudan who are anxious to obtain sesame for local consumption. In some areas sesame is pressed for oil by grindstones which are turned round by a blindfolded camel.**

The export of sesame will be discussed in great detail in Chapter 9 together with the world trade in oilseeds. Before the export trade is considered however it is necessary to give more detail about the uses of sesame.

---

* At one stage Ethiopia exports exceeded those for the Sudan, a position which it is believed the smuggled sesame from Gedaref the largest production area is partly to blame.

** Such traditional camel driven presses are even found in Omdurman (the largest city in the Sudan). The writer had seen several where it is claimed that the oil is extracted at a lower cost than at the modern oil pressing mills at Khartoum North at the opposite side of the Nile. The flavour of the oil is better and the oil cake produced is in demand for livestock feeding in the nearby market area (The Zariba) of Omdurman the largest cattle market in the Sudan. In addition to the demand for livestock feeding freshly produced cake is a much sought after delicacy for salad dishes. Oil cake produced by the modern mills is hard while the traditional product while fresh is soft.

7.4 Utilisation of sesame in the Sudan

Table 7.1 gives details of sesame production and utilisation for five years 1970/71 – 1974/75.[104] The average total production for the five years is 290,621 tons while the average gross domestic utilisation is 204,611 tons, the difference 86,010 tons is for export which represents about 31 percent of the total production in the Sudan. From the average gross domestic utilisation 9.3 percent is used as direct food. Sesame seed is used for decorating bread and cakes and is also used in the manufacture of sweets. Part of the crop has to be retained as seed while part is wasted. It will be seen from the table that wastage accounted for 4.6 percent annually of the average total domestic use. Of the oil cake produced (just slightly greater in weight than the amount of oil extracted), the bulk was used in the country for stock feeding while the residue was exported.

7.5 Oil Mills

Modern industry started in Sudan after the First World War. In 1956 manufacturing output amounted to only 5 percent of national output, since then it has grown rapidly and now accounts for about 10 percent of the gross domestic product. The expansion of industrial output has been as much the result of Government policy as a natural accompaniment to development in other sectors of the economy. Very considerable fiscal concessions have been made to encourage the establishment of industry in the private sector of the economy and the Government has been active in promoting agricultural industries.[105]

Table 7.1

Sesame Production and Utilisation
in the Sudan 1970/71 - 1974/75

	1970/71	1971/72	1972/73	1973/74	1974/75	5 yr. average
Area (000 Feddans)	1,857	1,921	2,847	2,193	2,199	2,203
Production m.t.	296,967	296,141	340,504	237,845	281,650	290,621
Exports as seed m.t.	86,300	86,500	92,400	107,852	57,000	86,010
Gross Domestic Utilisation						
Total m.t.	210,667	209,641	248,104	129,993	224,650	204,611
Direct food m.t.	21,598	21,351	23,215	16,515	13,458	19,227
Seed m.t.	4,763	7,118	5,483	5,432	5,728	5,704
Waste m.t.	10,799	10,676	11,607	8,257	6,729	9,614
Processed m.t.	173,507	170,496	207,799	99,789	198,735	170,065
Recovery of oil %	48	48	48	48	48	48
Production of oil m.t.	83,283	81,838	99,743	47,899	52,162	71,333
Export of oil m.t.	50	176	5,260	26	1,608	1,424
Domestic use of oil						
Total m.t.	83,233	81,662	94,483	47,873	50,554	69,909
Sesame cake 50% m.t.	86,753	82,921	97,622	49,895	54,335	74,305
Exports m.t.	15,881	14,699	11,605	14,196	5,547	12,386
Domestic utilisation m.t.	70,872	68,222	86,017	35,699	48,788	61,919

Source: Current Agricultural Statistics Vol. 1 No, 2. June 1976
Statistics Section, Department of Agricultural Economics.

Industrial development has been concentrated largely on the processing of agricultural products and on textile production. So far it has been almost exclusively directed to import replacement and to providing for home needs.

As has been mentioned in page 180 until very recent times oil was extracted by means of the primitive camel driven presses (Assaras). These Assaras were a common feature in very many villages and towns especially in the areas producing sesame and groundnuts. The oil extracted was almost all for local consumption. The oil cake was also used locally for livestock feeding.

After independence the oil industry was flourishing and was encouraged by the Government. Private mechanical oil mills were constructed in different parts of the country pressing large quantities of sesame and groundnuts for both domestic use and for export. The oil mills are mainly concentrated in Um Ruaba, Khartoum North, Eastern Kordofan, El Obeid and Port Sudan. Oil is normally tinned and sent to different parts of the country where it is consumed for food. Inferior oil which is cheaper is used mainly in soap manufacture. The production of oil from the Port Sudan oil mill is usually for export (For details of oil mills see Appendix E_1)

7.6 Costs of marketing

As has been mentioned earlier the sesame trade falls in two broad categories, the internal trade which is concerned mainly with the delivery of sesame to processers, either traditional or operating large modern mills.* The internal trade in sesame is operated by the private sector subject to the floor price and other related regulations of the Oilseeds Company. The export trade as has been explained earlier is directly controlled by the Oilseeds Company. The private sector buys sesame destined for export from producers' auction markets and then resells it to the Oilseeds Company on delivery to Port Sudan. Consequently it is necessary to differentiate the cost of marketing according to the divisions of the sesame between external and internal trade and then according to the various stages within the two divisions.

In common to all the various possibilities is the stage where the sesame passes from the producer to the primary market. The farmer invariably has to purchase new sacks for his sesame since the very small seeds can easily leak out of old sacks. In December 1976 sacks cost LS 85 for a bale of 300 sacks at Damazine in the Blue Nile Province. Strings to fasten up the sacks were included in this price. Transport charges averaged 0.5 piasters per sack per kilometre by motor lorry. Typically farms were 30 – 50 kilometres from Er Roseires auction market, the principal market of the region. Producers also faced a charge of 4 piasters a sack for loading and unloading the lorry. At the auction market the local Ushur and Gibana tax amounted to 85 piasters a sack which in theory was paid for by the buyer. Farmers Union officials

---

* For details of utilisation of the sesame crop, see page 181

complained that the buyers try to pass the incidence of this tax on to producers. If the floor price system operated satisfactorily this would prove difficult, but it was alleged that the merchants still managed to pass the tax on to the producers.* In other provinces the local taxation system is different but normally it is borne by the buyer. As with dura, produce taxes are a a major source of revenue of the provincial local Government authorities. As sesame is a higher value crop by weight than dura, produce taxes are higher per sack.

Where the sesame is to be exported the second stage is the cleaning, resacking and transportation of the crop to Port Sudan. The total costs of this operation depend on the distance between the primary markets and Port Sudan.** Tables 7.2 and 7.3 compare the costs of this stage according to whether the primary market was in Gedaref or El Obeid which is much further away from the Port. The Tables give marketing costs corresponding to various producer prices per Kantar. The lowest price is the floor price set for the 1973 crop. This division of costs according to price is necessary since the local provincial taxes are based on an ad valorem 10 percent for Ushur at El Obeid (Kordofan Province) and 12 percent at Gedaref (Kassala Province). The other local tax

---

* The writer has attended the Roseires market and noted that merchants tended to denigrate the quality of sesame offered for sale by producers. It would seem to the writer that the quality of the sesame should be independently assessed before it is offered for sale in the auction market.

** See Appendix F2 which illustrates how transport costs contribute to high marketing margins.

Table 7.2

Marketing cost of Sesame at Gedaref Auction Market for 1973

	Ls/mms.	Ls/mms.	Ls/mms.	Ls/mms.	Ls/mms.
Buying price/Kantar	2.800	2.850	2.900	2.950	3.000
23.1875 Kantar x price*	64.925	69.084	67.244	68.403	69.063
Ushur 12%	7.791	7.930	8.069	8.208	8.348
	72.716	74.014	75.313	76.611	77.911
Gibana 15mms/Kantar	.348	.348	.348	.348	.348
Transport, loading, string 38mms/Kantar	.881	.881	.881	.881	.881
Brokerage 14 mms/Kantar	.325	.325	.325	.325	.325
Cleaning	.750	.750	.750	.750	.750
Value of 13.333 sacks* x 200 mms.	2.667	2.667	2.667	2.667	2.667
Transport to railway to Port Sudan 13.333 x 7mms	.093	.093	.093	.093	.093
	5.064	5.064	5.064	5.064	5.064
Rail freight to Port Sudan Off loading	4.510 .150	4.510 .150	4.510 .150	4.510 .150	4.510 .150
	4.660	4.660	4.660	4.660	4.660
Cost per ton of Sesame delivery Port Sudan stores	82.440	83.738	85.037	86.335	87.635
Cost per Kantar	3.704	3.762	3.820	3.878	3.937

Source: Octomay Trading Corporation's books.

* 1 m.t. = 23.1875 Kantars or 13.373 sacks

Table 7.3

Marketing cost of Sesame in El Obeid Auction Market for 1973

Buying price/Kantar in El Obeid	2.800	2.850	2.900	2.950	3.000
23.1875 Kantars x price*	64.925	64.084	67.244	68.403	69.563
Ushur %	6.493	6.608	6.724	6.840	6.956
	71.418	72.693	73.968	75.243	76.519
Gibana 75 mms/kantar	1.739	1.739	1.739	1.739	1.739
Transport, loading, string 49mms/per Kantar	1.136	1.136	1.136	1.136	1.136
Brokerage 200mms/kantar	.464	.464	.464	.464	.464
Value of 13.333 sacks x 200 * mms/ per kantar	2.667	2.667	2.667	2.667	2.667
Cleaning	1.250	1.250	1.250	1.250	1.250
Loading and offloading 133.333 sacks x 28 mm/s	.423	.423	.423	.423	.423
	7.679	7.679	7.679	7.679	7.679
Rail freight to Port Sudan	6.720	6.720	6.720	6.720	6.720
Off loading	.150	.150	.150	.150	.150
	6.870	6.870	6.870	6.870	6.870
Cost per ton of Sesame delivery Port Sudan	85.967	87.241	88.517	89.792	91.068
Cost per kantar	3.862	3.919	3.977	4.034	4.091

Source: Octomay Trading Corporation's books.

* 1 m.t. = 23.1875 Kantars or 13.333 sacks.

Gibana is a flat rate per unit of weight. Additional costs incurred by the merchants include cleaning, loading, unloading and delivery to either El Obeid or Gedaref station and then collection at Port Sudan station, together with a large item for railway freight charges. Altogether at the floor price the total costs delivered to the Corporation stores at Port Sudan is LS 82.44 per ton from the Gedaref region and LS 85.97 per ton from El Obeid. The respective marketing cost per ton for the two areas in 1973 is LS 17.51 for Gedaref and LS 21.04 for El Obeid. The differences are largely accounted for by the railway freight costs but part of the locational advantage of Gedaref is offset by higher local taxes.[106]

Table 7.4 indicates sesame marketing costs at Gedaref auction market for the 1975/76 year. There is a considerable rise in prices and marketing costs compared with 1973 (see Table 7.2) For example the average purchase price per ton for sesame rose from LS. 65 in 1973 to LS. 107 in 1975/76, a rise of 64 percent. Ushur and Gibana rose from LS 8.232 in 1973 to LS. 16.249 in 1975/76 a rise of 97 percent. Railway freight rose from LS. 6.720 per ton to LS. 17 in 1975/76 a rise of 152 percent, jute and bags also rose from LS. 2.667 in 1973 to LS 4.389 in 1975/76. These increases in the prices led to the increase in the cost per ton of sesame delivered to Port Sudan from LS. 83 in 1973 to LS. 157 in 1975/76 a rise of LS. 71.[107]

Table 7.4

Sesame Marketing Costs 1975/76

Based on purchase price at Gedaref market of LS. 4.600 per kantar of 45 kg of undressed sesame seed equivalent to a raw material cost of LS. 106.662 per ton of dressed seed.

	LS. per Kantar		LS. per ton
Local Dealer Expenses			
Purchase of 23.187 kantars of undressed sesame			106.662
Ushur (local tax) 12%		12.799	
Gibana (local tax)	0.150		
Brokerage	0.015		
Loading to cleaning plant	0.080		
	0.245	5.681	
Cleaning charges		1.750	
New jute bags, 13.3 bags at Ls.0.330		4.389	
Storage and insurance		0.600	
Handling and transportation to railway station 13.3 bags at Lsd.0.045		0.600	
Railway freight to Port Sudan		17.000	
Offloading charges		0.200	
			43.019
Local dealer total expenses			149.681
5% profit			7.484
Price delivered store Port Sudan			157.165

Table 7.5 shows the percentage breakdown of the marketing costs given in Table 7.4, Gedaref to the Quay, Port Sudan. The costs do not include the charges for loading on board the ship. It will be noted from Table 7.5 that the producer receives 55 percent of the total while taxes both local and export accounted for 10 percent leaving 35 percent for the costs and margins of the distributor. Perhaps the most striking figure in the table is the 21 percent for the costs of handling and storing the sesame in Port Sudan itself and of course this does not cover the actual loading of the boat. The high figure for Port Sudan is partly reflection on the efficiency of the Sudan Oilseeds Company. The latter incurs considerable storage costs and penalty charges are incurred for failing to fulfil a contract by a specific date. The Company is unable to move the crop quickly to overseas markets. This cannot be blamed on the private sector who deliver sesame to the Company warehouses in Port Sudan, where sesame obviously must pile up there incurring both storage costs and other charges. Table 7.5 is based on a waiting period of four months in Port Sudan.*

---

* The activities of the Sudan Oilseed Company will be discussed in Chapter 9.

Table 7.5

Percentage breakdown of Gedaref marketing costs and margins from auction market to Quay Port Sudan 1975/76*

	%	
Price paid to producer	55	106
Local taxes	8	13.
Marketing costs and margin Gedaref to Port Sudan	14	30
Marketing cost and margin Port Sudan to quay	21	
Export taxes	2	
Total	100	

Source: Computed by the writer from Table 7.4 + charges for Port Sudan, brings total to LS 195.

---

* Not on board ship.

CHAPTER 8

The Price Analysis of Sesame in the Sudan

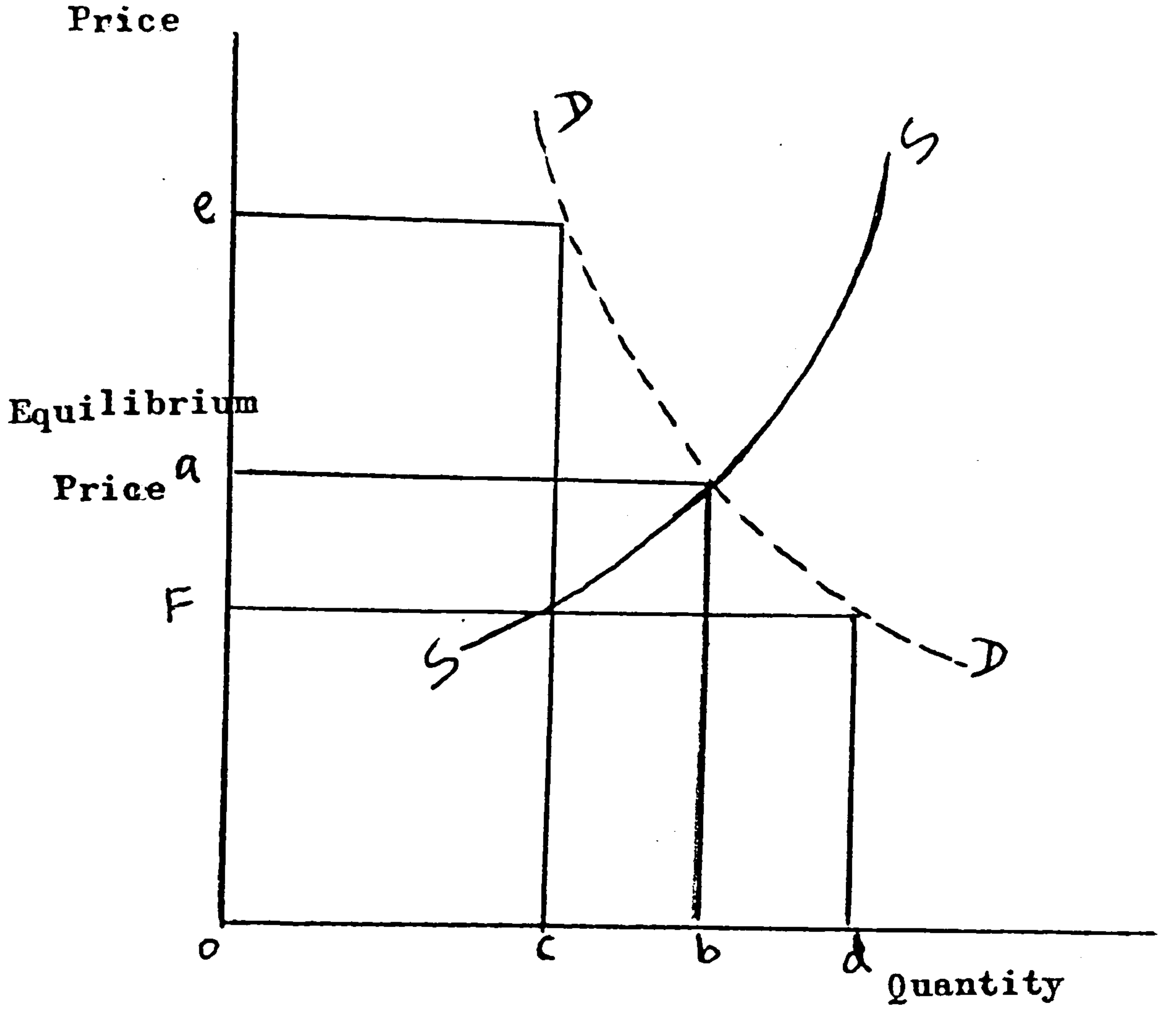
8.1 Introduction

The production of sesame as well as many of the rainfed crops in the Sudan is subject to quite large variations due to factors completely beyond human control; bad weather, pests, diseases and other natural causes are capable of reducing output to a level well below that planned by the Government, while exceptionally favourable conditions can cause production to be well above the planned level. Such unplanned variations in output must be kept in mind when we draw the supply curve for sesame.

The theoretical model was introduced by Cournat in the 19th century to explain the market forces under perfect competition.[108] Demand and supply are each subject to the expansion force of consumers and producers respectively. Both forces are checked by the market price. At the equilibrium price the two forces are equal. For interpretation a supply curve such as drawn in Fig. 8.1 shows the total quantity farmers desire to produce and offer for sale at various prices. If the price were oa, then planned production would be ob, but actual production might well differ greatly from this planned amount, owing to causes beyond the farmer's control. Unplanned fluctuations are assumed to cause output to vary between oc and od, if there were no unplanned fluctuations in production prices would settle down at oa and the quantity at ob. Since the supply coming on to the market fluctuates between oc and od prices will fluctuate between oe and of, if for example the actual production is oc, then a shortage will develop, prices will rise to oe and at this price demand will be reduced to a point at which it is equal

Figure 8.1

Market Forces And The Equilibrium Prices Under Perfect Competition



to the available supply. If on the other hand conditions are particularly favourable actual production will exceed planned production, a surplus will occur and price will fall. If for example production is od then price falls to of, at this price the quantity demanded will be increased sufficiently to take up the entire available supply.

These price fluctuations caused by change in the supply of sesame will bring about price fluctuations which in turn affect farmers' incomes.

To curb such fluctuations the Government of the Sudan followed a system in which some commodity prices are fixed by law and not by supply and demand in a free market. The Sudan Government each season announces separate floor prices for each of the nine major wholesale markets dealing in sesame. The wholesale markets in which these prices are posted are:-

1. Gedaref
2. El Obeid
3. Al Rahad
4. Umm Ruwaba
5. Tandalti
6. Kosti
7. Al Nuhud
8. Nyala
9. Ed Da'ein

The purpose of this floor price is to guarantee to the producer a minimum price which should slightly exceed his cost.

It is the stated policy of the Government that the producer must obtain a sizeable share of the returns from the exports of sesame in order to give him incentive to increase his production both vertically and horizontally. The floor prices, as have been mentioned earlier, are said to be due to the geographical location of a market in relation to Port Sudan. It will be seen from both Table 8.1 and 8.2 that the nearest market, Gedaref has the highest floor prices both in 1973/74 and 1976/77 while the lowest floor price in both seasons are those for Nyala the market furthest away from the Port.(109) By such price differentials the producer in the more remote areas is penalised. If he were mechanised he would be doubly penalised, since he will have to pay higher prices for such production inputs as fuel, machinery and sacks, since they have to be transported a much longer distance from the port of entry. Such inputs would have to bear far higher freight charges than those for areas such as Gedaref which are far nearer Port Sudan. The bulk of the sesame marketed in the Western Provinces however is from traditional producers whose main requirement for imported inputs is sacks. In view of the Government's avowed policy of giving priority to the development of the Western Sudan, these sesame price differentials deserve further consideration. In that the Sheil system is more likely to affect the smaller traditional producers than the large farmers of the modern sector, then it is unlikely that the traditional farmers of the West will achieve the floor prices

Table 8.1

Floor Prices for Sesame Seeds at Wholesale Markets

Season 1973/74

Wholesale Markets	Floor Prices per Kantar LS	m/ms
El Obeid	3	300
El Rahad	3	300
Um Ruwaba	3	300
Kosti	3	300
Nyala	3	200
El Da'ein	3	200
Gedaref	3	400

Source: The Octmay Trading Corporations Books 1975/76
Sudan, Khartoum

Table 8.2

Floor Prices for Sesame seed at Wholesale Markets

Season 1976/77

Wholesale Markets	Floor Prices per Kantar	
	LS	m/ms
El Obeid	4	600
El Rahad	4	650
Um Ruwaba	4	675
Kosti	4	730
Nyala	4	460
El Duein	4	550
Singa	4	740
Gedaref	4	900

Source: The Sudan Oilseeds Company Ltd. 1976 posted in the wholesale markets. The western small cultivator suffers from a further disadvantage which is apt to drive him to sheil in that drinking water shortage during the dry season forces him to purchase water in barrels or tins from local village merchants and often such purchases are made under the sheil system.

8.2 The price policy of the Sudan Oilseeds Company Ltd

The Oilseeds Company is the instrument by which the Government executes its decision as regards the export control of oilseeds. As has been mentioned earlier the Government's avowed policy is to pay the producers a price over and above the costs of production to provide an incentive for increased production. In practice, as it will be argued, this policy is not implemented. The producer has been subject in the form of indirect taxation to excessive deductions in that in 1975 the Company made a profit of LS 2 million, most of which went to Government as the principal shareholder. The producer also bore the incidence of the high costs incurred by the Company, for example the costs resulting from delays in Port Sudan described in Chapter 7.

The floor price is very much bound up with the world prices for the various grades of sesame. The floor price however is a single price which relates to one specific set of specifications which are given in Appendix F1. The world prices however are differentiated according to colour and quality. The Oilseeds Company in determining the price starts by making assumptions about both the world prices for the next season and the qualities of the sesame to be exported. Based on these projections the Company then estimates the prices which the next crop will fetch. These projected prices also serve as guidelines for basing future export contracts. Often these guidelines serve as minimum prices to be charged for sesame sold abroad. Ideally they will be exceeded, the Company policy being to sell on contracts to the highest bidders.

Given an estimated average export price, then the floor price is fixed by a committee on which serve representatives from the Department of Commerce, the Ministry of Finance and National Economy, the Oilseeds Company, and many persons well acquainted with the marketing of oilseeds in the Sudan, but no representatives of the Sudanese National Farmers Union. Criteria used in fixing the prices (beside the estimated world prices) are the Company's expected operating expenses, level of taxes* the marketing costs of the private sector and an allowance for reasonable profit margins.(110)

8.3 Supply and prices of sesame

There are many factors which affect the supply of sesame. The area sown in each year is influenced by the price of sesame in theprevious year, in other word there is a lagged price response, the area sown is also partly determined by the rainfall in May, June and early July. If the rainfall is excessive then it is very

---

*The Company pays over LS 10 per m. ton as an export tax and about LS 4 per ton as a development tax.

difficult for farmers to complete their sesame sowing by mid July, the latest time at which the crop can safely be sown. Sesame yield depends greatly on timeliness of sowing. Yields also are partly determined by the rainfall in August and September. Too little rainfall leads to the shrivelling up of the plant while too much rain also can be fatal. When the farmer decides to increase his area of sesame because the prices were high in the previous year, he cannot depend on soil moisture conditions being ideal for his new crop. Even if the moisture conditions are all right he still faces the problem of harvesting the crop before the seeds shatter. Normally losses from shattering are considerable; to harvest a larger area than normal increases the risk. Besides these hazards the farmer faces the risk of heavy losses from pests and diseases.[111] *

The official floor prices are not known until a month or so before harvest. This lack of information adds to the farmer's problems, especially as regards forward sales by the sheil system. Also this uncertainty makes it more difficult for the farmer to decide how much to pay for scarce labour at harvest in order to minimise the risk of shattering. If sesame commands a high price it might well pay a farmer to engage a large gang of labourers to complete the harvest as quickly as possible. To do this a farmer must plan in advance and lay in the necessary food and water supplies. H

---

* See also page 152 for a fuller discussion of these cultural problems.

then may well have to arrange transport for his casual workers coming from a distant area. If he decides that it is not worth his while to do all these arrangement in advance then higher losses from shattering are probably inevitable and he takes a risk in making his decision. Uncertainty about the price also of course affects the amount of effort put into other operations especially weeding, A farmer is more inclined to carry out a second weeding if he knows that the cost will be recovered by the extra revenue earned by the subsequent addition to the value of the yield.

8.4 Purchasing of sesame and volume of marketing in domestic markets

The marketing year starts in late October when the first crop comes off the field. The volume marketed builds up to a peak in November-December as normally most of the crops are sold either directly at harvest or a few weeks later. Most farmers are short of money and sell quickly. In the crop year 1974, 93% of the total estimated sesame crop was sold in the Gedaref area through the auction market at harvest time. The total crop production figures used by the writer in this calculation are those of MFC and the volume of produce marketed was extracted by the writer himself at Gedaref market. Those farmers who grow dura as well as sesame rely on the proceeds from the sesame crop to cover costs of dura harvesting.

After the direct harvest period little sesame is left on the farms and the seed entering the local markets mainly comes from local traders who have held it for a period of time hoping for a rise in prices. Whether prices rise above the floor price in the months subsequent to harvest depends on supply and demand. The person holding a crop cannot be guaranteed a profit on his transaction.

The private sector as has already been mentioned in Chapter 7 dominate the internal marketing of sesame whether the crop is destined for export or home consumption. If the first then the private sector organizes the assembly of the produce from the farm and its delivery to the Oilseeds Company warehouses in Port Sudan if the second then the trade is entirely in private hands. Before the Oilseeds Company was established in 1974 the export trade was dominated by a few large merchants based mainly in Port Sudan and Gedaref. These merchants operated through a chain of local agents some of whom were smaller merchants in local towns in the production areas and some were even village shopkeepers. The Sheil system was important and the large merchants provided the necessary funds to the local agents for forward purchase of the crop. The Sheil system of course has a notorious reputation with the merchants cast as the villains of the piece. The writer however in the course of discussions with both the large merchants and local agents heard the other side of the argument. Farmers it is alleged are notorious for their failure to fulfil their obligations under the system. Often the crops are said to have failed while in practice they have not. In fact the character given to the farmers was exceedingly bad both for the failure to deliver crops, repay debts and for the evasion of taxes.

As has been seen in Chapter 3 the Agricultural Bank of the Sudan also experienced great difficulties in retrieving loans from farmers in spite of the fact that a farmer in its debt is under an obligation to deliver his crop to the local stores of the Bank. In despair the ABS has started a contract combine harvesting service which its debtor farmers are supposed to use so that the Bank can obtain the true yield of the crop, and secure delivery.* In Gedaref also much is said about the smuggling activities of some of the larger producers especially those with farms convenient for trading over the Ethiopian border.**

30 percent of the total sesame produced in Sudan in the year 1976/77 (the latest figure available) was produced in the Gedaref area and much of this crop went through the Gedaref central auction market. The writer was able to collect details of the amount purchased by different merchants in the harvest months of October and November 1974.(112) A total of 393,000 Kantars went through the market during these two months.*** The crop was purchased by 96

---

* It is very difficult especially in underdeveloped countries to monitor the effectiveness of the enforcement of Government regulations.

** It is said that leases for these farms are illicitly sold at a large premium. In practice land is leased from MFC at a modest rental of 5 piasters per feddan annually and that such leases are not transferable. If a tenant gives up, then the land reverts to the MFC, in fact this does not happen. For farms in a popular location, farmers can receive considerable illicit payments to leave their farm and merely retain the tenancy as a nominee. Farms bordering the Wad Medani, Gedaref tarmac road also exchange at a premium.

** This represents 58 percent of the total quantity sold at the market in 1974/75. (For details see Appendix F_3).

merchants in all. Figure 8.2 gives the Lorenz curve of this data. This curve illustrates the degree of concentration in the marketing of sesame at Gedaref. This concentration is shown by the difference between the actual and 45° line. If all the merchants concerned had an equal market share then the curve would be the 45° line. (113) As this is not so then the gap between the line and the curve shows the extent of concentration. There is obviously inequality. It will be seen from the figure that just over 8 percent of the merchants purchased 40 percent of the total produce sold.* This 8 percent represents 8 actual merchants who have been interviewed by the writer. This includes three Coptic merchants who are related to one another and these three together purchased 18 percent of the total produce sold. Included in the 8 is the owner of the leading sweet factory in the country who purchased 3 percent of the total sale. The remaining big four are of Northern Sudanese origin and not related. They purchased mainly to resell to the Oilseeds Company and delivery to the latter's warehouses at Port Sudan. The 88 smaller operators are responsible for about 60 percent of the quantity and either bought to resell to the Oilseeds Company or for sale for the modern oil mills in Khartoum North. Small quantities would be bought for pressing locally in traditional camel driven oil mills.**

The figures so far discussed relate to the year 1974/75. Table 8.3 gives details of the total sales of sesame at Gedaref auction

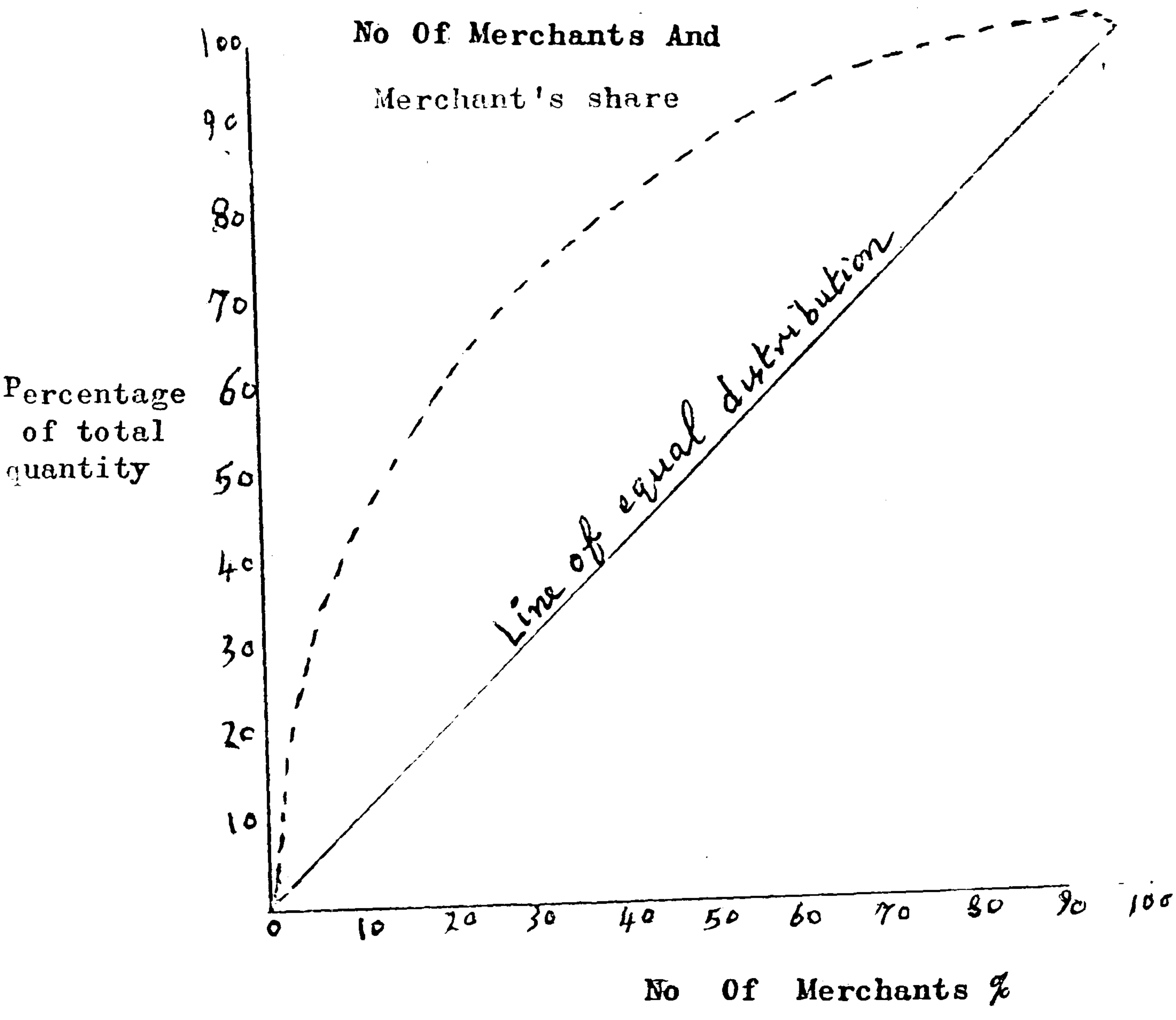
---

* For details see Appendix F3, Appendix F4 and Appendix F5

** See Appendix F3 for the quantities of sesame purchased locally by merchants at Gedaref auction market during October and November 1974.

Figure 8.2

Lorenz Curve



Source : Appendix F5

market for this latter year together with figures for the four previous years. It will be noted that sales fluctuate from year to year presumably because of the variations in the annual output of the crop. It will also be seen that there is a steady rise in prices. Table 8.4 gives similar details for sales of sesame at El Obeid market in Kordofan Province a major production area. It is difficult to estimate the actual supply of sesame from Kordofan and other Western Provinces. Consequently one cannot assess with any degree of accuracy the total percentage of the crop which goes through the primary markets. Most of the crop is produced by the traditional sector. Much of the sesame however is consumed locally, being pressed in traditional camel mills.

Table 8.5 gives details of the quantities of sesame passing through the major primary markets in 1966-1971. This table is inserted here to demonstrate the relative importance of markets in the three major producing provinces. Unfortunately up to date figures for the Blue Nile Province are not available mainly due to changes in the provincial boundary. More recent figures for Kassala and Kordofan Provinces are given in Table 8.3 and Table 8.4. It will be seen from Table 8.5 that the markets of Kassala Province accounted for nearly 64 percent of the total sales in the three Provinces in 1966/67. This share however declined to just under 50 percent in 1970/71. Kordofan Province is responsible for around 36 percent in the earliest year and for about 43 percent in the last year shown in the table. The Blue Nile has only a small share compared with the other two Provinces.[114] The total sesame sales vary from year to year

Table 8.3

Sesame Sale at Gedaref Auction Market (Kassala Province)

for 1970/71 - 1974/75

Year	Quantity (Kantars)	Average price per kantar Ls - m/ms
1970/71	691,691	2.534
1971/72	1,081,393	2.603
1972/73	1,614,774	3.107
1973/74	1,026,579	3.836
1974/75	675,071	5.016

Source: Gedaref Auction Market

Table 8.4

Sesame Sale at El Obeid Auction Market (Kordofan Province)

for 1970/71 - 1974/75

Year	Quantity Kantars	Average Price per Kantar LS
1970/71	265,775	2.689
1971/72	377,218	2.714
1972/73	531,631	2.924
1973/74	386,000	4.133
1974/75	412,317	5.186

Source: El Obeid Auction Market

Table 8.5

Sesame Sales in Major Markets 1966/7 to 1970/1 (Kantars)

Province	1966/7	1967/8	1968/9	1969/70	1970/1
Blue Nile					
Singa	70260	79376	76881	63994	33735
Other markets	23594	152649	67280	58340	120775
Total	93854	232025	144161	122334	154510
	(5.2%)	(10.8%)	(7%)	(6.4%)	(7.3%)
Kassala					
Gedaref	621768	541626	763363	703070	691691
Other markets	340233	375594	518044	494111	370828
Total	962001	917220	1278407	1197181	1061519
	(63.9%)	(46.7%)	(62.5%)	(62.4%)	(49.8%)
Kordofan					
El Obeid	113616	237685	198077	169397	265775
Um Ruaba	25983	383503	288422	267785	407706
Other markets	309543	194088	136746	162369	240757
Total	449142	815277	623245	599551	914238
	(36%)	(41.5%)	(30.5%)	(31.4%)	(42.9%)
Grand Total	1504997	1964522	2045810	1919066	2130267
	100%	100%	100%	100%	100%

Source: Department of Statistics.

according to the size of the local production. There is insufficient evidence in Table 8.5 of any underlining trend for anyone province to increase or decrease its market share.

8.5 The Wholesale Price of Sesame

The discussion of wholesale prices should start with those prevailing in the Gedaref market. The first in the present analysis is to investigate possible underlying price trends over time. A correlation had been carried out using yearly average prices data for the period 1968 to 1975 (8 years) for Gedaref auction market The results obtained and shown in Appendix F6 indicate a strong relationship between prices and time.* The period covers the change over from the private to the public sector and of course on the international market the period covers the great explosion in commodity prices. The fixed floor prices have to some extent reflected the upward movement in world prices. But as has been mentioned earlier the entire benefit of these prices has not been passed on to the producers.** Figure 8.3 shows the linear projection and the actual observed prices in Gedaref market. The linear equation gives a figure of approximately 36 piasters rise for a kantar every year. A similar exercise was carried out using annual data for the same period of time for El Obeied market in Kordafan Province. It was hoped that similar analysis could be made for other leading markets in the Sudan but unfortunately data

---

*A relationship more significant than that observed for dura.

**See page 198.

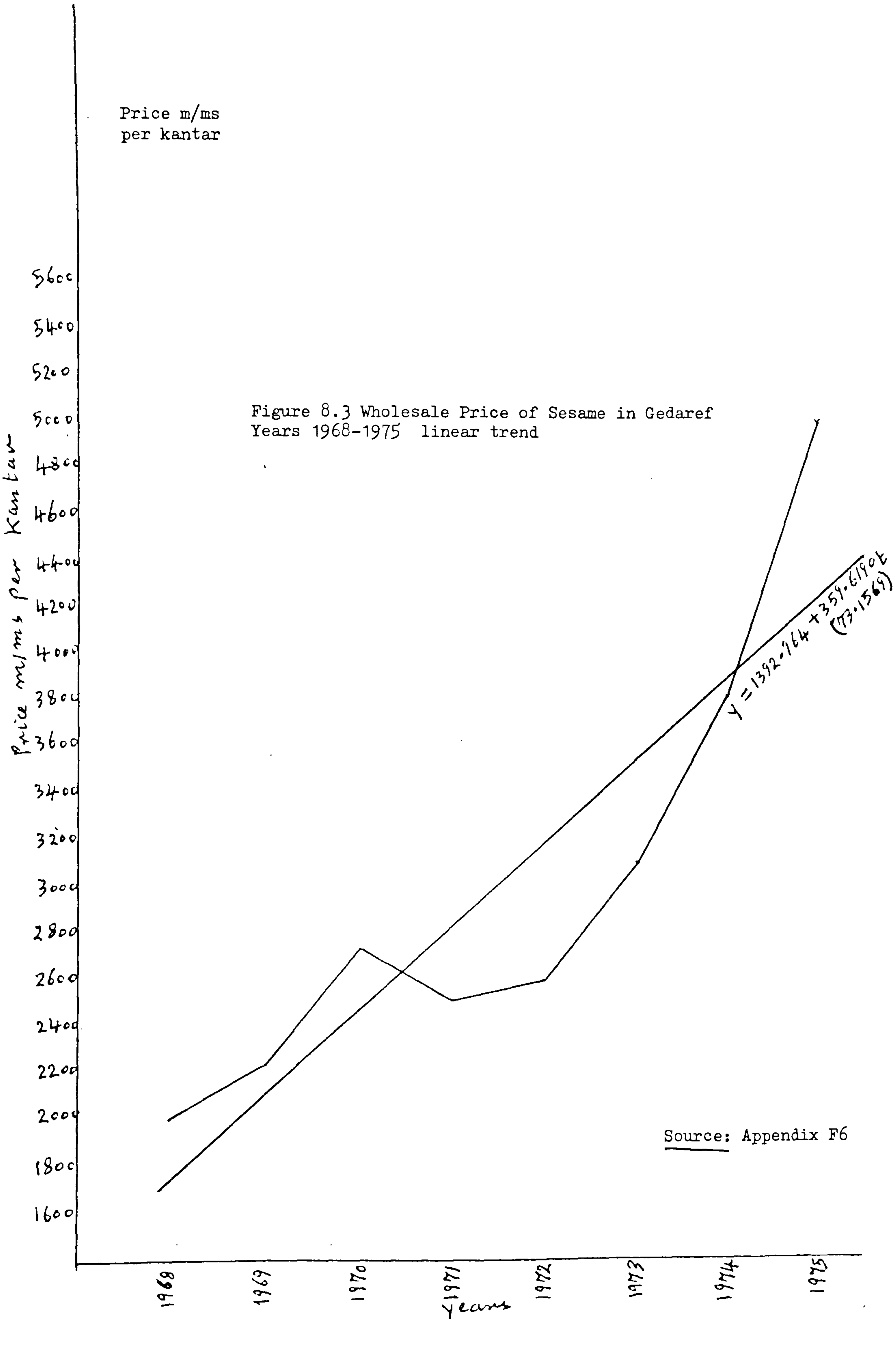


Figure 8.3 Wholesale Price of Sesame in Gedaref
Years 1968-1975 linear trend

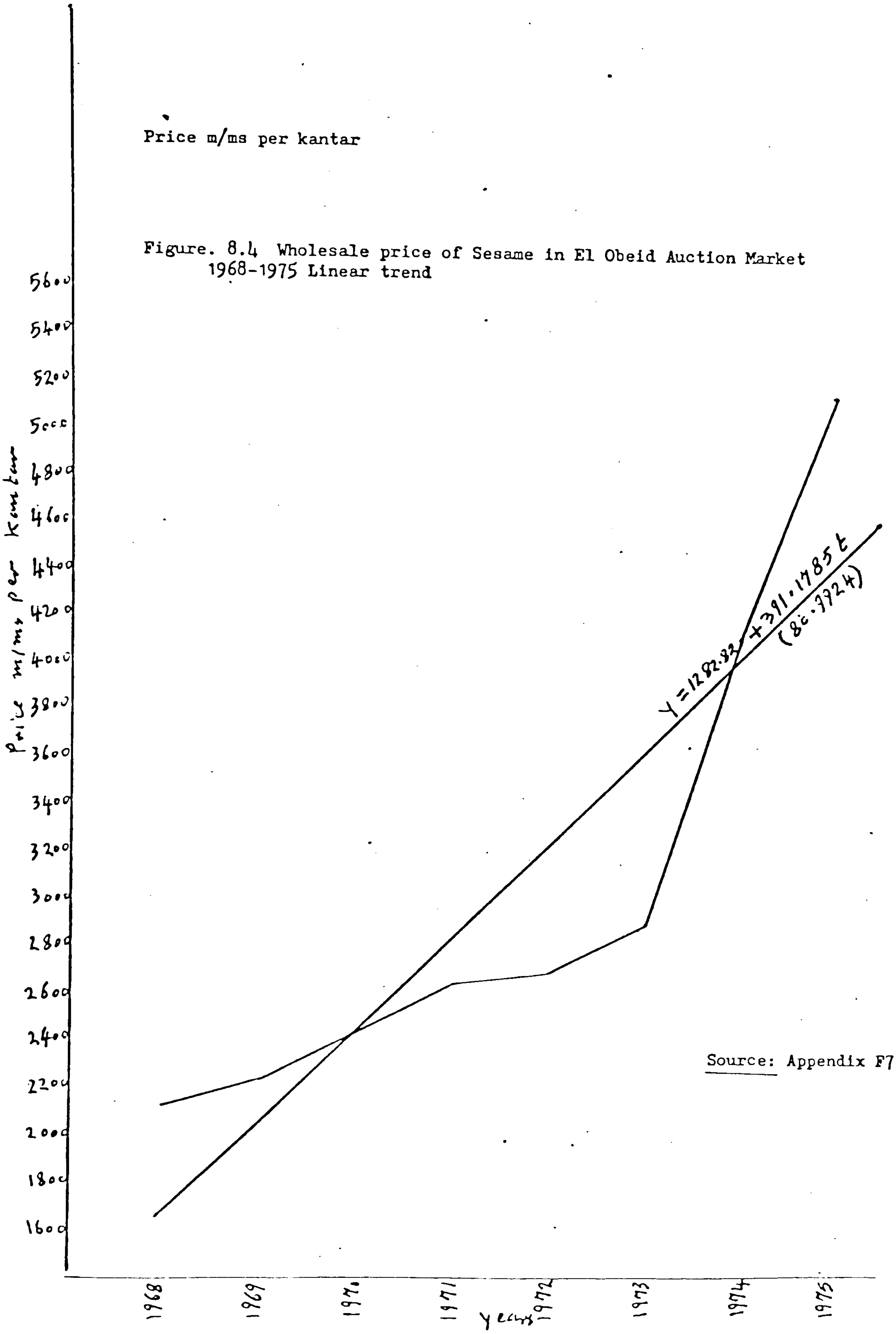
was unavailable. The results for El Obeid auction market are given in full in Appendix F7. Again there is a similar significant relationship between the prices and time and the linear equation gives a figure of 39 piasters per kantar, for the average price increase per year - very similar to the 36 piasters returned by the Gedaref sample.

Figure 8.4 illustrates the calculated and observed prices for El Obeid. The shape of the observed curve and its position as regards the calculated linear projection line are very similar to those relating to Gedaref (see figure 8.2).

Table 8.6 and Table 8.7 give the data used in these statistical analyses together with the monthly average prices from January 1968 to December 1975. It will be seen from Table 8.6 July, August and September are dead months in El Obeid and more or less dead months as regards Gedaref. These three months act as a division between one crop year and another. Analysis of the monthly prices for 6 crop years (1968-1974) shows that in Gedaref the lowest as would have been expected, are in the harvest month October to December and over the period studied no particular month emerges as that with the lowest prices. High prices are returned for May and June; a seasonal distribution which shows a price rise from the harvest peak to the end of season depletion of stock. If a farmer managed to retain his crop from harvest time (November) to May he would in these six years figures obtain an average price increase of 25-33 percent.

Price m/ms per kantar

Figure. 8.4 Wholesale price of Sesame in El Obeid Auction Market 1968-1975 Linear trend



Source: Appendix F7

Table 8.6

The Wholesale prices of sesame in Gedaref LS/Kantar for 1968–1975
(The ton = 22.26 Kantar)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
1968	2.303	2.327	2.143	2.096	1.921	1.874	-	-	-	1.922	1.922	1.954	2.117
1969	2.125	2.162	2.219	2.077	2.186	-	-	-	-	2.228	2.360	2.607	2.246
1970	2.937	2.978	2.974	2.946	3.034	2.984	2.986	2.551	-	2.242	2.284	2.310	2.748
1971	2.344	2.358	2.403	2.517	2.511	2.794	2.791	-	-	2.636	2.479	2.511	2.534
1972	2.539	2.554	2.579	2.600	2.636	2.610	-	-	-	-	-	-	2.603
1973	2.883	2.845	2.892	2.889	2.847	2.884	-	-	-	3.510	3.392	3.822	3.107
1974	3.800	3.680	3.918	3.540	3.746	4.700	-	-	-	3.821	3.722	3.601	3.836
1975	4.900	5.088	5.137	4.526	5.300	5.038	-	-	-	5.000	5.037	5.122	5.016

Source: Gedaref Auction Market

Table 8.7 The Wholesale prices of sesame in East Kordofan LS/Kantar for 1968 - 1975

(The ton = 22.26 kantars)

LS. m/ms

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
1968	2.670	2.571	2.538	2.595	1.811	1.724	-	-	-	1.822	1.821	1.952	2.167
1969	2.511	2.122	2.313	2.215	2.192	-	-	-	-	2.312	2.350	2.617	2.070
1970	2.670	2.571	2.538	2.595	2.518	2.590	-	-	-	2.319	2.038	2.320	2.462
1971	2.749	2.646	2.672	2.733	2.615	2.703	-	-	-	2.760	2.622	2.663	2.689
1972	2.839	2.815	2.690	2.701	2.720	2.760	-	-	-	2.687	2.706	2.507	2.714
1973	2.670	2.645	2.525	2.429	2.585	2.500	-	-	-	3.680	3.540	3.746	2.924
1974	4.432	5.114	3.843	4.173	4.155	4.109	-	-	-	3.993	3.779	3.600	4.133
1975	5.410	5.081	5.102	5.227	5.353	5.274	-	-	-	5.214	5.022	4.992	5.186

Source: El Obeid Auction Market

A similar analysis for the El Obeid [illegible] prices shows that again the lowest prices occurred in the harvest month with November as the lowest individual month in three out of the six years concerned. Surprisingly the highest price months were January and February with January the highest in four out of six years. The writer ascribes the January peak to two factors, the preoccupation of farmers with dura harvest and the rush to complete the buying of supplies by local oil mills.

CHAPTER 9

World Production and Trade in Oilseeds

9.1 Introduction

The writer's subject is sesame production and marketing but sesame is one of the major oilseeds in world trade and the demand and supply situation is very much affected by those relating to other oilseeds, many of which have similar usages to sesame seed. For this reason the writer found that it is incomplete to discuss world trade in terms of sesame only; the other oilseeds have to be taken into consideration as well.

The major oilseed is soya bean and the soya bean situation has its repercussions on the world prices. Soya beans represented 80 percent of the oilseeds entering world trade against only one percent for sesame in 1975 (see Table 9.1). Two countries, the United States and Brazil dominate the production of soya beans which can be grown both in temperate and tropical countries, while the remaining oilseeds are largely produced by developing countries. Production in the LDC's however is concentrated in 16 countries who between them account for 70 percent of LDC's total. Of the oilseeds other than soya beans, the United States is a major producer of groundnuts, cottonseed and safflower seed.(115) These together with the American predominance in soya beans means a developed country has a decisive influence on the world supply position.

The wider range of climatic conditions under which oilseeds can be grown and the relative ease with which one can be substituted for another in manufacturing has major implications for the producers of individual oilseeds crops grown in LDC's.

Table 9.1 Exports of Selected Oilseeds 1965, 1970, 1975

(Million tons)

Type of Oilseed	1965		1970		1975	
	Quantity	Percentage of Total	Quantity	Percentage of Total	Quantity	Percentage of Total
Soyabean	6.97	57.7	12.62	72.3	16.46	80.0
Groundnuts	1.36	11.3	0.99	5.7	0.89	4.3
Copra	1.36	11.3	0.91	5.3	1.08	5.2
Rapeseed	0.68	5.6	1.23	7.1	0.97	4.7
Palm Kernels	0.66	5.4	0.46	2.6	0.34	1.7
Cottonseed	0.46	3.8	0.48	2.7	0.20	1.0
Sunflower seed	0.24	2.0	0.48	2.7	0.35	1.7
Sesame seed	0.18	1.5	0.22	1.2	0.21	1.0
Safflower seed	0.18	1.5	0.08	0.4	0.08	0.4
TOTAL	12.09	100.0	17.47	100.0	20.58	100.0

Source: FAO Trade Yearbook 1975 percentages computed by the writer.

All this as has been mentioned earlier has a repercussion on prices.

World production of oilseeds has increased substantially in recent years showing an increase of some 43 percent over the decade 1965 — 1975, (the latest available ten year period). The actual increase is from 123.2 million metric tons in 1965 to 175.9 million metric tons in 1975. Table 9.2 illustrates the levels of production and the relative shares of the major oilseeds.[116] No major changes have occurred on the ranking of individual oilseeds in the last decade despite the fact that some have recorded larger proportionate increases in production than others. The highest rate of production is returned by oil palm and soya beans. In the case of the former the bulk of increase comes from Malaysia where the Government had a highly effective policy of increasing the area under oil palm. With the less important oilseeds, rapeseed expanded by 33 percent.* The latter is a temperate crop and the area grown in Western Europe has increased significantly. Safflower, the lowest ranking (see Table 9.2) with less than 1 percent share in world production in 1975, has also doubled its output between 1965 and 1975 because of increased production in India and Mexico. The demand for safflower oil in some developed countries has been influenced by the growth in health food shops.**

Cottonseed production of course is a by-product of cotton production and the latter has not increased significantly largely

---

* Rapeseed offers a conventient cash crop in crop rotations and is easily mechanised.

** Safflower oil is less likely to cause heart disease than some other vegetable oils.

Table 9.2

Production of Major Oilseeds

(Million tons)

Type of oilseed	1965			1970			1975		
	Quantity	Percentage of total	(1965) (base year)	Quantity	Percentage of total	(1965) (base year)	Quantity	Percentage of total	(1965) (base year)
Soyabeans	36.5	29.6	100	46.5	32.7	127	68.4	38.9	187
Coconuts	26.4	21.5	100	26.3	18.6	99	29.6	16.8	112
Cottonseed	22.1	17.9	100	22.2	15.6	100	23.0	13.1	104
Groundnuts (in shell)	16.0	13.0	100	18.4	12.9	115	19.1	10.9	119
Sunflower seed	7.9	6.4	100	9.9	6.9	125	9.6	5.5	121
Oil palm	6.8	5.5	100	9.2	6.6	135	15.1	8.6	222
Rapeseed	5.3	4.3	100	6.7	4.7	126	8.1	4.6	153
Sesame seed	1.7	1.4	100	2.2	1.5	129	2.0	1.1	118
Safflower	0.5	0.4	100	0.7	0.5	140	1.0	0.6	200
TOTAL	123.2	100.0	100.0	142.1	100.0	115	175.9	100.0	143

SOURCE: FAO Production Yearbook, percentages computed by the writer because of competition from artificial fibres.[117] Groundnuts recorded only relatively small increase in production and its share of world total consequently fell slightly but its ranking remained unchanged.

Sesame seed which has been mentioned earlier is of minor importance in the overall oilseeds position and like groundnuts suffered a slight fall in its percentage share of world production.[118] It is of significance of course that the major increase in output is that of soya beans and the extra quantity is over 15 times that of the total sesame seed produced in 1975.

Production of oilseeds is comparatively concentrated geographically. Figure 9.1 indicates the position as regards the principal oilseeds producing countries subdivided between developed, developing and centrally planned economies. In aggregate some twenty four countries, of which sixteen are developing economies account for over 80 percent of world oilseeds production. Also other developing countries may still have a potential for expanding and upgrading their oilseeds processing industries.

World trade in unprocessed oilseeds is relatively small in comparison with total production. In 1975 some 11 percent of global production entered international markets in the raw form. The predominant feature of oilseed trading is its dominance by soya bean which accounted (as shown in Table 9.1) for 80 percent of the total volume of all oilseeds traded in 1975. Although the total volume of all oilseeds traded has risen from 12.0 million tons in 1965 to almost 21.0 million tons in 1975, the difference is almost entirely due to the growth of soya beans exports. The volume of other oilseeds has

Figure 9.1 Principal Producing Countries of Oilseeds

Type of Oilseed	Developed economy	Developing economy	Centrally planned economy
Soyabeans	United States	Brazil	China
Coconuts		India, Indonesia, Philippines, Sri Lanka	
Cottonseed	United States	Argentina, India, Pakistan, Peru, Turkey	China, USSR
Groundnuts	United States	India, Nigeria, Senegal, Sudan	China
Sunflower		Argentina, Turkey	Bulgaria, Romania USSR
Oil palm		Indonesia, Ivory Coast, Malaysia, Nigeria, Zaire	
Palm Kernels		Brazil, Malaysia, Nigeria, Zaire	
Rapeseed	Canada, France	India	China, Poland
Sesame		Ethiopia, India Mexico, Sudan	China
Safflower	United States	India, Mexico	

Source: extracted by the writer from FAO Production Yearbook either declined or remained comparatively stable.*(119)

9.2 World Exports of Sesame Seed

As has been mentioned early only a very limited proportion of sesame seed production enters international trade. The developing countries comprise the major exporters of sesame seed, and normally account for well over 90 percent of all supplies. Sudan and Ethiopia are the largest exporters with 55 percent of the present market. Mexico and Thailand, both minor exporters have increased their share of total world exports from less than 3 percent of the market in 1965 to over 8 percent in 1975. Leading producing countries such as India, China, Venezuela and Burma export only small amounts of sesame seed, instead they utilize their sesame for oil production for both their home consumption and export.

Figure 9.2 indicates the world production, world exports and Sudan exports from 1960 to 1974. Sudan exports represent about 39 percent of total world exports and Ethiopia about 16 percent. Figure 9.3 shows sesame seed exports from major exporting countries and estimated world total exports during the same period.

In 1975 despite a decline in volume compared with 1970, Japan maintained its role as leading importer but was closely followed by Italy, U.S.A. and Egypt. Greece, Israel, Lebanon and U.S.S.R. all continued to import significant quantities and in 1975 accounted for

---

*Production of oilseeds 1965-1975 by major producing countries are shown in Appendices G1, G2, G3, G4, G5, G6, G7, G8, G9 and G10.

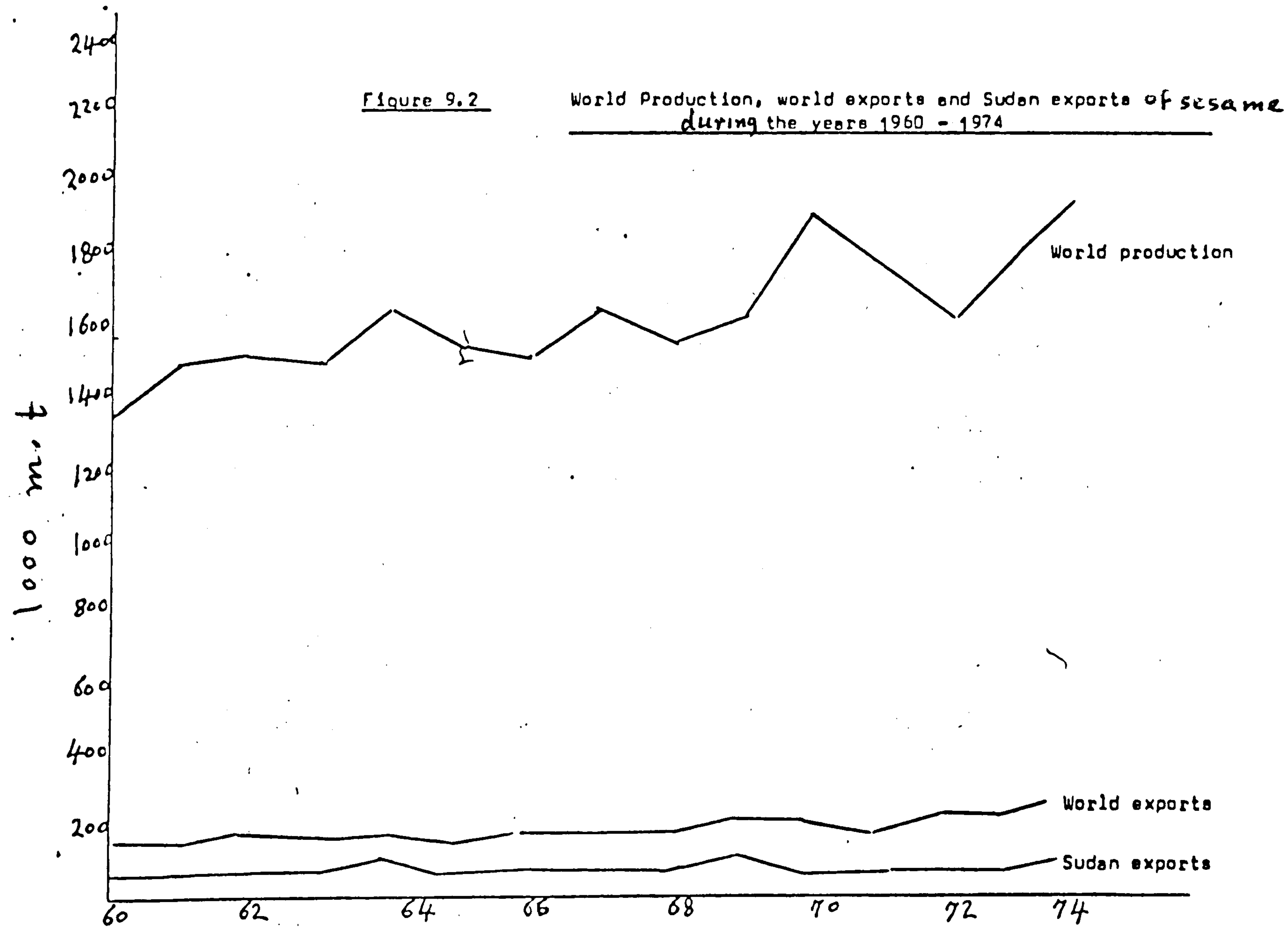


Figure 9.2 World Production, world exports and Sudan exports of sesame during the years 1960 - 1974

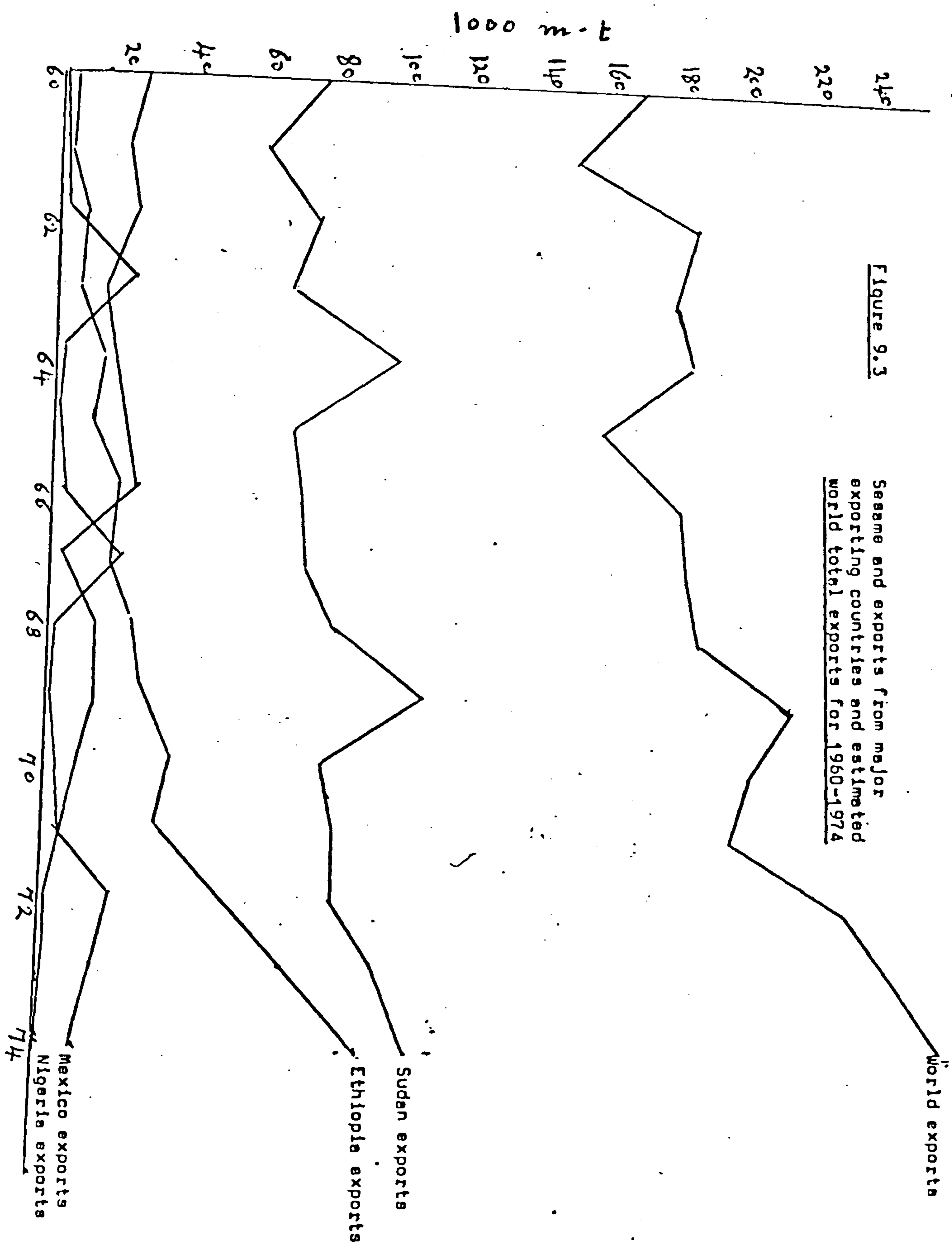


Figure 9.3

Sesame and exports from major exporting countries and estimated world total exports for 1960-1974

17 percent of all imports. Figure 9.4 indicates sesame seed imports into major importing countries for 1966–1974. Japanese imports increased from 39,682 metric tons in 1967 to 56,040 metric tons in 1973 at an average annual rate of approximately four percent. Egypt's imports have increased from 7,397 metric tons in 1966 to 15,000 metric tons in 1974 at an annual average rate of 9.5 percent. United States imports have also increased at an annual average rate of 6 percent since 1966.

The major importers of Sudanese sesame seed are Italy, Japan Egypt, Jordan and Lebanon. The U.S.S.R. and U.S.A are relatively small buyers since most of their imports are used in bakery and confectionery items which demand larger Latin American seeds. The African sesame seeds are smaller and better utilized in producing oil. Japan and Italy import sesame mainly to produce oil. Table 9.3 shows exports of sesame seed by principal producing countries while Table 9.4 indicates imports of sesame by principal importing countries for 1960–1975.[120]

9.3 Exports of Sesame Seed from Sudan

Sudan is the largest world exporter of sesame seed. As has been mentioned earlier Sudan is responsible for about 39 percent of total world exports (Table 9.3). Sudan exports sesame to nearby Arab countries as well as to Western Europe and Japan. Table 9.5 shows Sudan's sesame exports by country in terms of values and quantities for 1976. It will be seen from the table that Egypt is the largest importer of Sudanese seed followed by Japan, Italy and Syria.*

* For the previous years Japan and Italy are the largest importers (see Table 9.4).

Figure 9.4 Sesame seed imports into major importing countries for 1966–1974

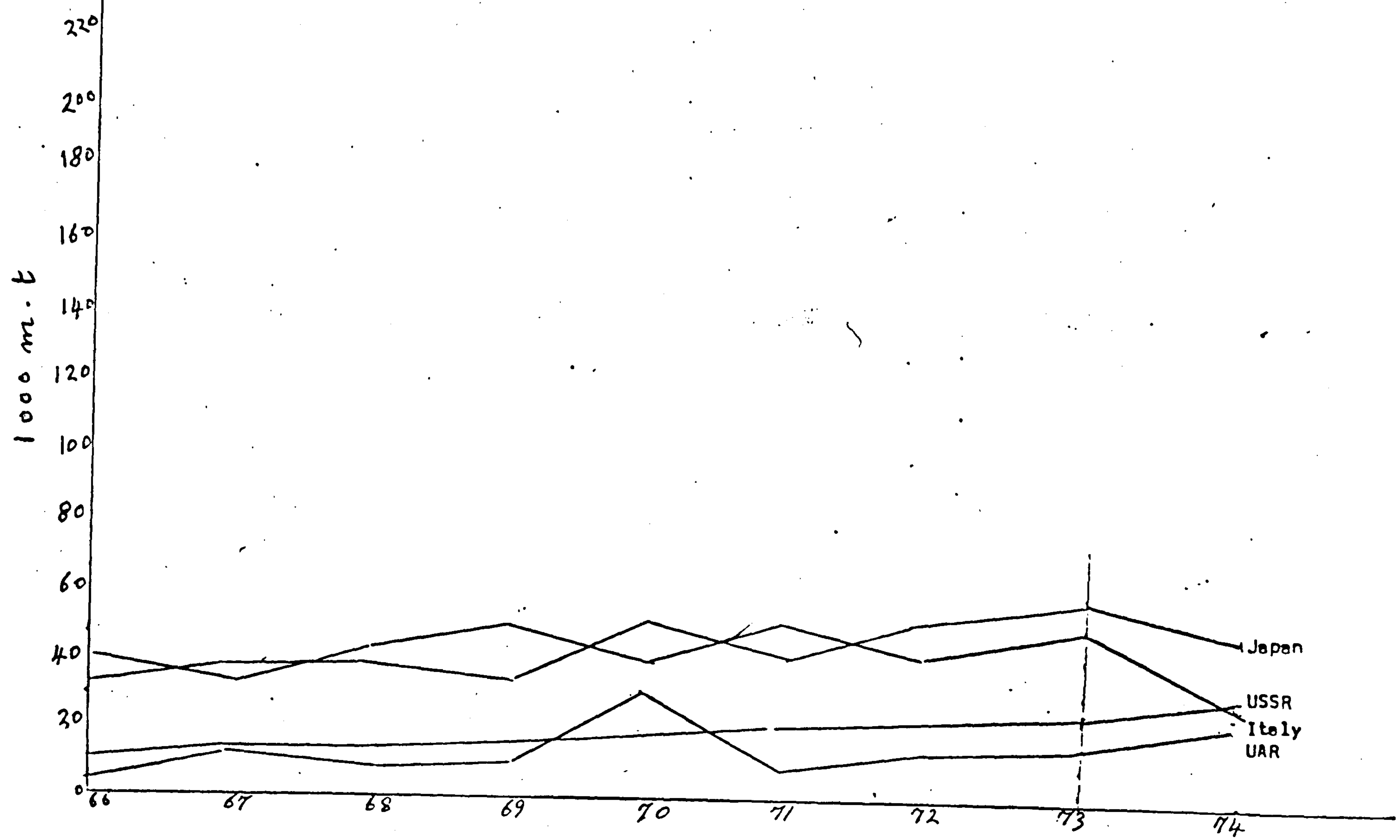


Table 9.3

Exports of Sesame by principal producing countries for specified years (1960 - 1975) Quantity in M.T.

Country	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Sudan	76367	62800	77220	69649	101410	70588	73663	75856	84725	112602	81890	86260	86522	92400	107852	56694
Nigeria	27717	21005	24453	15718	18208	20500	25000	3293	14310	16100	12100	7449	3000	1042	3248	4156
Ethiopia	13925	10630	2356	8557	14350	21500	60300	19800	26700	30800	39700	36076	57891	72200	84600	60302
Mexico	-	-	1866	22726	1677	378	2954	22005	2216	2920	-	5796	15811	17095	15000	11926
Cambodia	3248	3036	7856	5686	1300	8903	4794	6628	4500	4000	7000	5000	1000	413	-	-
Hong Kong	3344	4233	6205	5828	5227	7450	5994	4630	3023	3527	5403	2605	1680	1693	2198	1200
Indonesia	1085	1574	2030	2000	2000	5790	6790	5800	3380	2150	-	-	1517	6737	3010	3000
Nicaragua	9023	8086	5699	5667	6182	5531	4960	6993	9379	7258	5900	4859	4026	1770	4800	-
China P.R.	-	-	-	1637	695	3755	3054	1590	1233	1750	700	1000	-	-	-	-
Singapore	53	241	336	2660	1570	1303	1317	1964	2704	2410	2807	2222	3161	7614	3170	6704
Thailand	2911	4045	7057	3748	2618	3691	5288	3576	3942	3800	5410	9022	8493	6435	13401	6500
Central A.R.	1080	490	792	1334	2075	2735	673	887	-	69	-	-	-	-	-	-
Mozambique	818	2044	3834	1367	1968	1447	1708	1800	2492	3513	1312	2626	1317	2621	3700	2000
Kenya	1493	1482	699	1227	2	562	1444	718	1507	679	787	1047	368	164	1	281
Ivory Coast	-	241	-	1293	965	151	924	127	4	-	250	400	10	400	-	-
Angola	987	919	926	1070	1991	1533	1776	1504	1131	858	2254	1162	627	736	750	400
Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Export M.T.	173276	154337	179836	176320	184498	150606	178047	188313	189744	218275	197902	165524	185423	211320	241730	153163

Source: FAO Trade Yearbook 1960-1975

Table 9.4

Imports of Sesame by principal importing countries for specified years 1960 - 1975 M.T

Country	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Japan	27916	22199	28202	32932	33430	33357	37688	39682	39191	34050	52705	40682	51404	56040	49655	39374
Italy	25712	19765	20687	32507	26789	31216	40704	35685	45197	52122	40289	50452	41796	49607	19003	24912
Taiwan	-	-	-	-	3395	997	964	2621	3493	2862	5000	-	-	-	-	-
Venezuela	13740	15766	21026	14301	14953	1000	2620	2257	-	-	-	-	-	-	24000	2
U.A.R.	6325	11862	15745	9538	6910	5000	7397	15496	9162	10015	19000	8931	12873	10618	15000	30000
U.S.A.	7882	10385	9134	11485	11057	12564	13712	16373	15419	17608	19400	20612	21419	23550	25742	20248
Czechoslavkia	3376	2000	312	316	314	7838	99	-	-	-	-	-	-	-	-	-
Hong Kong	4665	3910	6716	7172	5535	6548	6123	5892	5162	3709	7866	3341	2602	2758	2510	1715
Syria	2164	3292	2910	3947	3500	1512	2907	1397	877	1448	-	2108	1200	5000	1595	1600
Poland	1759	997	240	772	1687	8496	3110	1546	3826	3509	1158	6718	3020	3385	2063	3000
Denmark	2142	815	2027	1661	1907	94	1790	1602	1453	1816	-	2019	2057	2187	18	1824
Jordan	1628	4719	4397	4060	4418	3359	5063	3938	3740	3407	-	6801	2536	4309	3500	1769
Lebanon	3820	5372	5056	-	5113	4353	4799	3970	5421	-	-	6878	6000	5000	6000	6400
USSR	6000	12000	8200	10300	12200	7900	100	7500	9300	12100	8700	8900	6400	5000	5100	8435
Singapore	3625	3314	3701	-	1609	1246	1064	1405	786	598	919	1213	4008	7465	4440	9683
Tunisia	385	1078	1104	1486	654	694	790	506	718	529	515	989	1481	1797	1800	2200
Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Imports M. T.	115776	135696	154277	152777	144486	155435	153410	162423	180790	193927	204780	159644	156796	176716	160426	126285

Source: FAO Trade Yearbook 1960 - 1975

Table 9.5

Sudan Sesame Seed Exports and Value by Country
Year 1976

Country	Quantity M.T	Value LS
Egypt	27,685	5,304,527
Japan	23,199	4,318,596
Italy	17,276	3,026,162
Syria	5,923	1,144,894
China P.R.	5,970	1,059,845
Greece	4,415	840,617
Jordan	4,301	798,999
Kwait	2,214	416,043
China Taiwan	1,218	233,822
Libya	1,085	202,231
Poland	518	103,522
Lebanon	1,541	308,685
P.R. of S. Yemen	987	192,933
Tunisia	740	144,837
German F.R.	994	128,633
Netherlands	1,000	53,760
Saudi Arabia	245	49,296
Algeria	326	60,464
Denmark	500	27,000
Belgium	100	21,500
USSR	2,441	453,641

Source: Foreign Trade Statistics
Ministry of National Planning - Department of Statistics

The writer studied export trends over time, for the Sudan, Figure 9.5 indicates exports from 1960 to 1975 (see Table 9.6) and illustrates the point made earlier about the wide fluctuations in the quantity exported between one year and another. The writer carried out a regression analysis between time and the quantity exported, and discovered that there is a trend for exports to rise over time. A similar exercise was performed with the total value of exports and time. Total value of exports is determined by the physical volume and export prices both of which fluctuate widely from year to year.

There is a positive relationship between value of exports and time. Figure 9.6 indicates the movements in the value of exports from 1960 –1975. The linear equation gives a figure of \$583.657 rise every year. Figure 9.7 shows the increase in the price per metric ton of sesame seed from the year 1960 – 1975 together with the calculated linear regression line showing the relation between time and price. The R^2 is 0.64 suggesting that 64 percent of the change in the price per ton of sesame is due to time. It will be seen that the trend line has a positive shape and the linear equation gives a figure US \$ 12.997 dollars increase every year.* (121)

---

* The detailed calculations for Figures 9.5, 9.6 and 9.7 are given in Appendices G11, G12 and G13.

Table 9.6

Quantity, value and price per ton of sesame exports from Sudan 1960 - 1975

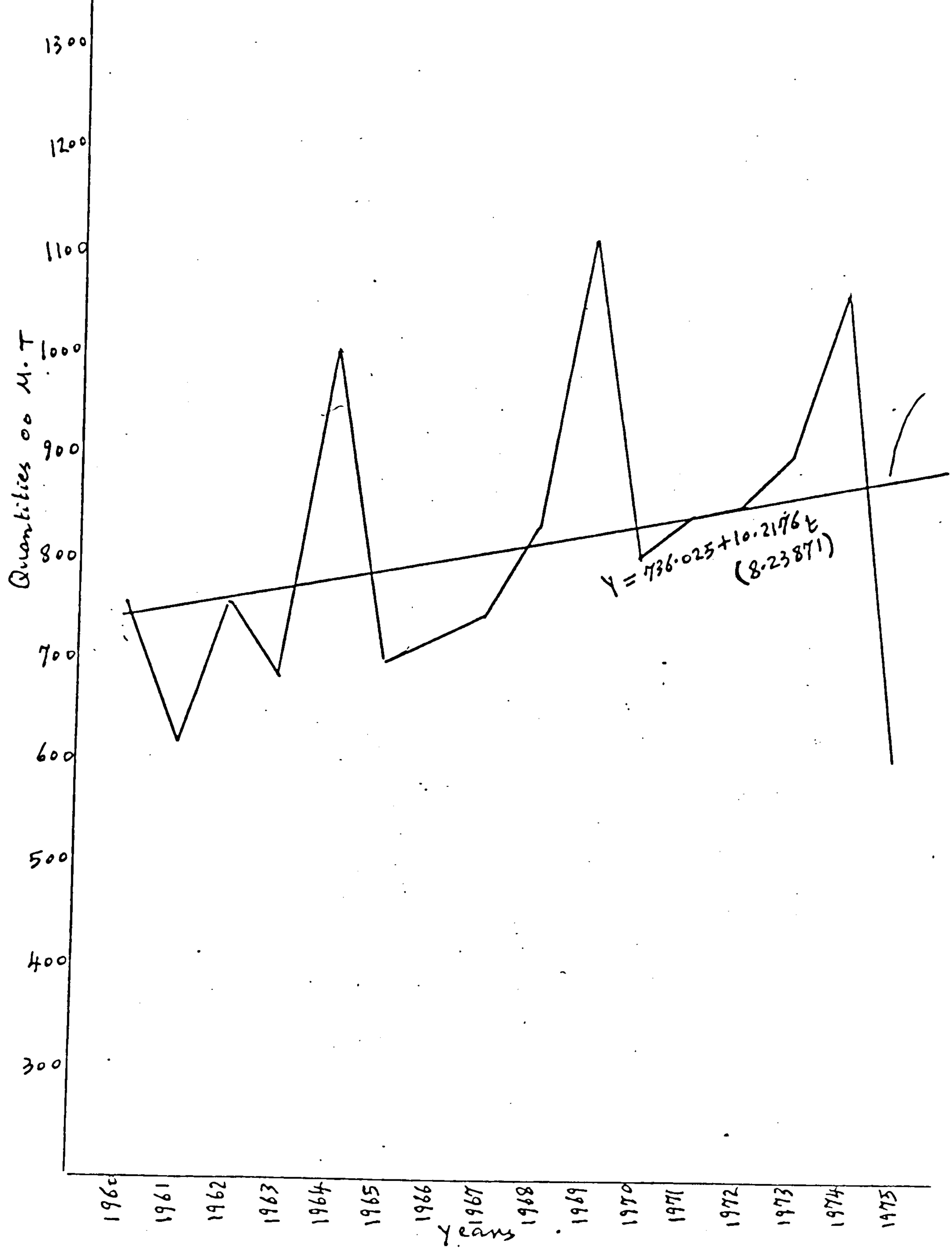
Year	Quantity M. T.	Price Per M. Tons ¢	Value
1960	76,400	182	13,904,800
1961	62,500	206	12,875,000
1962	77,200	226	17,447,200
1963	69,600	212	14,755,200
1964	101,400	189	19,164,600
1965	70,600	209	14,755,400
1966	73,700	244	17,982,800
1967	75,900	272	20,644,800
1968	84,700	225	19,057,500
1969	112,600	231	26,010,600
1970	81,900	283	23,177,700
1971	86,200	288	24,854,400
1972	865,002	203	17,559,500
1973	924,002	390	36,036,000
1974	107,852	392	42,277,984
1975	57,000	430	24,510,000

Source: F.A.O. Trade Yearbook 1960-1975

Quantities 00 M Tons

Fig. 9.5 Quantity of Sesame Seed Exports from The Sudan
Years 1960-1975 Linear Trend

Source Appendix C11



Value (000$)

Fig. 9.6 Value of Sesame Seed Exports from The Sudan 1960-1975 Linear Trend

Source: Appendix C12

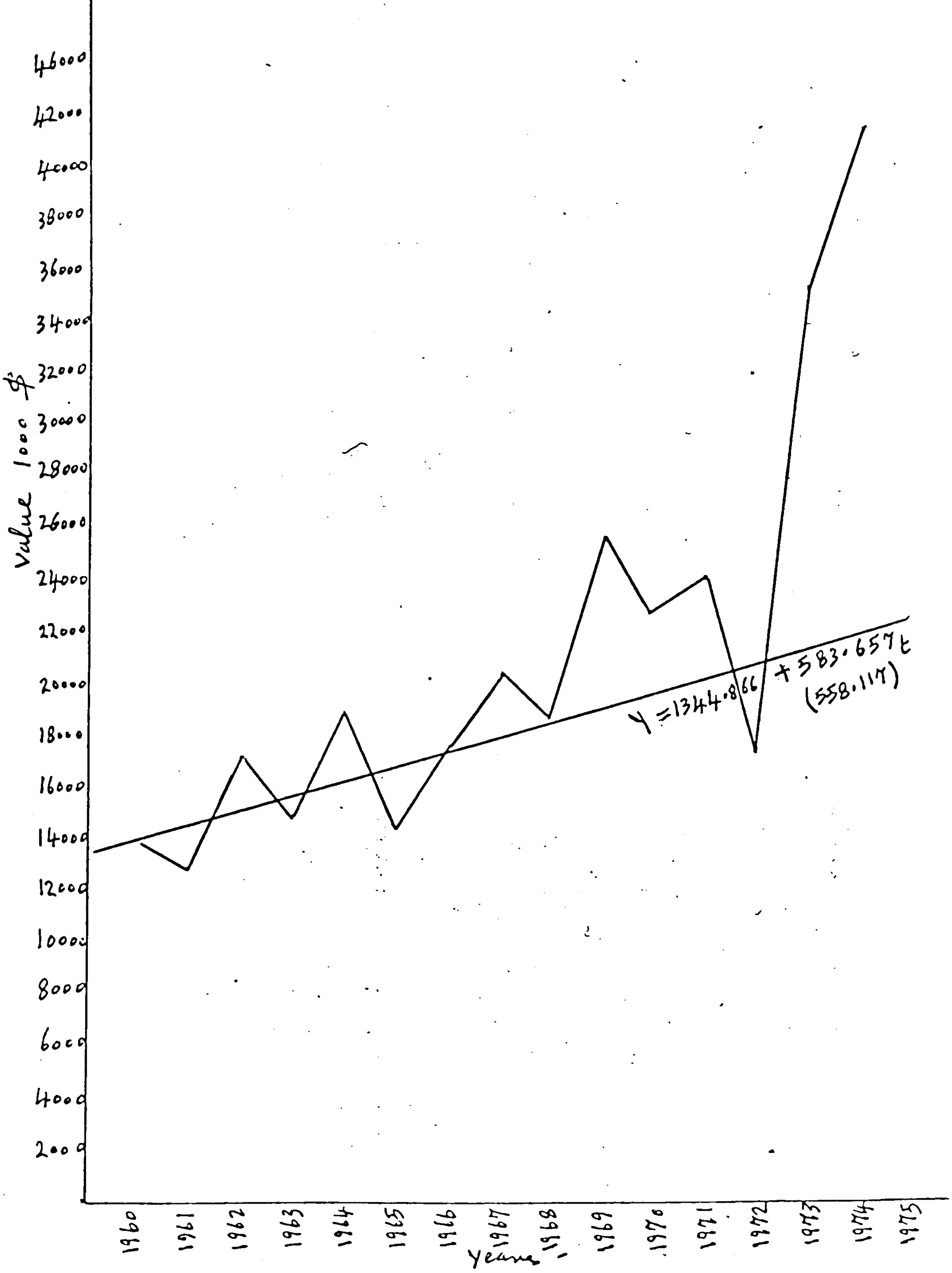
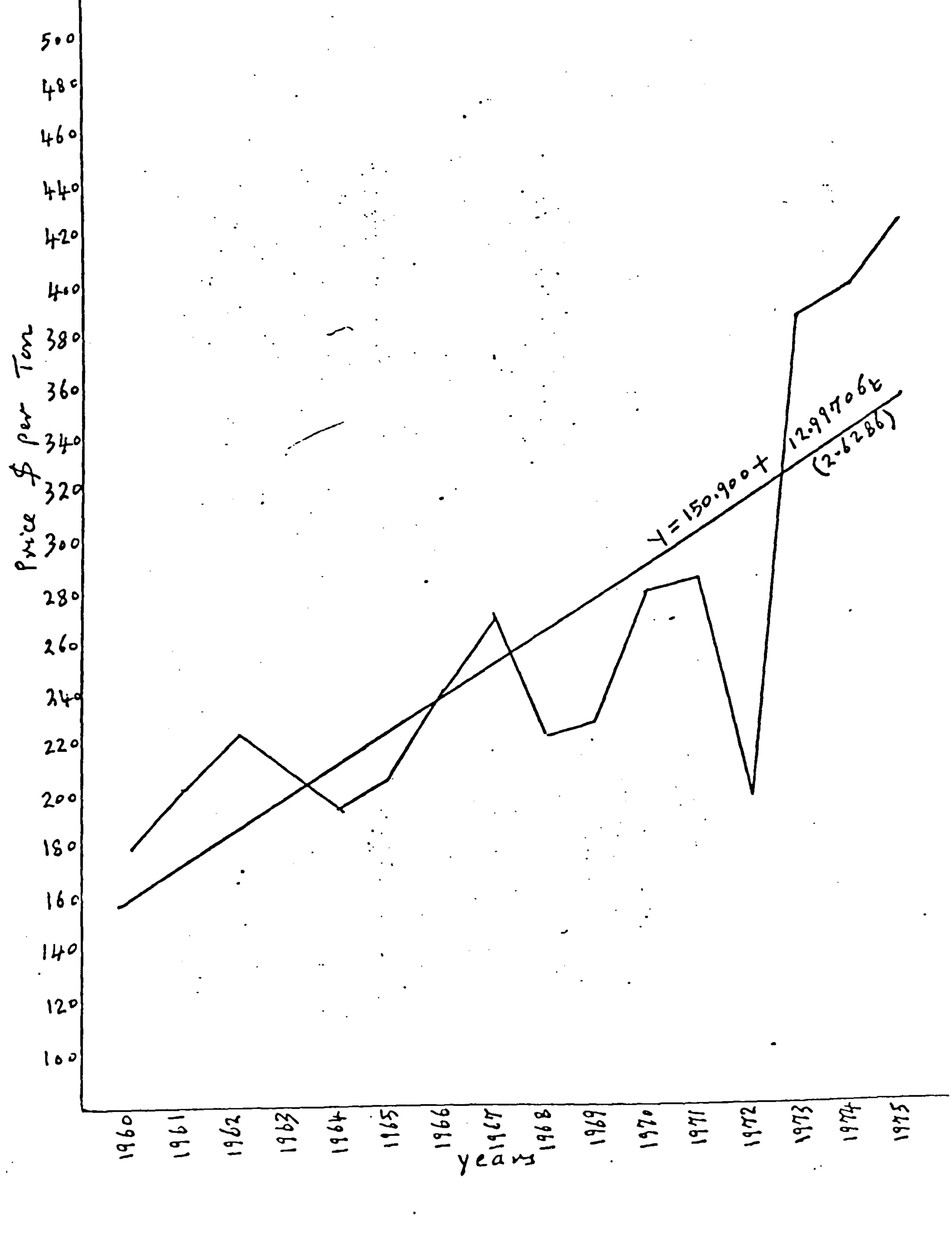


Fig. 9.7 CIF Price of Sesame seed Exports from The Sudan 1960-1975 Linear Trend

Source: Appendix G13



9.4 Exports of Sesame Oil from the Sudan

Oil is extracted by means of the primitive camel driven presses (Assaras) as well as by large oil mills. As has been mentioned in Chapter 7, large private oil mills were constructed in different parts of the country especially in the areas producing sesame and groundnuts. In the production areas the oil and oil cake are mainly for domestic use. The production of oil and cake from the large Port Sudan oil mill is mainly for export. Table 9.7 indicates Sudan's exports of sesame oil by volume and value for 1960 — 1975. The exports of sesame oil fluctuate from year to year according to the amount of sesame available for pressing, and the demand for sesame oil by the major importing countries together with the trade in other vegetable oils especially soya bean and palm. It will be seen from Table 9.7 that the quantities of oil exported from the Sudan increased from 3179 metric tons in 1962 to 5,260 metric tons in 1973 and fell to just 26 metric tons in 1974.

The writer studied export trends over time by using a simple linear regression equation and the data in Table 9.7 and discovered that there was a tendency of rising exports of sesame oil over time. Figure 9.8 indicates exports of sesame oil from 1960 to 1975.(122)

A similar exercise was carried out between the F.O.B. price of sesame oil per ton at Port Sudan and time. There is a positive relationship between price and time. The linear equation gives a figure of LS 6.326 rise every year. The R^2 obtained is 0.53 suggesting that

Table 9.7

Sudan, Exports of Sesame Oil and Value of Exports
1960 - 1975

Season	Quantity M.T.	Price per ton LS	Value of Export LS
1960	817	122	99,674
1961	972	143	138,996
1962	2179	158	344,282
1963	781	142	110,902
1964	786	127	99,822
1965	616	153	94,248
1966	720	163	117,360
1967	607	173	105,011
1968	182	146	26,572
1969	190	154	29,260
1970	41	195	7,990
1971	50	173	8,650
1972	176	145	25,520
1973	5260	168	883,680
1974	26	257	6,682
1975	1608	269	432,552

Source: Department of Statistics, Khartoum, Sudan, 1975

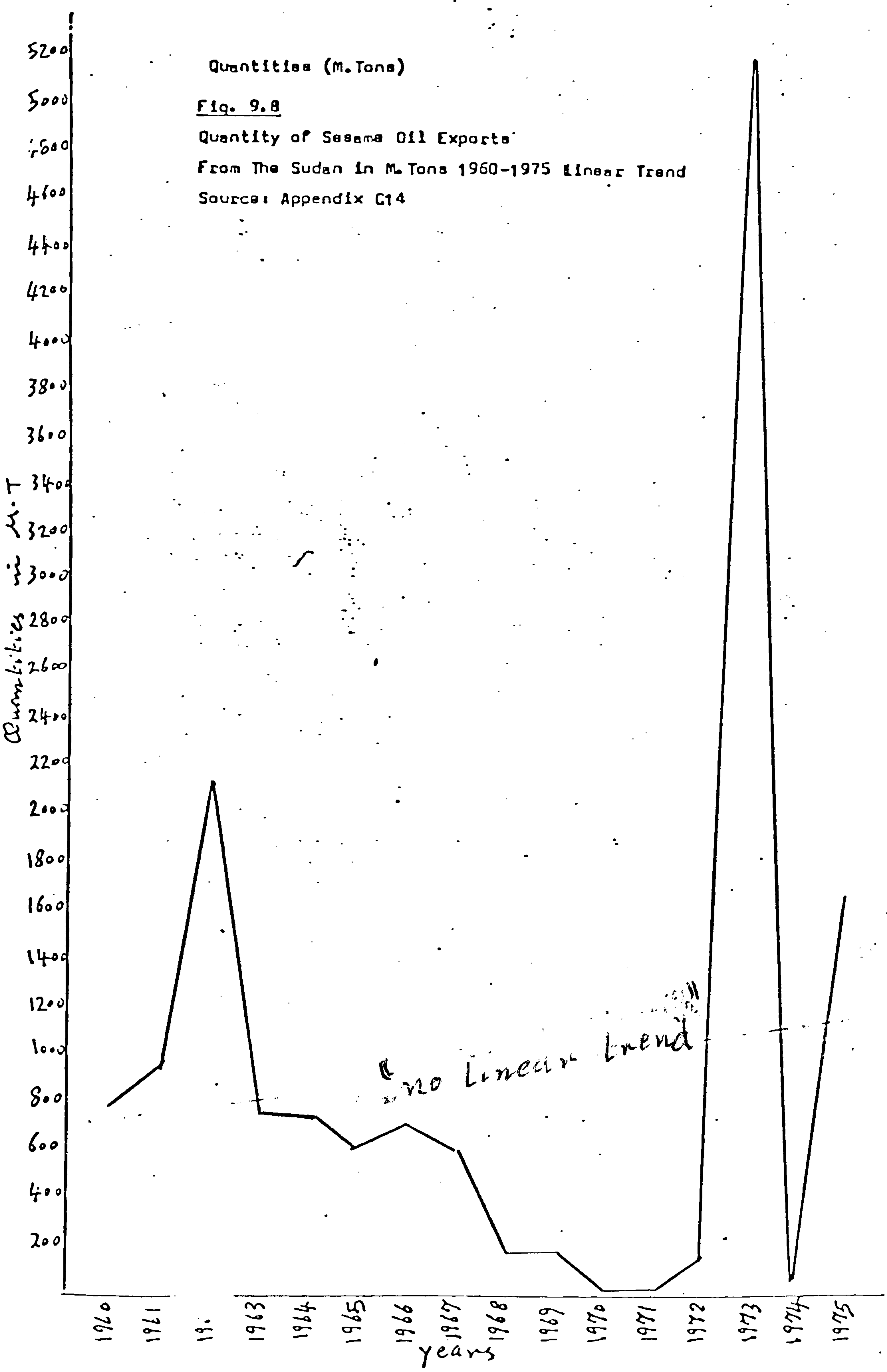


Fig. 9.8

Quantity of Sesame Oil Exports From The Sudan in M.Tons 1960-1975 Linear Trend

Source: Appendix C14

53 percent of the change in price per ton of sesame oil is due to time*. Figure 9.9 shows F.O.B. price of sesame oil for the years 1960 - 1975.

The relationship between the value of sesame oil exports from the Sudan and time is not significant. The annual values are plotted on figure 9.10 where it will be seen that the annual export figures fluctuate rather erratically.

9.5 Exports of Sesame Meal from the Sudan

The bulk of the oil cake produced in the Sudan is used in the country for stock feeding while the residue is exported. Table 9.8 indicates the volume and value of sesame oil cake exports for 1960-1975 It will be noted from the table that exports of sesame cake fluctuate from year to year according to the amount of sesame seed produced in the Sudan. For example the amount exported in 1960 was 12939 metric tons while it was only 5547 metric tons in 1975. This was due to the increase in the amount consumed locally. Sudan exports only a small amount of sesame cake compared with those countries which are major exporters of vegetable oil cakes.[122]

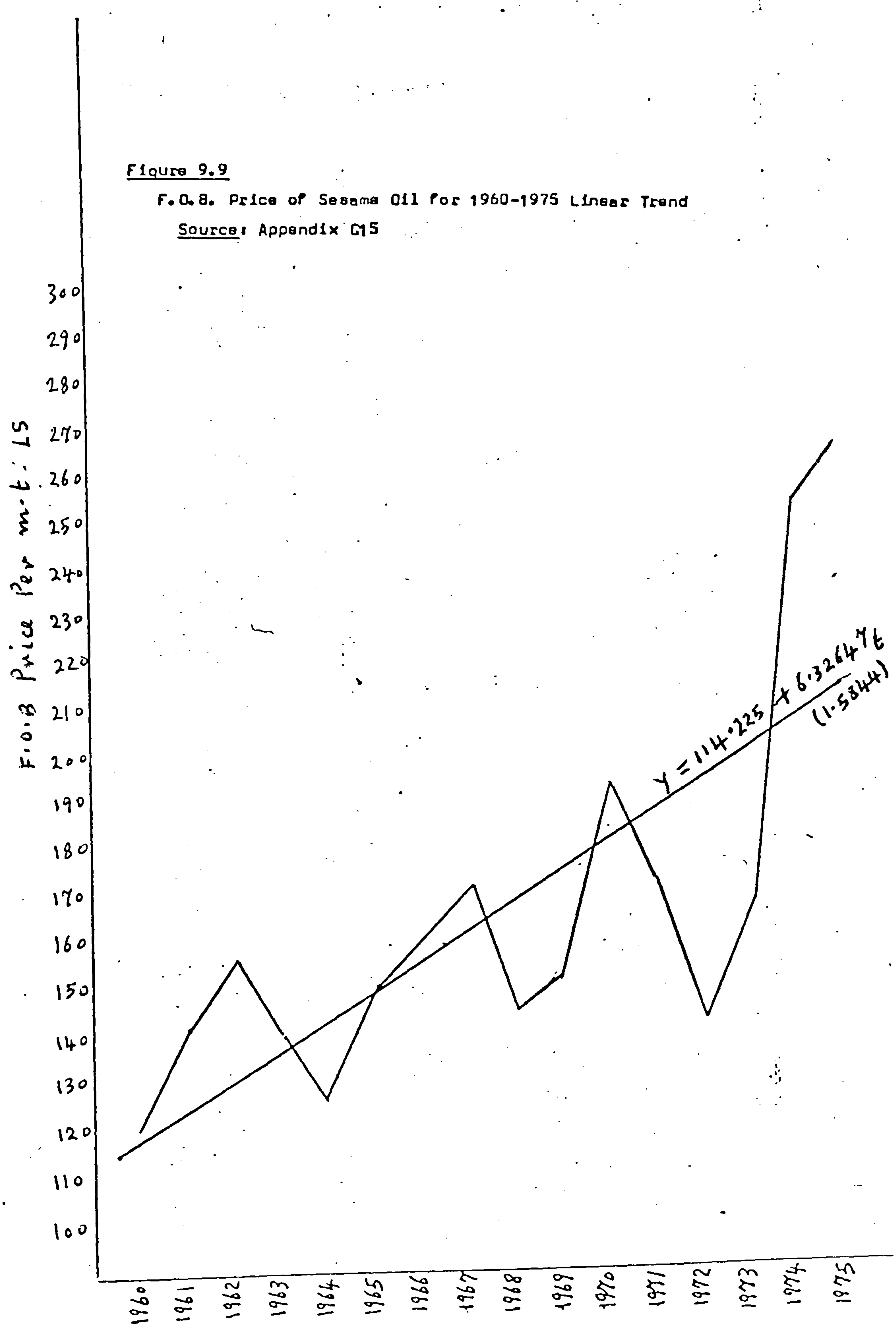
The Sudan is only a minor world exporter of vegetable oil cakes and meals. Table 9.9 gives details of the world trade in selected vegetable oil cakes[123]. It will be seen that the predominant commodity is soya bean products accounting for 68.8 percent of the overall total. The Sudan of course does not grow soyabean while the

*The detailed calculations of figures 9.8, 9.9 and 9.10 are shown in Appendices G14, G15 and G16.

Figure 9.9

F.O.B. Price of Sesame Oil for 1960-1975 Linear Trend

Source: Appendix G15



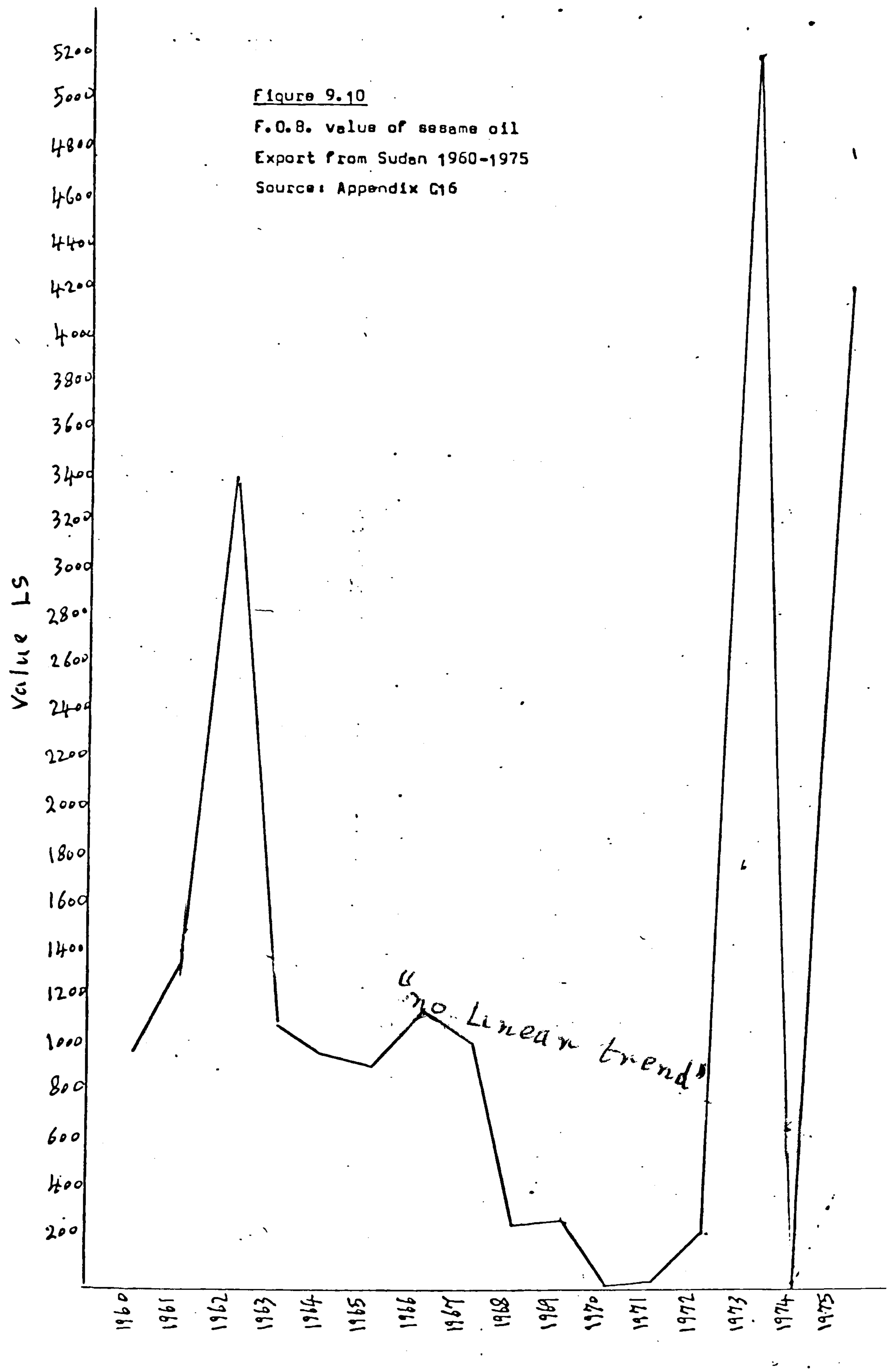


Figure 9.10
F.O.B. value of sesame oil
Export from Sudan 1960-1975
Source: Appendix G16
Value LS
5200
5000
4800
4600
4400
4200
4000
3800
3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
1960
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
"no Linear trend"

Table 9.8

Sudan Exports of Sesame meal and value of exports
1960 - 1975

Season	Quantity M.T.	Price/Ton LS	Total value of exports LS
1960	12939	29	375,231
1961	33278	26	865,228
1962	17285	29	501,265
1963	13550	32	433,600
1964	22336	34	759,424
1965	24256	33	800,448
1966	25199	30	755,970
1967	10110	31	313,410
1968	12127	32	388,064
1969	28841	28	807,548
1970	16631	32	532,192
1971	15881	35	55,835
1972	14699	31	455,669
1973	11605	32	371,360
1974	14196	72	1,022,112
1975	5547	32	177,504

Source: Department of Statistics, Khartoum, 1975.

Table 9.9

Exports of selected vegetable oil cakes for 1965, 1970 and 1975

	1965		1970		1975	
Type of oilseed	Quantity (000 tons)	Percentage of Total	Quantity (000 tons)	Percentage of Total	Quantity (000 tons)	Percentage of Total
Soyabean	2,801.4	42.4	5,370.9	55.1	8,745.0	68.8
Groundnut	1,497.6	22.7	1,492.3	15.3	1,158.0	9.1
Cottonseed	1,167.6	17.7	1,275.2	13.1	1,115.0	8.8
Coconut	465.2	7.0	569.7	5.8	697.0	5.5
Sunflower seed	353.0	5.3	558.9	5.7	358.0	2.8
Rapeseed	174.6	2.6	230.4	2.4	272.0	2.1
Palm Kernel	149.6	2.3	245.0	2.5	374.0	2.9
Sesame seed	-	-	-	-	-	-
Safflower seed	-	-	-	-	-	-
Total	6,609.0	100.0	9,742.4	100.0	12,719.0	100.0

Source: FAO Trade Yearbook 1965 - 1975

amounts of sesame cake and meals are too insignificant to be shown in the table. Figure 9.11 indicates the volume of exports from 1960 - 1976, and it will be seen there are wide fluctuations from year to year. Although the relationship between volume and time is not significant, that between price and time is. A linear regression gives an R^2 of 0.69 percent indicating that 69 percent of the change in price per ton of sesame cake is due to time. The linear equation suggests a rise in price of LS 1.34 per ton each year.* Figure 9.12 shows F.O.B. price of sesame cake per ton for 1960 - 1975.

9.6 Profit Margins

As has been mentioned in Chapter 7 the Sudan Oilseeds Company Limited is given the complete monopoly of trading in oilseeds from the Sudan. The company does not deal directly with the producers but operates through wholesalers who in theory obtain their supplies from auction markets. The export trade is completely under the control of the Company, and the merchants are primarily concerned with assembling the local produce for export. They have to pay for delivery to the Oilseeds Company warehouses at Port Sudan. Merchants also have to bear the risk of losses on the journey and the possibility that the produce is not up to the prescribed grade. On delivery at the Company warehouses the consignment of each seller is first inspected for the presence of impurities and then for the percentage of oil content. Deductions are then made for consignments

*The detailed calculations of Figures 9.11 and 9.12 are given in Appendices G17 and G18.

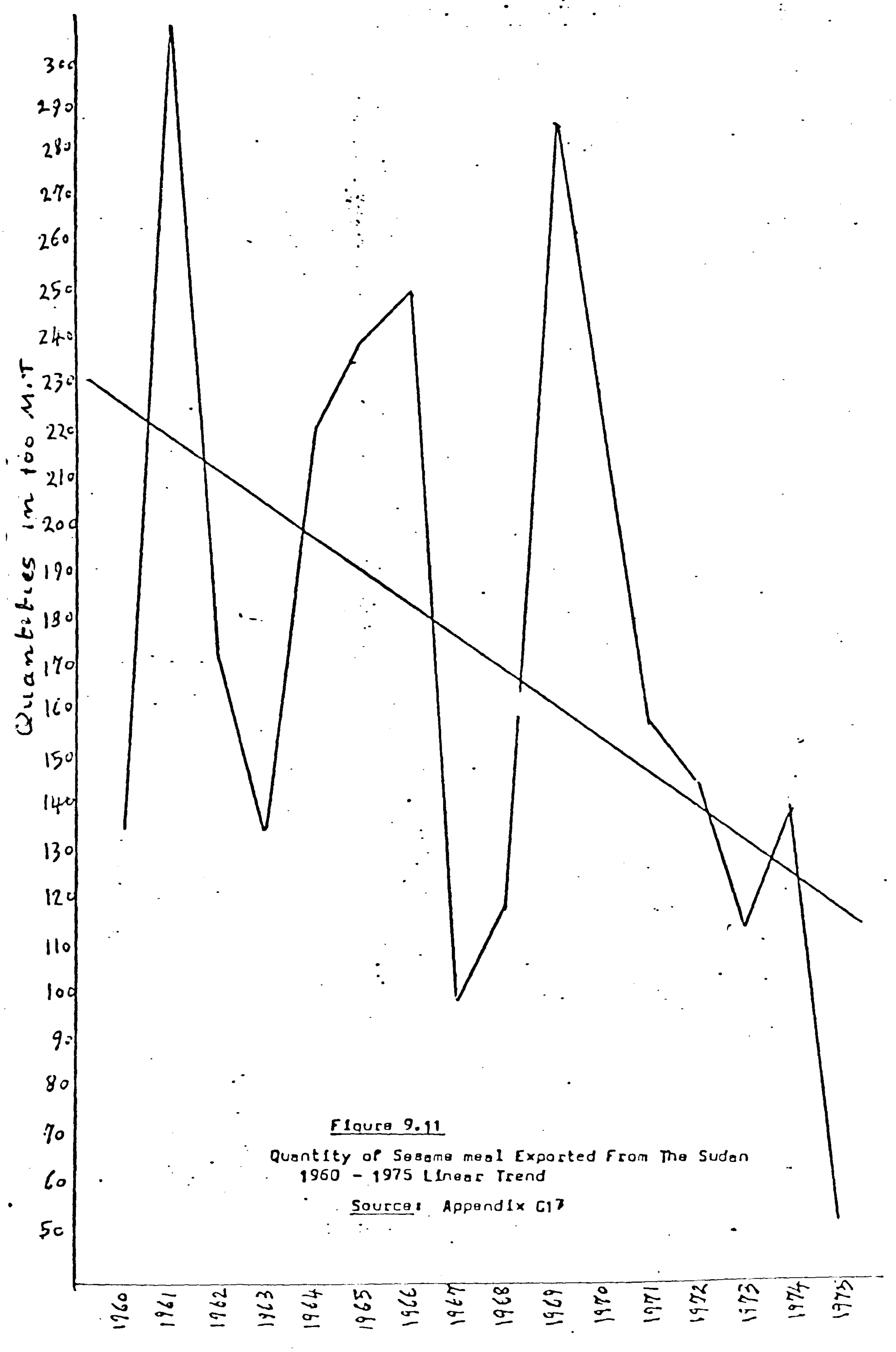


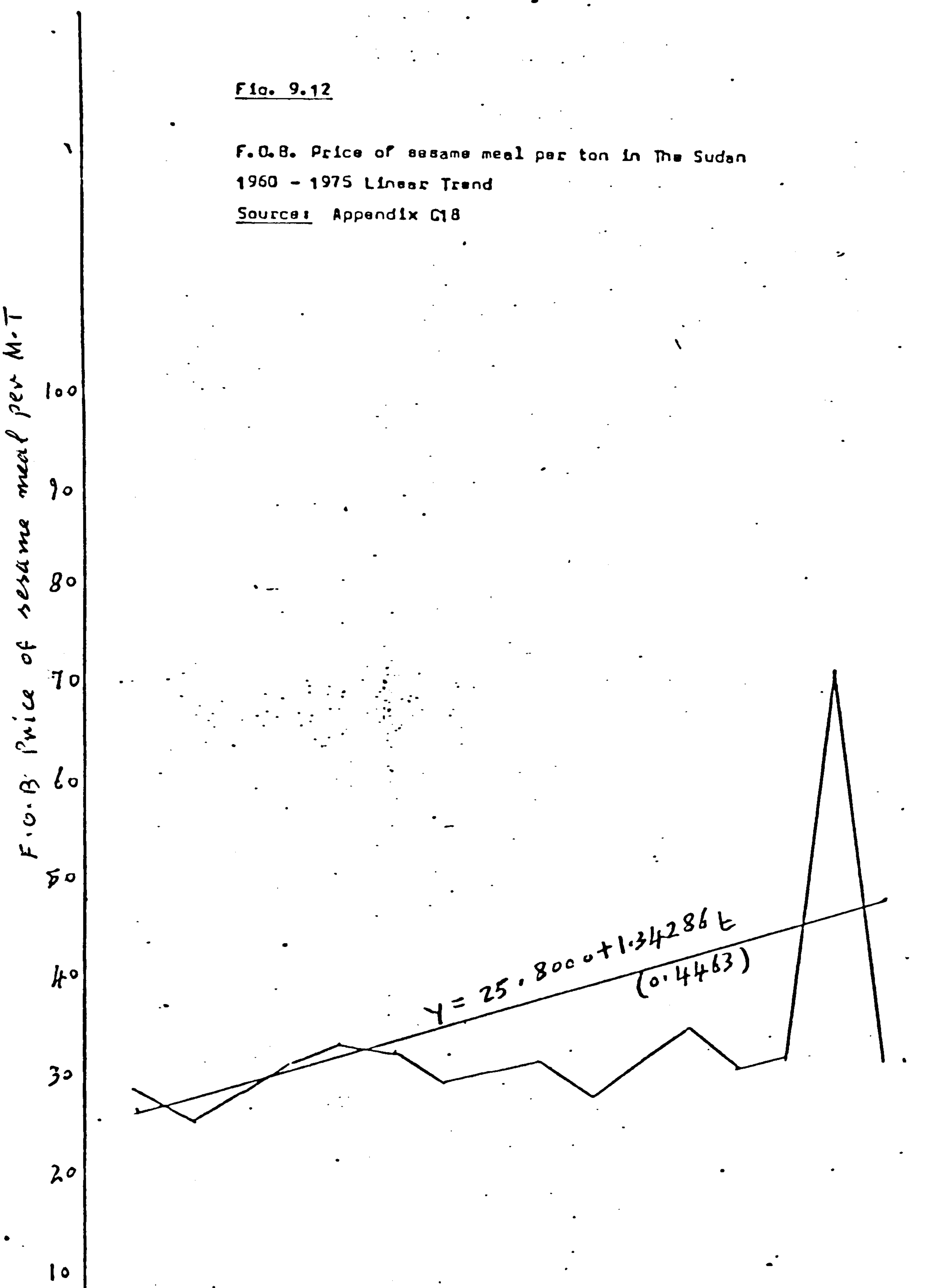
Figure 9.11

Quantity of Sesame meal Exported From The Sudan 1960 - 1975 Linear Trend

Source: Appendix G17

Fig. 9.12

F.O.B. Price of sesame meal per ton in The Sudan
1960 - 1975 Linear Trend
Source: Appendix C18



which are below standard. The selling policy of the Company, as has been mentioned in Chapter 8, is based on specified grades which are then offered to foreign buyers. The bids received are then considered in relation to the Company's minimum selling prices, and the Company's judgement of world prices. As has been mentioned on page 190 the bureaucratic procedure of the Company often results in either penalty clauses being enforced for non delivery to foreign buyers by the specified time or long delays at Port Sudan through failure to find a buyer. Both of these of course lead to financial losses. As has also been mentioned before in Chapter 7 page 172 the former major exporter of oilseeds before nationalisation moved to London and is still actively dealing with oilseeds even those from the Sudan. It is alleged that this Company has obtained supplies through various devious ways including, it is said, corruption.

The writer was able to obtain the profit and loss accounts for the Sudan Oilseeds Company for the years ending September 30th, 1977. It will be seen from Table 9.10 that the total value of the Company's sales of groundnuts and sesame in the fiscal year 1975/76 was LS.71,686,978, double that of the previous year.

Expenditure for the later year totalled LS 66,581,354 with an increase of LS.29,570,926 over the previous year. The increased expenditure arises out of the greater volume of produce handled, the increased export tax on sesame which was raised from 5 percent to 8 percent and the development tax which also was increased in the later year from 3 percent to 5 percent ad valorem. The Company

Table 9.10 Sudan Oilseed Company, Ltd

Trading, Profit and Loss Account for the Year ending September 30, 1977

1975 LS		LS	1976 LS
35,331,565	Sales		71,018,543
	Less: goods in stock		
-	- Opening date	18,127,954	
47,621,319	Purchases	73,017,538	
47,621,319		91,145,492	
18,127,954	Less: goods, closing date	24,747,778	
29,493,365		66,397,714	
40,600	Plus inventory and dues	95,657	
36,961	Insurance	87,983	
29,570,926			66,581,354
5,760,926			4,437,189
428,703	Other revenues		791,055
6,189,342			5,228,244
935,936	Less: Finance charges (Bank interest)		2,843,676
5,253,406	Gross profit		2,384,568
	LESS: ADMINISTRATIVE EXPENSES AND OVERHEADS		
13,200	Remuneration for Directors	16,404	
177,110	Wages and salaries	384,656	
367	Uniforms for labour	1,628	
815	Medical expenses	4,060	
3,050	Lease of office premises	8,700	
12,074	Bank charges	19,954	
206,616		435,452	2,384,568
14,758	Grants and donations	25,734	
13,802	Mail, cables and telephones	18,637	
15,069	Printed matter and stationery	19,643	
4,035	Repairs and maintenance	15,769	
24,903	Business travel abroad	15,211	
5,956	Motor vehicle expenses	11,220	
509	Litigation fees	11,100	
7,626	Establishment expenses (1/3)	7,626	
9,601	Subscriptions and advertising	7,311	
1,217	Stamp duty	1,824	
3,167	Electricity and water	1,201)	sic. Tr.)
1,807	Hospitality and gratuities	3,694)	
1,512	Sundry expenses	2,490	
22,870	Depreciation of fixed assets	101,373	
3,000	Auditors' honorarium	3,500	
336,448			681,785
4,916,958	Annual profits before taxes		1,702,783
2,949,000	Less business profits tax		1,111,683
1,967,958			591,100
	Less Doubtful debts		300,000
1,967,958	Net profit carried over to distribution of Profits and Loss Account		291,100

Source: Sudan Oilseeds Company Ltd.

made a gross trading profit of LS 4,437,189 which rose to LS. 5,228,244 with the addition of other income. After deducting bank interest, administrative overheads, taxes and doubtful debts, net profit is only LS. 291,000. When the writer asked the manager why the overheads and administrative expenses rose from LS. 336,448 in 1974/75 to LS. 681,785 in 1975/76, the manager's answer was that the company had extended its activities and so increased costs of items such as salaries, wages and travelling expenses. Also salaries and wages increased by 15 percent as a result of the recommendations of a committee set up to review employment in the public sector in response to demands by trade unions.

Table 9.10 makes it possible to gain some impression of the efficiency of the Company from the figures given. The first relate to the carry over of stocks from one financial year to another. The end of the Company accounting year the 30th September does not coincide with the marketing of the current year's crops. Hence one can assume that the bulk of the stocks in hand refer to the previous year's harvest. The figure for bank interest of nearly 3 million in 1976/77 refers mostly to the financing of holding the stocks. As has been mentioned earlier merchants receive payments on delivery to the Company's warehouses in Port Sudan. The high carry over of stocks from one year to another together with the high interest rates incurred on the money borrowed to finance the carrying of these stocks suggest that delays must occur in selling. This is confirmed by the writer's fieldwork in which he discovered that on average, oilseeds remained in Port Sudan for over three months before being shipped abroad.

Storing oilseeds for long periods leads to the decrease in their oil content beside the presence of large unsold stocks of oilseeds in a major producing country tends to depress the world prices. It is very obvious to the writer that the Company should look to its marketing practices and ensure that excessive stocks are not held on the one hand and penalties for non-delivery are not incurred on the other.

Table 9.10 also shows the loss to the producer of the proceeds of oilseed crops which are paid to the Government both in taxes and the Oilseeds Company's profits (despite the latter's inefficiency). The Company is of course a monopoly. In 1975/76 LS 2.9 millions went to the Government in the form of business profits, tax and nearly LS 2 millions was distributed to the shareholders mainly to the Government which owned 75 percent of the equity. It is also interesting to note that the Government owns the banks in the Sudan and the interest charges of nearly 3 millions help to prop up the banking system. If some of this money could be saved and a higher price paid to producers, a major incentive would be provided to increase production.(124)

9.7 <u>Oilseeds other than sesame exported by the Sudan and their importance in the Sudanese economy</u>.

Sesame is only one of three major oilseeds exported by the Sudan and no account of sesame marketing is complete in the writer's opinion without some reference to the other two major oilseeds (groundnuts and cottonseed). The first of course is a crop in its own right and the second is a by-product of the major export earner of the country. Oilseeds, of course, are easily substituted one for another in the manufacture of vegetable oil products and in the Sudan are all subject to the parastatal Sudanese Oilseeds Company which the writer has criticised in the previous section.

A discussion of alternative oilseeds such as groundnuts and cottonseed should start with a brief account of their position in international trade. A decade ago as shown in Table 9.11 the international trade in groundnuts ran at over one million metric tons annually, but in the last few years the total volume of trade has declined well below the million tons level because of the decline in the production of certain West African countries. It will be seen from 9.11 that Nigeria had 38.2 percent of the world exports of groundnuts in 1965, this fell to 29.4 percent in 1970 and by 1975 Nigeria had only 0.2 percent. This dramatic fall is due to one main factor, the Sahel drought in the early 1970s. Groundnuts are the principal cash crop of the savannah areas which were adversely affected not only in Nigeria but in neighbouring countries like Senegal, and Niger. Another factor which affected Nigeria especially was the Afla-toxin scare around 1970.* What was bad for West Africa was good for the Sudan. The Sahel drought did not have any major effect on groundnuts production in the Sudan nor were Sudanese groundnuts affected by Afla-toxin.

---

* Afla-toxin is a poisonous substance which can kill livestock fed on groundnut cakes and meals. It is derived from a fungus which can affect groundnuts under wet harvest conditions. Livestock died in Europe from Alfa-toxin poisoning and the presence of this substance was traced back to a consignment from Nigeria. The publicity given to the case adversely affected compounders demand for Nigerian produce.

Table 9.11

Groundnuts - Major Exoorters for 1965, 1970, 1975

Countries	1965		1970		1975	
	Quantity '000 M.T	Percentage of total	Quantity '000 M.T	Percentage of total	Quantity '000 M.T	Percentage of total
Nigeria	520.0	38.2	291.2	29.4	2.0	0.2
Senegal	216.8	15.9	51.4	5.2	17.4	2.0
Sudan	152.2	11.2	63.9	6.4	203.0	22.9
Niger	86.4	6.3	131.9	13.3	-	-
U.S.A.	78.4	5.8	51.2	5.2	237.4	26.8
China	46.4	3.4	16.2	1.6	22.7	2.6
Gambia	33.8	2.5	38.1	3.8	51.0	5.7
Mali	22.2	1.6	17.6	1.8	13.0	1.5
Malawi	18.9	1.4	22.5	2.3	26.0	2.9
South Africa	18.8	1.4	70.3	7.1	70.0	7.9
Brazil	18.4	1.3	53.5	5.4	54.0	6.1
Cameroon	10.6	0.8	13.4	1.4	18.0	2.0
India	0.2	-	25.8	2.6	70.0	7.9
Others	140.0	10.3	144.1	14.5	101.9	11.5
World	1363.0	100.0	991.1	100.0	886.4	100.0

Source: F.A.O. Trade Yearbook 1965-1975

Consequently the Sudanese were able to replace Nigeria as a major exporter and by 1975 Sudan was second only to the United States as the leading exporting country with a 22.9 percent share of the market compared with only 6.4 percent in 1970.

There are a number of smaller suppliers who have a significant share of the trade like Brazil, Cameroon, India and South Africa. They account for almost a quarter of the world market, whereas in 1965 their exports as a group were insignificant. It may well be that over the next few years this group of countries will consolidate their position in the world groundnut market and their share could well be increased if production in West Africa does not recover to its former levels.*

In similar fashion to exports, groundnut imports have declined since 1965. Nevertheless, the broad picture as regards the principal importers has remained remarkably stable. Western Europe is still the major outlet, taking about 70 percent of the total. The Federal Republic of Germany, France, Italy and the United Kingdom are the major importers. The other major importers are Canada and Japan. Canada's imports, contrary to the overall trend, have almost doubled since 1965. Table 9.12 indicates groundnut major importers for the years 1965, 1970 and 1975.

A little over one percent of world cottonseed production enters international trade and even this proportion has tended to decline

*See Table 9.11 for groundnut major exporters for 1965, 1970, 1975.

Table 9.12

Groundnuts - Major Importers for 1965, 1970, 1975

Countries	1965		1970		1975	
	Quantity '000 m ton	% of total	Quantity '000 m ton	% of total	Quantity '000 m ton	% of total
France	504.2	38.4	314.3	30.0	198.6	22.5
Italy	103.0	7.8	116.1	11.1	75.6	8.6
Portugal	92.0	7.0	48.0	4.6	59.1	6.7
U.K.	91.8	7.0	61.6	5.9	71.5	8.1
Switzerland	70.6	5.4	80.9	7.7	50.1	5.7
Fed. Rep. of Germany	56.3	4.3	89.2	8.5	53.2	6.0
Canada	49.1	3.7	49.0	4.7	90.9	10.2
Netherlands	42.2	3.2	42.4	4.0	55.5	6.3
Spain	28.6	2.2	26.7	2.5	20.0	2.3
Japan	25.1	1.9	58.9	5.6	51.0	5.8
Others	250.9	19.1	161.2	15.4	157.8	17.9
World	1313.8	100.0	1048.3	100.0	883.3	100.0

Source: F.A.O. Trade Yearbook 1965-1975

over the past decade. A considerable number of countries export cottonseed, but only two countries exported as much as 30,000 tons in 1975, these were the Ivory Coast and USSR. However trade in cottonseed has tended to fluctuate geographically. In 1970, for example, Nicaragua exported only 17,000 tons compared to 138,000 tons in 1965 and 47,000 tons in 1974. The overall impression remains one of an export trade which is subject to major annual fluctuations in the amounts supplied by as many as a dozen countries.

Japan is the principal importer of cottonseed. The only other importers of any note are Lebanon, which has consistently imported from 10 - 12 percent of traded cottonseed, and Greece which likewise has been a consistent importer. Mexico built up its cottonseed imports from 1,000 tons in 1965 to over 35,000 tons in 1974, but imported very little in 1975. Table 9.13 shows the major exporters of cottonseed while Table 9.14 indicates the major importers of cottonseed for the years 1965-1975.[123]

9.8 Major importers of oilseeds

The EEC is the major importer of oilseeds as the local production of oilseeds and oil cakes is small. This means that the community depends heavily on imports from non-member countries to satisfy its needs. Table 9.15 gives biennial averages from 1962-1964 to 1971-1973. It will be seen that the EEC self-sufficiency in the major vegetable oil did not exceed 26 percent during the whole period. It will be noted that the highest individual percentages returned are for olive, palm and coconut oil. The latter two are surprising since they are tropical products, but the reason is simple. Certain islands in the former French colonial empire count as Departments

Table 9.13

Cottonseed - Major Exporters for 1965, 1970, 1975

Countries	1965		1970		1975	
	Quantity '000 M.T	% of total	Quantity '000 M.T	% of total	Quantity '000 M.T	% of total
Nicaragua	138.5	30.3	17.2	3.6	23.0	11.4
Nigeria	71.3	15.6	96.0	19.9	5.0	2.5
Sudan	65.3	14.3	69.2	14.3	11.0	5.5
Thailand	8.9	1.9	23.7	4.9	10.0	5.0
Uganda	-	-	8.1	1.7	15.0	7.4
Ivory Coast	4.9	1.1	15.6	3.2	29.0	14.3
U.S.A.	4.8	1.0	22.1	4.6	7.0	3.5
Afganistan	4.3	0.9	5.2	1.1	10.0	5.0
Benin	1.0	0.2	8.2	1.7	-	-
Israel	2.1	0.5	19.1	4.0	5.0	2.5
USSR	-	-	39.5	8.2	30.0	14.9
Others	156.5	34.2	156.9	32.5	57.0	28.2
World	457.6	100.0	482.6	100.0	202.0	100.0

Source: F.A.O. Trade Yearbook 1965-1975

Table 9.14

Cottonseed - Major Importers for 1965, 1970, 1975

Countries	1965		1970		1975	
	Quantity '000mton	% of total	Quantity '000mton	% of total	Quantity '000mton	% of total
Japan	217.1	47.4	296.6	60.1	116.0	65.1
Lebanon	49.8	10.9	49.3	10.1	20.0	11.2
Greece	28.4	6.2	48.5	9.8	25.0	14.0
Czechoslo-vakia	24.5	5.3	12.0	2.4	-	-
Portugal	7.7	1.7	21.7	4.4	4.0	2.2
Honduras	2.1	0.5	0.3	0.1	-	-
Kenya	1.9	0.4	8.4	1.7	1.0	0.5
Spain	1.6	0.3	1.5	0.3	1.0	0.5
Mexico	1.0	0.2	32.4	6.6	3.0	1.7
Costa Rica	-	-	4.1	0.8	7.0	4.0
Others	124.3	27.1	18.4	3.7	1.0	0.5
World	458.4	100.0	493.2	100.0	178.0	100.0

Source: F.A.O. Trade Yearbook 1965-1975

Percentages computed by the writer

Table 9.15

Estimated net available supplies of the major vegetable oils in the EEC (The Nine)

	Average 1962-64		Average 1965-67		Average 1968-70		Average 1971-73	
	Quantity 1000 mt.	Percent	Quantity 1000 mt.	Percent	Quantity 1000 mt.	Percent	Quantity 1000 mt.	Percent
Groundnut oil	344	14	445	15	415	13	298	11
Soyabean oil	226	9	268	9	342	11	428	11
Cottonseed oil	95	4	81	3	53	2	59	2
Rapeseed oil	108	4	216	8	332	10	441	12
Sunflower oil	105	4	216	8	373	12	333	9
Olive oil	534	21	556	19	582	19	729	20
Coconut oil	268	19	504	17	380	12	488	13
Palm Kernel oil	274	11	244	8	213	7	230	6
Palm oil	365	14	382	13	428	14	600	16
Total	2519	100	2912	100	3118	100	3706	100
Oil prod. for domestic seed	548	22	659	23	753	24	965	26
Oil prod. for imported seed	1157	46	1251	43	1110	36	1367	37
Net imports of oil	814	32	1002	34	1255	40	1374	37

Source: U. N. F. A. O. Production Yearbook 1952 - 1974 inclusive and
U. N. F. A. O. Trade Yearbook 1952-1974

of France and as such are in the EEC.

The variety of different vegetable oils and fats available in the EEC from both home production and imports is much greater than in many of the producing countries especially if they are less developed countries who are less likely to import substitutes for the vegetable oils they produce themselves. Consequently the demand for vegetable oil in the EEC is very much affected by the prices of the different types which can be readily substituted for one another.* This in turn of course affects the demand for a particular oil. In the LDC's such wide possibilities of substitutions are not as important as regards the internal trade within the country. Export prices of course will be affected by the trends in principal overseas markets.

Table 9.16 refers to the oilcakes situation in the EEC and covers the same period of time. It will be noted that except for soyabean cakes where the EEC is 50 percent self-sufficient, the degree of self-sufficiency in the other major oilcakes is very low, not exceeding 8 percent for any individual commodity. The EEC consumption of cake increased from 6.5 million tons in 1960/61 - 1961/62 to 13.6 million tons in 1970/71 - 1971/72. This increase is due to the expansion in animal production and the higher consumption of concentrates per animal unit.(126)

---

*U. N. F. A. O. Approaches to International Action on World Trade on Oilseeds, Oils and Fats 1971, pp. 57-73.

Table 9.16

Estimated net available supplies of the major oilcakes in the EEC (The Nine)

	Average 1962-64		Average 1965-67		Average 1968-70		Average 1971-73	
	Quantity	Percent	Quantity	Percent	Quantity	Percent	Quantity	Percent
Groundnuts	1136	17	1033	13	841	10	903	8
Soyabean	1995	30	3104	38	3830	44	5545	50
Cottonseed	887	14	956	12	920	10	870	8
Rapeseed	261	4	426	5	524	6	868	8
Sunflower	352	5	531	7	627	7	422	4
Lineseed	824	13	765	9	708	8	749	7
Copra	496	8	644	8	598	7	844	7
Palmnut & Kernals	407	6	391	5	324	4	348	3
Others	197	3	264	3	396	4	581	5
Total	6555	100	8114	100	8768	100	11130	100
Oilcake from domestic seed	263	4	330	4	422	5	594	5
Oilcakes from imported seed	2130	33	2370	29	2634	30	3528	32
Net imports of oilcakes	4162	63	5414	67	5712	65	7008	63

Source:
Computed by the author using data from U.N. F.A.O. Production Yearbook 1952-74

Meat production increased from 11.7 million metric tons in 1960/61 - 1961/62 to 16.4 million metric tons in 1970/71 - 1971/72. Production of milk increased from 84.6 million metric tons to 93.0 million metric tons and of eggs from 2.8 million tons to 3.7 million tons over the same period. Meanwhile the output of compound feeding stuffs of which oilseed cake is a major component, increased in the enlarged community from an average 23.2 million metric tons in 1960/61 - 1961/62 to 50.9 million metric tons in 1970/71 - 1971/72 giving an increase of about 119 percent as compared to an increase of about 40 percent in the production of meat, indicating a higher consumption of feeding stuff per unit.

As has been mentioned earlier that the major oilcake consumed in the community is soyabean cake. This is due to favourable prices as well as the increased world production of soyabean cake which rose from an annual average of 17.3 million metric tons in 1971 to 32.8 million metric tons in 1973.

9.9. Sudanese exports of oilseeds to the EEC

The Sudan unlike other African less developed countries associated in the past with the British colonial empire, has not as yet entered into any form of association with the EEC. Consequently it does not enjoy trading advantages such as lower or zero tariff on specific exports to the EEC nor has it signed the Lome Convention of 1975 under which it would receive certain guarantees as regards the stabilisation of exports earnings from specific agricultural commodities.*(127) Although Sudan kept out of any agreement with the community, many of its principal competitors did not. These included the West Africa

*Five years relationship agreement to be known as Lome Convention (after the capital of Togo) covers trade, aid and co-operation links between the Nine and 46 developing countries in Africa, the Caribbean and the Pacific.

oilseeds exporting states who, as a consequence, enjoy preferential terms compared with the Sudan.

The EEC has been considered one of the major markets for Sudan's export of oilseeds and oilseed products. In 1975 the EEC purchased 41.2 percent of the Sudan's exports.[128]

It is realistic to predict that the exports of oilseeds to the EEC from Sudan will decline, partly because of non-association with the Market and partly because of greater self-sufficiency in the EEC itself following the expansion of soyabean and rapeseed production, and finally because of competition from other oilseeds entering the world market notably soyabean which has lower prices than groundnuts and sesame seed in the world market.

Table 9.17 shows the average annual European wholesale prices for major oilseeds. It will be noted that sesame enjoys a price advantage, this is partly due to its high oil content and partly as a result of its quality of yielding a colourless oil (from white sesame only) and its use in the confectionary trade.

Table 9.18 indicates prices of selected fats and oils C.I.F. Europe for 1960–1976. It will be noted that soyabean oil is also highly competitive together with rapeseed, palm and coconut oil.

Sudan has to initiate new policies and programmes in the field of production and exports of oilseeds. Co-operation is needed with other major oilseed exporting countries to

Table 9.17

Average annual European wholesale prices for major oilseeds

($U.S. a ton, c.i.f. Europe)

Type of oilseed	1960	1965	1970	1972	1973	1974	1975
Copra f)	207	225	223	141	351	670	256
Groundnut a)	198	206	232	326	543	604	462
Palm Kernel g)	164	179	179	124	260	463	204
Rapeseed e)	128	124	148	132	254	374	293
Sunflower d)	104	124	208	164	235	481	473
Cottonseed b)	97	104	105	106	153	230	219
Soyabean c)	92	117	128	140	290	274	222
Sesame h)	-	-	288	323	387	617	647

Source: F.A.O.

a) Nigerian, shelled

b) Sudanese, bulk

c) United States No.2 yellow

d) East African, pure

e) Canadian, 40% bulk

f) Straits

g) Nigerian

h) Sudanese

Table 9.18

Prices of selected fats and oils[a)] c.i.f. Europe 1960-1976
(\$U.S. per ton)

Year	Soyabean	Sun flower	Cotton seed	Ground nut	Rape-seed	Olive	Palm	Coconut	Palm kernel
1960	225	243	235	326	219	585	228	312	317
1961	287	311	305	331	280	561	232	254	263
1962	227	246	266	275	221	631	216	251	255
1963	223	236	243	268	215	871	222	286	287
1964	205	255	250	315	252	586	246	297	299
1965	270	294	278	324	263	663	273	348	353
1966	261	263	333	296	244	661	236	324	271
1967	216	212	378	283	206	690	224	328	249
1968	178	172	305	271	161	681	169	399	367
1969	228	213	291	332	200	666	181	361	306
1970	307	331	354	379	293	699	260	397	429
1971	323	375	392	441	295	727	261	371	335
1972	270	326	324	426	232	916	217	234	244
1973	465	480	500	546	395	1399	378	513	491
1974	795	983	939	1077	745	2174	669	998	1010
1975	619	739	726	857	551	2436	433	393	439
1976	376	600	645	675	390	2350	370	340	360

a) Descriptions:
Soyabean oil: crude, United States, c.i.f. Rotterdam
Sunflower oil: any origin, ex-tank Rotterdam
Cottonseed oil: United States, c.i.f. Rotterdam
Groundnut oil: Nigerian/Gabian, any origin, c.i.f. Europe
Rapeseed oil: Dutch f.o.b. ex-mill
Olive oil: Spanish, edible, 1% drums
Palm oil: Malaysia, 5% c.i.f. U.K.
Coconut oil: Philippines/Indonesia, bulk c.i.f. Rotterdam
Palm Kernel oil: West African c.i.f. U.K.

negotiate trade policies with the EEC with the objective of increasing the Community's imports of oilseeds and their products, oil, meal and cake. Sudan also should undertake major market promotional activities in the EEC in order to increase its share of the market. This should go together with plans for improved qualities, better grade and more competitive prices.*

9.10 Market and potential markets for sesame seed

As has been mentioned earlier in Chapter 6 sesame is utilized in three major ways:

1. Sesame seed
2. Sesame oil
3. Sesame cakes and meals.

Sesame seeds are used directly for bakery goods and as ingredients for confectionery. This market is relatively small and exists primarily in U.S.A. Approximately 24,000 metric tons are imported annually into the U.S.A. with 75 percent for the bakery industry, the other 25 percent is used in candy and other sweets. The U.S.A. market is growing at about six percent per year. The main competition for this market comes from Latin America.

Most sesame is used for oil pressing with cakes and meals as by-products. Figure 9.13 indicates the market and potential markets for sesame seed. Sesame seed is 48 percent oil with an average yield of 80 percent refined oil (by weight) or 40 percent yield on gross weight. The remainder of the crushed seed (50 percent) makes a 44 percent protein meal . A smaller market exists for sesame oil as speciality

*For further details about trade in oilseeds, vegetable oil and oil meals 1965-1975 by major trading countries, see Appendices G19,20,21,22,23, 24,25,26,27,28,29,30,31,32,33,34,35,36,37,38 and 39.

Figure 9.13
Market and Potential Markets For
Sesame seed

Source . Tropical Products Institute-Lo

oil used in pharmaceutical and cosmetics manufacture and in blending to extend olive oil; sesame oil is also sold as a health food.

The primary future market for the oil is a medium cost premium quality edible oil. Industrial sources indicate that at similar prices sesame oil will be preferred to groundnut oil. The groundnut oil market is large; world production is about 3,000,000 metric tons annually. Sesame oil has another major advantage beside the health aspects, in that it enjoys very good keeping qualities, and does not cloud with age; hence its value as a blender with other cooking oils to improve shelf-life both in the shop and the home. Sesame oil is now used for blending with both groundnut and olive oil. The former is the primary vegetable oil used for cooking and sesame oil is unlikely at present to supplant groundnut oil given comparative production costs and prices. In the writer's opinion it would be well worthwhile to sell sesame oil at a discounted price for a limited period of time to some of the principal cooking oil manufacturers to introduce them to the virtues of sesame oil. Such a policy might well encourage them to use a higher proportion of sesame oil in the blends which would of course increase the quality of their products, both from a health and from shelf-life aspects. The consumer may well be prepared to pay more for a better product and so the manufacturers could afford to move away from the concept of the "least cost mix" in which one type of oil is substituted for another as market prices change.

With the increasing shortages of protein focusing attention on the prospects of substituting protein of vegetables origin for animal protein, there must be a large potential market for sesame meals with their 44 percent protein content. Such meals should find a ready market in the manufacture of artificial meat products. Such products are already manufactured on a limited scale mainly for the catering industry, and experiments are in process to improve the appearance and palatability of these products. There is also a potential market for less sophisticated forms of animal protein substitute in the animal feed compounding industry. The shortage and high prices of fish meals are causing compounders to look elsewhere for proteins. Such meals of course are vital for growing dairy stocks and laying hens.

The writer visited the scientists of the Tropical Products Institute in London, and discussed the present position as regards research and the implementation of research findings into new uses and markets for sesame meal. Considerable research is being carried out at the present time (1978) into vegetable oil, cakes and meals as a source of protein for incorporating into both products for direct human consumption and for feeding to livestock in the form of compounded feeds. As far as human consumption is concerned research has concentrated on using vegetable oil meals in the production of "milk products" such as milk powder substitute,* ice cream, cheese spreads and yoghurts. With animal feeding little additional research is

---

*For example a popular product is the Carnation Food Company's Coffe-mate, which does not contain any dairy products at all but instead has a high vegetable oil base.

necessary on oilseeds meals.* Beside using a straight sesame meal in animal protein substitutes, there is also a possibility of blending it with other vegetable oil meals, especially soya. Sesame meal contains certain amino acids not found in soya meal and blending the two together should be advantageous. The blend might range from 1:1 to 2:1 soya concentrate, sesame meal. World consumption of soya concentrate is running at 30,000,000 lbs annually, but expansion at a rapid rate is expected. Obviously this is a market with a future and the sesame producing countries like the Sudan should study this potential in order to exploit the new opportunities. According to the writer's information little work is being done on sesame itself. "Most work is concentrated on soya". The neglect of sesame is said to be due to the unfamiliarity and unavailability of sesame meal and also the high price of sesame seed compared to other oilseeds. This in the writer's opinion is a mistake in view of the high amino acid content of sesame meal and perhaps sesame exporters should contact research workers and provide suitable facilities for obtaining sesame products. A very important facet in marketing is to find new uses for a product, hence it is vital that sesame exporters should be knowledgeable about possible developments in this field.(129)

---

* From the point of future competition, quite a lot of scientific work is in progress for the production of protein from organisms feeding on such media as straws. Such work is being carried out at Reading by the Tate and Lyle Company.

CHAPTER 10

Problems of Production and Marketing of Dura and Sesame in the Sudan

A: Obstacles to Production

10.1 Introduction

The climate in the main dura and sesame production areas is semi arid and, under rain farming conditions, crop yields in any one year are partly determined by the annual rainfall. This in semi arid areas fluctuates widely from year to year with the inherent risk of drought. The condition of the soil of course is another main factor influencing crop yields and little has been said so far about the soils of the Central Rainlands and the deleterious effects on them of the bad farming practices of many Sudanese mechanised farmers which encourage soil erosion. Farm land of great potential value has been and is being lost to the Sudan, farmers' profits are falling and will vanish if they allow this land to become eroded. In other words soil fertility falls unless plant nutrients are added to the soil. This can be done by fallowing, by including a leguminous break in the rotation, by following a mixed farming system incorporating animals with crops or by other well tried farming practices. Chemical fertilizers are not readily available in the Sudan, all are imported and the great distances inside the country mean that transport costs would be prohibitive at present. The prevalence of poor farming has led to the rapid fall in crop yields after land had been in cultivation for a few years only. In the first two years crop yields from new land provided that the rainfall is favourable, are high. The fertility of the virgin land has been increased by the ashes left from burning the former vegetative cover of forest trees and bushes as well as humus from the disintegrating roots. But after a few years the productivity declines noticeably and after 8 - 10 years of cultivation many farmers want to shift to new virgin land. From the farmer's point of view, it is the only option open to him under the present farming system, since with low crop yields continuous cultivation on the same piece of land is financially unviable. From the Sudan's point of view however the social costs are very high. Nomadic and traditional farming systems have been disrupted [illegible] The tree cover has been cleared with the consequent loss of forest products such as charcoal and timber and the valuable gum arabic trees have also been lost. Added to these losses of production are the unknown costs of erosion and desert creep. The latter proved decisive factors in the World Bank refusal to give the Sudan a major loan for extending the rainfed mechanised sector in 1978.

Beside these adverse effects a system of large scale mechanised farming adds to both transport and infrastructure costs. The development of the mechanised farming system in the rainfed areas has seen a movement southwards and westwards, so lengthening the lines of communications from the urban markets ~~and~~ to the main export port. The fact that farmers are on the move acts as a constraint on the provision of such infrastructure as roads, water supplies, electricity, schools, clinics and other services. As a consequence of the lack of infrastructure few large farmers live on their farms and so do not become attached to a particular neighbourhood. Consequently they and their families have few qualms about moving on.

In theory a farmer is bound by his lease from the Mechanised Farming Corporation (MFC) to observe the farming practices which are to be specified by the Corporation, otherwise he forfeits the lease without compensation. In practice however little is done to enforce good husbandry, perhaps the main constraint is the lack of resources of the MFC.* The failure of the MFC to control the situation has also resulted in the unauthorised cultivation of large tracts of land which sometimes, because of the contours, led to serious erosion problems.**

The present problem is to change the farming system and so ensure the permanent cultivation of the land. The World Bank Mission of 1977 suggested the initiation of an applied research programme to identify and test alternative systems in the field. As yet no specifications are available of possible alternative systems.

The writer however who is an agricultural graduate with considerable field experience in the Sudan would suggest the following possible alternatives for consideration. The first obvious step is to enforce fallowing, this would enable the soil to be rested and so give micro-organisms and organic decomposition a chance to release minerals. Fallowing will also control weeds and pests. Leguminous plants distinguished by the presence of nitrogen fixing bacteria in their root systems, release nitrogenous compounds to the soil and provide an excellent fertilizing effect and so should be included in the rotations.

* The MFC functions at a loss mainly because it is responsible for the highly unprofitable state farms. The losses at the latter ran at LS 2 million in 1976.

** The MFC is responsible for allocating the land which belongs to the state. It is also charged with a supervisory and an extension role.

10.2 Plant Breeding

The research and experimental programmes have had a minor effect on the system of production especially in the rainlands area of the Sudan. The reasons for this lack of take up of research results lies in the ineffectiveness of the extension service and the physical isolation of the research stations.* Research and applied experimental trials have tended to be concentrated on weed control, the mechanisation of sesame harvesting and the evaluation of fertilizers. Plant breeding has been confined to dura, and even the new varieties produced have failed to give satisfaction to the consumer and have little resistance against dura diseases. One of the troubles of some newly introduced locally bred varieties is that they have a low protein content which affects the flavour of the bread made from the grain. Also some of the new varieties have coloured grains which did not give the white flour favoured by the consumer. These two disadvantages meant that the prices received for dura grains from these new varieties were lower than those commonly grown, and that the extra output if any from the new varieties did not compensate for the lower prices. The obvious moral of this is that the plant breeder should concentrate in the qualities that the market requires.

In the U.S.A. hybrid sorghum has been very successful and crop yields greatly improved. These hybrids are now being introduced

*For example the World Bank Mission in 1977 was unable to visit a research station because the dirt road was closed by mud. The writer visited the same research station in the course of his fieldwork and gathered from the director that few visitors let alone extension workers and farmers came to see the station.

to many other sorghum growing countries including India. Hybrid sorghum there has proved to be partially resistant to drought and in one very dry year crop yields of over one metric ton per feddan were obtained. (Compare with Sudan national yield of 0.4 metric ton per feddan in such years when rainfall conditions were favourable). Work on hybrid dura in the Sudan was stopped - inexplicably in 1962 and only resumed again in 1973 and little details are available since.* In the Argentine in the semi-arid areas, in one province only, over 2,000,000 metric tons of sorghum were produced with an average yield of over 4,000 kgs a hectare using entirely hybrid varieties.

10.3 Problems of weeds, pests and diseases

Weeds infested every farm visited by the writer in the central clay plain of the Sudan. Weeds rob the main crop of water, and mineral nutrients, absorb sunshine and compete for space. In some dura crops, one could hardly distinguish between the real crop and weeds. Weed populations build up over time with the first one or two years being relatively weed free. It is weeds which are a major factor in reducing crop yields to uneconomic levels in less than ten years of cultivations. Farmers often abandoned heavily weed infested crops

---

*There is no central coordinating system for compiling annual research reports of the individual stations. Records are badly kept and often stored under unsuitable conditions where they deteriorate. The consequence is that many research findings are lost.

not even attempting to weed them let alone harvest them. The weeds then multiply further and the strong winds of the central plains carry the seeds over a wider area. The problem then is how to control weeds economically and then ensure that the farmer adopts improved weed control practices. In the United States for example sorghum is sown in rows wide enough to allow mechanical inter-row cultivations. Whereas in the Sudan dura is sown in narrow rows and hand weeded; an operation which is expensive and often farmers are unwilling to incur the expense of weeding a poor crop. In the United States also herbicides are used if necessary.* Most farmers in the Sudan have never heard of herbicides let alone used them.

A major complaint of farmers is about pests. The wholesale clearance of the savannahs for mechanised cultivation has upset the natural balance. Discing for example has killed the snakes which previously kept down the rats and mice, and the result is major crop losses. There has also been a bird population explosion following the great increase in available food supplies and the provision of water by the excavation of hafirs. One of the worst pests is the Quelea aethiopica which has now been declared a national pest. An expensive aerial spraying campaign has been undertaken to destroy the young in their nests. As with pests, diseases have multiplied. Both dura and sesame are members of the same botanical families as many of the wild plants of the region.

---

* United States agriculture spends about $2.5 billion annually on chemical spraying against some 600 kinds of such infesting plants and yet the loss in yield on this account is estimated at about the same sum, making the total annual costs on the weed account reach $5 billion.

These are hosts to disease and pests which promptly transfer their attention to the plentiful food supply afforded by the new crops. Farmers interviewed by the writer did not use any method of plant protection, relying on the services of the Plant Protection Department of the Ministry of Agriculture which is both understaffed and lacks effective equipment.(133)

10.4 Labour problems

The shortage and the consequent high costs of labour are a major problem that hinders increased production in the rainfed areas of the Sudan. Labour for agricultural production is highly seasonal, with a high demand for labour during the weeding and harvesting periods. Weeding is extremely labour intensive. This operation to be effective has to be done within a given period beyond which there is damage to crop yields. Harvesting is also labour intensive. Sesame yields are greatly influenced by timeliness in harvesting and if the crop is not cut within a few days of ripening, much seed is lost through shattering. Casual workers are well aware of the farmers' predicament and bid up their charges. Farmers also as has been mentioned in Chapter 2, have to provide transport, food, water and shelter for their casual workers, and often in the bargaining process workers demand extras including free cigarettes. This shortage of labour is a result of great employment opportunities resulting from the opening up of new agricultural development schemes in the rainlands and irrigated areas. As this shortage of labour will continue for some time, it becomes obvious that if agricultural production has to be increased, the processes should be mechanised.

10.5 Problems of mechanisation

When the writer was doing fieldwork in the Sudan, he found that farmers complained bitterly about lack of spare parts and servicing.[134] During the cultivation season timeliness in agricultural operations is vital if output is to reach satisfactory levels. It is therefore essential that the machine operates as efficiently as possible. The peak cultivation period coincides with the rainy season when the roads are generally impassable, so if a tractor breaks down the results may be disastrous.

Some of the problems result from the nationalisation of all companies dealing in the importation of agricultural machinery. After nationalisation these companies became one state owned Company known as the State Trading Corporation. The old private companies were held in high regard by their farmer customers for the reliability of their services and for the honesty of their staff. They were well managed and the morale and discipline of their managers, storekeepers and workers were high. After nationalisation all this deteriorated and the Corporation ran into cash flow difficulties. The stocks of spare parts were cut down drastically and small workshops in production areas were run down and some finally closed down.[135]

The neglect of tractor maintenance means that the working life of a tractor is shorter than it would otherwise have been. An engineer from the Ministry of Agriculture told the writer that this potential was cut by at least 50 percent through this factor, this of course means that tractors have to be replaced earlier than they would otherwise have been, a drain both to the country's foreign exchange and the financial resources of farmers. The engineer also pointed out that machinery in the Sudan needs extra care because of the rough roads, heat and uneven ground in the field.

A further complication which affects mechanisation is that the Government, faced by foreign exchange shortages, entered into trading arrangements with a variety of the Communist Bloc countries. The results of these agreements were an importation of a whole collection of different makes and models of tractors and other machines most of which had not been previously tried out under working conditions in the Sudan, with poor or no local service facilities . The Eastern Bloc machines are cheaper to buy than the corresponding Western types. The former's high repair and spare parts costs more than offset this initial saving. The writer in his fieldwork saw many abandoned Eastern European tractors for which spares were not available. A fleet of Russian combines purchased for the state farm at Agadi were out of commission in 1977 after only a few seasons work, the Government who had fallen out with Russia by then, were desperately trying to obtain spare parts from Iraq and Algeria.

Another problem is the total lack of trained drivers and mechanics. The Government operated a training centre for drivers and mechanics at Tozi. The Tozi centre was established in 1963 with assistance from US, and from 1963 to May 1976 a total of 602 people have been trained. Tozi centre has a 1500 feddan farm attached that can be used for training purposes. Financial assistance is now provided from IDA funds which will continue to 1978. The course is long, over one year, and the few graduates of the course easily found non-farm jobs especially in road haulage. Some even went to Saudi Arabia and other rich oil states. Farmers complained of inadequate care in driving and maintainence of tractors in the absence of suitable local staff.

The culmination of all these troubles was the failure both to achieve time limits in sowing crops and sometimes the inability to cultivate the whole area of the farm. All this of course adversely affected output. Most farms have only one tractor and during the cultivation season which coincides with the rainy season, are isolated by impassable dirt roads. This means that it is vital for the farmers to start the season with a tractor in good working order and to have on hand an adequate stock of spare parts and staff with sufficient mechanical knowledge to keep the tractor working. These requirements are often impossible to ensure under Sudanese conditions.

Even if the maintainence and personnel problems were solved, the lack of adequate fuel supplies would remain a major constraint. The main problem is the difficulties in rail transport as a result of shortage of locomotives and tanker rolling stock and a permanent way in poor condition resulting in strict speed limits on many sections of the line. Managerial problems also arise and allegations of corruption to secure priority use are common.* Bribery or no bribery, there are often critical shortages of tractor fuel during the cultivation season and it is common for farmers to resort to the black market for supplies at double the cost. The situation has got worse in the last

---

*The writer heard that sometimes bribes were paid even to delay delivery in order to create local shortages which would be of financial benefit to black market operators.

two years since there is a shortage of petroleum products in the country because of the lack of foreign exchange.

10.6 The Ministry of Agriculture's Role in the Production of Sesame and Dura

The Ministry of Agriculture is responsible for the MFC, agriculture extension, seed propogation, plant protection and agricultural engineering. These many activities of the Ministry affect the smooth running of the mechanised farming sector. Some of these activities have of course already been touched on briefly before in the thesis and all that remains here is to give a brief summary and critique.

The MFC is responsible for the operations of the mechanised farming sector both under public and private farming units. It has neglected it activities as regards the private sector because of preoccupation with state farms. Unfortunately these run at a loss and the accumulated debts exceeded LS two millions. Consequently the MFC is somewhat demoralized and short of both staff and finance resources. In the writer's opinion the MFC should be relieved of the burden of state farms and concentrate on its supervisory and advisory role as regards the private sector which accounts for over 90 percent of the area under mechanised dura and sesame production.

The extension department of the Ministry of Agriculture has been criticised by both a Ford Foundation Report [132] and by the World Bank.[133] The gist of the criticism is that the extension service exists on paper but not in practice. Shortage of financial resources and staff appear to be the main reasons. The organisation has its headquarters staff in Khartoum, but is forced to curtail its activities in the provinces because it has neither the staff, the housing for the staff, nor the vehicles essential for the staff to visit the field. In such circumstances it is not surprising that all the farmers visited by the writer had never seen an extension worker nor had one visited the research station which the writer visited himself.

The Seed Propogation Department's duty is to supply improved seed to farmers. Unfortunately farmers do not consider the improved seeds superior in yield to the present local seeds. They maintained that the market preference is for the local varieties not the improved varieties made available to them especially for dura.

There is no seed propogation service in the Western Provinces. As these are the areas of concentration of traditional farmers they have no access to improved seeds of any kind.

The Crop Protection Department also suffers from similar problems of staff, transport and housing. Consequently it is not able to cover all the agricultural areas sufficiently. In the Damazine area one of the principal regions for dura and sesame, the Crop Protection Department has not even a local office and has to bring its personnel and equipment from Sennar, about 200 Km away over dirt roads. Further complications are that the telephone service (another parastatal organisation) suffers from long delays and it is often difficult to make long distance calls. It is not therefore surprising that one farmer remarked to the writer that the pests had eaten the crop before the Department sprayers had arrived.

The Agricultural Engineering Department of the Ministry of Agriculture which is responsible for the testing of machines and advising the Government regarding farm machinery, is also understaffed and situated in Khartoum. It has no branches whatsoever in agricultural areas.

There is little farm mechanisation research being carried out in the Sudan, inspite of the importance of farm mechanisation in the expansion of cultivation in the rainfed areas and the role of machinery to compensate for a rapidly growing shortage of labour.

B: Obstacles to Marketing

10.7 Transport

A main constraint on the faster expansion of commercialised modern agriculture is transportation especially in the rural areas. Delays in moving produce from the farm to the town or the export port add to the costs and to the risk of damage. The Universal dirt roads found in the rural areas are the main factor to blame together with the overloaded network of Sudan Railways.

Sudan is the largest African country covering an area of 2.5 million square Km. In addition the country's main access to foreign markets, Port Sudan, is located in the Upper North East desert corner of the country. The main agricultural production areas, even in the East of the country, are far removed from Port Sudan while the agricultural areas of the West and South of the country are well over 1000 miles from the Port to which they are connected by an overloaded railway. There are no tarmac roads from these areas to the more accessible parts of the country. The remoteness of these western areas is the main constraint in their development especially as regards the growth of a mechanised export oriented agriculture since the costs of bringing in necessary inputs and moving the outputs for export, would be prohibitive under existing conditions. The Sudan has depended on railways, roads came rather later and as yet there is no national network of tarmac roads. The rural areas, as has been previously mentioned, rely on dirt roads which are impassable during the rainy season — three to four months a year. These dirt roads either act as feeder roads to the railways system if there is a railway system in the vicinity or else link the country with a local market town.

Trunk roads come under the supervision of the Department of Roads in Khartoum which has a budget of less than LS.50,000 per year for maintenance, less than LS.10 per kilometer for the roads they maintain. This sum is completely inadequate and the trunk roads are deteriorating in condition especially as drainage culverts are not repaired when broken so increasing the possibility of heavy rain sweeping away road surfaces. The local roads are the responsibility of the local authorities which in turn lack the money to maintain them. The usual treatment is to scrape the earth surface every two to three years, a process which over time lowers the surface of the roads, so that in the wet season they get flooded. Obviously a major investment in road improvement is a pre-requisite for agricultural development in the Sudan Rainlands. The problem of course is where the money is to come from, not only for their construction but also for maintenance. The national lorry fleet consists of about 50,000 vehicles and the average age is high. These trucks suffer from wear and tear from operating on dirt roads and the risk of overturning is high. During the wet season they also are liable to be bogged down in mud. In the dry season dust gets into working surfaces and breakdowns are commonplace. The poor state of the roads also means that travelling speeds are reduced. Like tractors, lorries suffer from shortages of spare parts and fuel.

The writer during the course of his fieldwork heard many complaints about the inadequacy and high costs of transport. Farmers complained of the poor state of the roads and of the high costs of moving materials to the farm and removing their produce from the farm to the market. Merchants centred their complaints on the inadequacies of the railway system and complained bitterly that delays often either lost them contracts or subjected them to penalty clauses, as a result of the non-fulfilment of contract delivery dates.

To ensure a steady flow of crops throughout the Sudan the transportation system must be efficient enough to get these crops to consuming areas and to the port in good time at minimum costs and with little wastage.

10.8 Storage

Storage is an essential part of the marketing process, crops are harvested at relatively short periods of the year and the demand by consumers is fairly constant throughout the year. Hence the need for an efficient storage system. Normally farmers are faced with cash flow problems and want to dispose of their crops as soon as possible even if they obtain lower prices by doing so.

The Sudanese farmer has one great advantage as regard farm storage in that no buildings are required to house grains during the long dry season.

---

*In Damazine area for example sesame is harvested in October - November and dura from January to February. It will not rain from these months until May. Once the torrential thunderstorms of the rainy season start any crop in the open will be lost.

The risk of crop damage is limited to insects, rodents, other pests and theft. A traditional peasant farmer stores grain for his own domestic use, these stores range from small pits in the ground (Matmora) to beehive structures made from mud and straw and standing on stilts. Grain stored by these traditional methods can be stored for quite a long period of time.

Off the farm, grain is stored by merchants and banks. As has been mentioned earlier in Chapter 3, some merchants in Gedaref use large pits (Matmoras) besides sheds and open yards. Farmers and merchants in debt to banks are supposed to deliver their produce as security for loans. Commercial banks at Gedaref and Damazine tended to store in open yards with the grain and oilseeds piled in sacks. The yards will be surrounded by high wire fences and a watchman is employed. The only large scale modern silos in the country belong to ABS.

The ABS manages two silos, one at Gedaref for bulk handling and storage with a capacity of 100,000 tons, the other in Port Sudan with a capacity of 50,000 tons. The major objectives of the silos are twofold, to carry reserve stocks from year to year in order to cope with years of scarcity caused by droughts, and within a given year, to help to stabilise prices and ensure a smooth flow of grains to the consumers. Without an adequate storage provision, prices fluctuate widely to the detriment of both the consumers and producers. These objectives are of course commendable. Excessively large price fluctuations are undesirable while the holding of reserve stocks not only helps to ensure the supply of basic foodstuffs, but also helps the country to take advantage of any sudden price rises in the international market.

The Port Sudan silo is situated in the only port of the country through which all the imports and exports of food grains have to pass.* Unaudited accounts show that during the period 1971 to 1975 this silo operated for four years at a profit and for one year at a loss. The main headache for the bank is the larger Gedaref silo which stores mainly dura and sesame. From 1969 to 1975 the annual intake fluctuated between 32,000 and 51,000 metric tons in spite of a total capacity of 100,000 metric tons. The silo was only fully utilised in 1970/71, when there was record production. Table 10.1 gives the unaudited silo accounts at 31st December 1975.

It will be seen that the accumulated losses at the two silos were over LS 1.2 million while nearly another LS 0.5 million was unaccounted for. The gross revenue for the smaller Port Sudan silo exceeded that of the larger Gedaref one, the difference in 1975 being nearly LS 0.2 million. The revenue per metric ton of storage capacity was LS 5.7 at Port Sudan against the very low figure of LS 0.87 for the Gedaref silo. The Gedaref silo operating costs ran at LS 1.4 per ton of storage capacity. The Port Sudan silo cleared its operating cost at LS 3.7 per ton of storage capacity but was brought into the red by heavy depreciation and interest charges. As has been mentioned earlier in Chapter 3, merchants and farmers are reluctant to incur the high costs of storing produce in the silos. These costs are not merely

* During the 1971—1975 years wheat and wheat flour represented the biggest import tonnage fluctuating annually between 110,000 and 160,000 tons. With the increase in Sudanese wheat production this item is expected to diminish. Some wheat and flour was stored at the Port Sudan silo.

Table 10.1

Agricultural Bank of Sudan Unaudited Silo Accounts Balance Sheet at 31 December 1975

Liabilities	LS	Assets	LS
Loan from Ministry of Finance	3,902,865	Cash	168,647
Interest (2%) accumulated	602,273	Sundry debtors	296,785
Miscellaneous	27,149	Miscellaneous	37,799
		Fixed assets less depreciation	371,656
		Loss (accumulated)	1,215,271
		Unaccounted for	427,129
Total	4,512,287	Total	4,512,287

Profit and Loss Statements for 1974 and 1975

A. Port Sudan Silo	1974	1975	B. Gedaref Silo	1974	1975
	......Lsd......			......Lsd......	
Gross revenue	272,339	277,370	Gross revenue	200,881	86,826
Expenditure			Expenditure		
Salaries and wages	45,670	51,600	Salaries & wages	70,904	81,500
Operating costs	113,915	120,778	Operating costs	56,709	63,175
Sub-total	159,585	172,378	Sub-total	127,613	144,675
Gross profit	112,754	104,992	Gross profit/(loss)	73,268	(57,849)
Less depreciation	79,129	80,262	Less depreciation	109,754	106,717
Interest	33,216	33,216	Interest	44,841	44,841
Net profit/(loss)	(409)	(8,486)	Net profit/(loss)	(81,328)	(209,407)

Source: Agricultural Bank of Sudan

the higher charges for using the silo but also include the indirect costs of weight losses through dehydration. Grains stored in pits in the ground do not suffer such a degree of weight loss. The writer would question the future viability of the Port Sudan silo if the Sudan Government policy of self sufficiency in wheat materializes. From his visit to the silo it seems very obvious it is imported wheat which keeps the silo from making too great a loss. Perhaps the ABS should consider ways and means of attracting farmers and merchants to use the silo more intensively. The private sector could not afford to under-utilize such an expensive capital asset as the Gedaref silo. More flexibility is necessary to meet the requirements of users.

Beside the two silos discussed above the ABS either own or rent another 117,250 metric tons of storage capacity situated in different parts of the country. This includes a further 10,000 metric tons rented capacity at Gedaref despite the fact that its silo there is under-utilized. Another 30,000 metric tons storage capacity is owned at Port Sudan again in addition to the silo. These warehouses are mainly used to store produce in sacks which has been delivered to the bank as security for loans. Table 10.2 indicates the existing ABS storage capacity other than the silos.

The history of the silos produce a cautionary example of the rather superficial tendency for people to recommend an increase in the provision of modern storage facilities as a panacea for some marketing constraints. It is obviously of little use to incur the high costs of constructing and maintaining modern plant which does not meet the needs of the community. Traditional methods of storage were not

Table 10.2 The Agricultural Bank of Sudan, Existing ABS Storage Capacity

Location	Capacity tons
Warehouses Owned	
Sennar	25,000
Kosti	25,000
Port Sudan	30,000
Total	80,000
Warehouses Rented	
Gedaref	10,000
Sennar	10,000
Kosti	4,000
Dilling (Debeibat)	10,000
Shendi	400
Dongola	1,000
Atbara	1,200
Wad Medani	150
New Halfa	500
Total	37,250

Source: Agricultural Bank of Sudan

superseded and presumably these met the needs of the trade at more reasonable costs.

10.9 Quality of produce and the need for grading

One of the purposes of grading is to enable buyers to purchase on description only, without having to examine each consignment individually. This of course facilitate trade especially in the international market, and cuts down cost. From the sellers' point of view grading enables him to enjoy the advantages of price differentials in that he will get higher prices for better quality. Whereas if he sold produce ungraded the chances are that the prices would be depressed by the presence of impurities and poorer quality produce of mixed quality.

Farmers sell their dura and sesame ungraded. When produce is sold in the auction markets, it can be inspected by prospective buyers before sale. To inspect all the sacks offered for sale would be a tedious task and usually according to the writer's experience a prospective buyer only samples a small proportion of the produce on offer. The chances are that they will make conservative price bids for the bulk of produce which of course they have not seen. If the produce has been graded before sale then the farmer would in all probability have obtained a higher price for graded quality produce.

The writer inspected farmers' consignments for sale at Gedaref auction market (the largest in the country for dura and sesame) and found that the great majority of consignments contained a high percentage of trash and other foreign materials. With sesame the consignments usually contained seed of different colours, another factor which will reduce their price. White seeds unlike coloured seed produce a colourless oil which commands a price premium since it can be used for blending with other vegetable oils. Likewise dura consignments often contained a mixture of grains of different colours and sizes. This in turn depresses prices. Produce is normally cleaned by the buyer after sale and he bears the cost of this operation both direct and indirect.*

Most marketing experts argue that quality improvements begin on the farm with the caveat that farmers will not improve quality unless they receive an increased benefit from doing so. Hence the writer would argue that produce should be graded before sale by an impartial inspector. This will help to secure payments on quality and does provide incentives to farmers to produce better produce. Eventually the improvements would make an impact on the world market and the Sudan would be expected to benefit from this better image.**

At present as has been mentioned in Chapter 4 dura is exported entirely by the private sector who make their own arrangements. Oilseeds however are the responsibility of the Sudan Oilseeds Company Limited who have been trying to improve the quality of the exported produce by inspection at Port Sudan.

---

*He pays the actual costs of the operation and bears the cost of weight losses from the removal of dirt and trash and undersized grain which fall through the sieve. For these reasons he discounts the price he pays for produce he has not inspected before sale.

**A senior official of the Ministry of Commerce, Khartoum, commented that produce of some other African countries which compete with Sudan in the world market enjoys a price premium over Sudan produce since the latter has an international reputation for poorer quality for those commodities which are not sold on grades.

But as yet the system is not working effectively.* Improving the quality of the crop is essential in a programme aimed at substantial increases in export earnings. Sudanese dura and sesame seeds can be upgraded through more efficient cleaning. Therefore, an orderly efficient marketing system for export of sesame and dura for the Sudan requires more attention and control to improve the overall quality of export crops.

10.10 Packaging the crop

Dura and sesame seed are normally packed in sacks imported from India and Bangladesh. The average net weight per sack is about 75 Kgs for sesame and 92 - 100 Kgs for dura according to variety. Farmers normally buy their own sacks for marketing the crop and sesame invariably is placed in new sacks because of the danger of leakage. The seed are very small so it is imperative that the sack has no holes and is in a condition to stand rough handling. Dura which has much larger seeds is often marketed in secondhand sacks. On purchase the buyer normally resacks the crop after cleaning and all produce for exports is put in brand new sacks.

The use of sacks has two major disadvantages. The first is the cost of the importing of new sacks. Total sacks imports ran at a cost of LS. 8,582,000 in the year 1975, the latest year for which figures are

---

*See page 175 and Appendix F1
The basic trouble is the lack of suitably trained staff while allegations of bribery are commonplace.

available. This heavy cost is in foreign exchange which has a very high opportunity cost in the Sudan. The second is the failure to exploit the cost savings potential of bulk handling.* Much of the rainfed dura is combined directly but bagged in sacks and even if combined by a tanker combine is then put in sacks. When it comes to storage as has been mentioned earlier, the Gedaref silo is equipped for bulk handling, but again sacks are emptied on arrival, the produce stored in bulk but again resacked on taking out of storage. The reason given for this resacking process is that Sudan railways will not accept bulk consignments, but instead require produce in sacks. At the time the silo was built the railway purchased some imported bulk grain carrying wagons, but these proved to be too long for the existing railway tracks with their many bends.

10.11 Processing

Oilseeds and grain processers play an important role in the overall marketing situation. For example sesame seed is an edible oilseed which is used commercially both in its natural seed form and also a raw material for the manufacture of edible oil. The oil is extracted from

---

*The Sudan Government established a Kenaf planatation and factory to produce Kenaf sacks as a substitute for the imported jute type. Unfortunately the sacks were too large and heavy to be handled easily by manual labour. Consequently farmers and merchants are reluctant to buy them with the consequence that the whole kenaf operation has run at a loss which might well had been avoided if the factory had done a little primary market research to discover what type of sack was demanded. The factory however continues to produce the wrong type of sacks because it is tooled up with the machinery which makes large sacks, the machines concerned have been imported from Europe where mechanical not manual handling is normal practice.

the seeds commercially by various processes. In the Sudan camel driven mills (Assaras) are still used. A considerable number of mechanised oil mills have been established in the Sudan which press large quantities of oilseeds and produce a surplus of oil for exports. (see Appendix El). Most of the countries producing sesame prefer to industrialize their sesame seed. Only Sudan and Ethiopia still export raw sesame in any quantity.

As regards dura, the demand for dura based manufactured products such as starch, and glucose is increasing at a rapid rate because of the expansion of industries such as textiles, sweets and fruit canning. Dura grain and plants are in great demand as animal concentrates and forage feeds in the expanding livestock and poultry industries. Both the industrial and agricultural demands for dura are likely to increase.

10.12 Finance and agricultural credit

A major complaint of farmers is the lack of institutional credit facilities which forces them to money lenders and merchants for credit. As has been mentioned in Chapter 4 the notorious sheil system is spreading all over the country especially into new areas when they are opened up for agricultural development. This system which ensures that farmers sell their crops at a greatly discounted price, in turn acts as a major constraint on both production and marketing.

Institutional credit in the Sudan is only available to those farmers who are credit worthy, mainly by the provision of adequate security for loans. The latter stipulation debars both the traditional small farmer and the struggling larger mechanised farmer in the rainfed dura and sesame production areas. These two categories have no other alternative but to resort to sheil. A recent study shows that prices received for dura and sesame under the sheil system average about 2/3 of the prices which would have been obtained if the crops had been sold at harvest in the normal way. Harvest time already is the period of the seasonal low in crop prices. So under sheil farmers tend to get a discount on the seasonal low price. Such a situation acts both as a disincentive and starves the farmer of capital which he could use to improve both the quantity and quality of his produce.

Successive Sudanese governments have been well aware of the constraints of the sheil system. Marketing and credit co-operatives have been tried but their record is very discouraging. One institution however has survived, this is the Agricultural Bank of the Sudan (ABS) and its activities will be discussed in the next paragraph.

ABS besides being a credit institution is also concerned in marketing. It was established in 1959 and had at first as its major objective, the financing of cotton schemes. This accounted for nearly 60 percent of the total credit advanced by the ABS during its earlier years. After the government nationalised the private cotton schemes in 1970 the ABS was instructed to cut down its loans to the rest of the private cotton sector. The bank first got involved in the financing of mechanised rainfed dura and sesame production in 1960 when it was instructed by the government to move into the Gedaref area and prevent a major cash flow problem halting the harvesting of the current crops (see page 93). From this date the bank has played an active role in both the production and marketing sides of the mechanised farming sector.

On the production side the bank provides medium term loans (up to five years) for land clearance and machinery purchase. Short term loans (for a maximum period of 15 months) are granted to meet the farmers' production, harvesting and marketing expenditure while the long term loans which are for the maximum period of 10 years, are granted on projects which bring returns on capital after a long period of time. Short term loans are advanced at an interest rate of 7 percent per annum while other loans pay 9 per cent per annum.

Farmers availing themselves of short term credit facilities are supposed to deliver their crops to the bank stores at harvest. The bank either sells the crop directly and then deducts the loans from the proceeds or will store the crop at a charge until prices rise, and then it sells the crop, retaining whatever is due and pays over the balance to the borrower. Farmers resent these charges and many have little scruples about cheating when they can. This usually takes the form of the non delivery of the entire crop to the bank stores. The bank in order to monitor the size of the farmers' crops has now started to harvest borrowers' crops with its own combines, operated in the areas of its branches. The writer is of the opinion that this is only a partial solution to the problem since some big farmers will bribe the combine crews.

Table 10.3 gives details of the short term, medium and long term loans dispensed by the ABS for 1971–1975. It will be noted that the amounts of short term loans rise rapidly during the short period, having broadly quadrupled between 1971–1975, partly as a result of inflation and partly because of the rapid spread of the mechanised farming sector into new areas. The amount advanced for medium and long term loans however are more erratic from year to year.

Table 10.3

The Agricultural Bank of Sudan
Loans disbursed during 1971 to 1975

Year	Short-term loans LS	Medium & long-term loans LS
1971	1,228,909	1,227,815
1975	1,775,233	544,492
1973	2,213,951	2,176,948
1974	3,031,346	761,058
1975	5,007,447	2,715,166

Source: Agricultural Bank of Sudan

Table 10.4 gives the detailed break-down according to the regional offices of the ABS of short, medium and long-term loans advanced in 1975. It will be noted as far as short-term loans are concerned the Gedaref and Sennar offices are responsible for approximately half the total. The Sennar office administer loans to the Damazine area which together with Gedaref are the major mechanised dura and sesame production regions. With medium-term loans the high figures retained by Sennar and Kosti are partly due to new mechanised farming developments at Damazine and Renk respectively. Detailed examination of the ABS records of 1975 show that the great majority of loan applications were successful.

Table 10.4 The Agricultural Bank of Sudan

Amount of loans advanced during 1975

Branches	Short-term loans LS	Medium-term loans LS	Long-term loans LS
Atbara	434,509	48,535	6,327
Dilling	375,258	109,277	-
Dongola	29,494	74,394	603
Gedaref	1,221,410	262,369	-
Khartoum North	96,569	129,895	6,356
Kosti	677,143	672,804	-
Medani	72,754	523,329	-
New Halfa	248,826	83,711	-
Sennar	1,299,308	751,709	-
Shendi	139,519	31,552	1,731
Zalingi	18,264	12,574	-
Headquarters	394,390	-	-
Total	5,007,444	2,700,149	15,017

Source: Agricultural Bank of Sudan

The ABS is supposed to give priority to loan applications from co-operative societies. The rate of interest charged on such loans is one percent below that charged to other borrowers. From January 1971 to July 1976 nearly LS 2 million were lent to 110 co-operatives societies. Approximately a third of these were situated in the rainfed mechanised farming areas. A high proportion of the money lent to mechanised farming co-operatives must have been lost since the majority of the societies had collapsed by 1977, through lack of support by members who were largely absentees, production difficulties & bad management. The ABS has not published statistics relating to the defaulting rate of co-operatives.

Table 10.5 gives a summary of short, medium and long-term loans outstanding as of 31 December 1975. It will be seen that the amounts involved exceeded LS 8 million. Detailed examination of the records suggest that some of this money has been overdue for a long time. For example the sums shown under the heading of headquarters in the table refers mainly to the bad debts carried over from the old private pump schemes which were nationalised in 1970. Similarly the large total shown for Atbara refers to pump irrigation schemes.*

One of the major cotton schemes near Atbara was the Zedab scheme and perhaps some of the outstanding debts refer to this scheme. Similarly Dongola and Shendi also in the Sahara Desert had private cotton schemes and accumulated debts could well refer to some of these. Given that private cotton schemes have been nationalised, it is unlikely that these debts will be recovered. Another area with largely outstanding

*Atbara is in the Sahara Desert and the only agriculture possible is that irrigated from the Nile.

Table 10.5 Agricultural Bank of Sudan

Short, Medium and Long-term loans outstanding at 31 December 1975

Branches	Short-term	Medium-term	Long-term
	LS	LS	LS
Atbara	1,319,058	25,728	40,630
Dilling	152,864	164,120	-
Dongola	27,440	80,671	106,637
Gedaref	659,733	229,849	-
Khartoum	305,327	442,999	-
Kosti	333,397	701,818	-
Medani	51,557	637,875	-
New Halfa	410,585	85,818	-
Sinnar	787,575	673,082	-
Shendi	202,837	125,556	55,726
Zalingi	14,272	56,802	11,054
Headquarters	638,594	17,781	12,855
Total	4,903,239	3,242,099	226,902

Grand Total all loans = 8,372,240.

Source: Agricultural Bank of Sudan

debts is New Halfa, where difficulties have been encountered in the development of the major scheme at Khashm El Girba. It is again probable that most of this money is lost. The outstanding debts of the mechanised farming sector are covered by the returns from Gedaref, Dilling and Sennar offices.

Another activity of the ABS which is said to be run profitably is the importation of agricultural machinery and agricultural inputs like fertilizers, insecticides and sacks and selling these to farmers on a hire-purchase basis. The decision for the ABS to enter the agricultural input trade was taken on the ground of costs saving. The authorities felt that by doing so the ABS would save paying a high margin charge to importers. It would seem however from the prices charged to farmers by the bank that this cost saving was not passed to farmers.

It is worth mentioning that the traditional farmers who account for over 50 percent of the cultivated area are scattered over all the country, the ABS has not been able to reach them. This is partly because of lack of infrastructure and partly because the bank is grossly understaffed. If ABS is to succeed it needs to be strengthened with both financial and technical assistance. This will help it to meet the demand for credit for farmers during the next six years plan when large scale agricultural developments are expected to be started.

CHAPTER 11

Summary and Conclusions

11.1 Area, production and average yield for dura and sesame

The study shows there has been great increase in the area and production of dura and sesame during the last two decades. These increases are mainly due to the opening up of new areas in the Central Rainlands for the mechanised production of dura and sesame. Unfortunately, after the initial euphoria* these developments proved very disappointing and the financial viability of the whole mechanised farming sector is in doubt. The trouble is twofold, crop yields fall quickly after the first three years of cultivation and secondly the input/output price ratios are deteriorating rapidly due to inflation and the prices of inputs which are not compensated for by similar rises in produce prices.

The input/output price relationships are beyond the control of producers and are largely beyond the control of the country itself. Rising costs of oil and machinery are world wide phenomena while the very precarious state of the Sudan balance of payments which leads to import licencing and local scarcities does not help producers who often resort to the high price black market to obtain essential fuel and spare parts.

Crop yields however are more under the control of farmers, research and extension workers in the Sudan itself. Unfortunately crop yields have been disappointing. The explanations given range from

*Sudanese politicians were claiming that the Sudan was the potential bread-basket of Africa and Middle East.

bad farming practices, and frequent droughts resulting from climatic changes to the exhaustion of the humus of the soil.* The need to raise crop yields was recognised by the World Bank who granted a loan of $16 million in 1978 to carry out adaptive trials to test possible new farming systems and machinery. Money was also included in that loan for other research and for the strengthening of the extension services.** The problem however is that by the time new farming systems have been tested and found to be technically and economically feasible, and then the new practices adopted by the great majority of farmers, many years WILL have elapsed and in the meantime given the continuation of the present unfavourable situation, many farmers will have given up. Consequently the remaining producers will be hard put to meet the growing demands for dura and sesame from the growing population, let alone providing a surplus for export. Only one redeeming feature as regards the farmers' interest can be seen. Growing internal shortages will force up farmgate prices, provided that the Sudan does not resort to importing more grains to meet its internal deficiencies. Given the present chronic shortage of foreign exchange, this does not seem very likely. The Government however is coming under increasing public criticism because of the escalating cost of living.

11.2 Cost of production of dura and sesame

Costs of production of both dura and sesame are increasing rapidly and the figures quoted in Table 2.4 and 2.5 for dura and Table 6.5 and

---

*See Table 2.1 for the area, production and average yield of dura for 1952-1975 and Table 6.1 for area, production and average yield of sesame for the same years,

**Announcement in the press.

6.6 for sesame are now out of date. The latest* prices available at the time of writing show that in the Damazine district there is an overall increase in input costs of 24 percent between December 1976 and December 1977, while the prices for dura and sesame increased only by 6 percent. The term of trade continue to move against the farmers, a tendency which must eventually be halted by growing internal shortages of dura and sesame.

The demand for dura is rising because of the natural growth of the population, growing urbanization and the influx of nearly one million refugees from Eritria. Dura is the staple grain of the country and it is unlikely in periods when real per capita incomes are not rising,** that there will be any major switch from dura to the higher priced and largely imported wheat and rice. Sudan is already a net importer of grains and given the continuance of the precarious balance of payments position, no major imports of grains are likely. Consequently given all this,prices of dura should rise in the Sudan.

The same argument applies to a lesser extent to sesame. To a lesser extent because other vegetable oils notably groundnut can be substituted. The prospects of internal shortage does not hold out an

---

* December 1977 is the last harvest period at the time of writing.

** Given the depressed state of Sudan's economy real per capita incomes are unlikely to rise in the immediate future.

optimistic outlook for export. The writer's opinion on export surplus requires first the solution of the problem of falling crop yields, for both dura and sesame, hence priority should be given to this factor.

11.3 Marketing cost for dura and sesame

The costs of marketing for dura have increased faster than the farmgate prices received by the producers.* This is shown by comparison given in Table 3.6 where the F.O.B. price per ton at Port Sudan had increased by an average Ls.16.6 between 1970/73 and 1974. This increase is largely due to rises in transport, storage and handling costs, which have continued to rise since 1974. Increases in Ushur and Gibana and other taxes have also added to costs.

Similarly the marketing costs of sesame have also gone up (see Tables 7.2 and 7.3). For example railway freight charges rose from LS. 6.72 per ton in 1973 to LS. 16.25 per ton in 1975/76, and the rates continue to rise.

The cost of sacks which are used for both dura and sesame has risen from LS 2.67 per 11 sacks in 1973 to LS. 4.39 in 1975/76, a 64 percent rise. In December 1977 farmers at Gedaref claimed that there was a shortage of sacks due to restrictions on imports to save foreign

*For more details about the cost of production for dura and sesame see Appendices B7, B8, B9, B10, B11, B12 for dura and Appendices E8, E9, E10, E11, E12 for sesame.

exchange. Consequently a black market had developed. Farmers also complained that the costs of hiring lorries to deliver the inputs to the farms and take away the outputs, had doubled in the last few years.* In fact they claimed that 25 percent of their total costs were accounted for transport charges. At the time of writing (September 1978) a chronic shortage of petrol and diesel oil in Gedaref has led to further major increases in the costs of transport, since many contractors are forced to obtain supplies from the black market where petrol is said to be £S. 2.50 a gallon. In other words inflation in costs has affected marketing as well as production.

11.4 Wholesalers of dura and sesame

There are only five big wholesalers of dura in the Gedaref region. It will be seen of the wholesalers who handled over 50 thousand sacks a year of dura, three handled over 500 thousand and accounting for 87 percent of the total handled. The largest merchants obtained their supply mainly from the auction market in Gedaref and also

---

* Evidence submitted by Gedaref Farmer's Union to a World Bank Mission.

on a very limited scale from the actual producer mainly those from mechanised crop schemes. It is interesting to know that all the large merchants of dura have their own schemes and naturally market their crop together with the produce of their relatives and friends. The writer found the larger wholesalers who are in a better financial position, held on to the grain for a longer period of time than did the smaller wholesalers. The small wholesalers resold their grain often after a week or two.

For the sesame crop the writer found just over 8 percent of the merchants purchased 40 percent of the total produce sold. The eight merchants sold mainly to the Oilseeds Company at Port Sudan. The 88 smaller merchants were responsible for about 60 percent of the quantity and either bought to resell to the Oilseeds Company or for the modern oil mills throughout the country. (See Lorenz curve Chapter 8 page 205).

As has been mentioned earlier that wholesalers provide credits to both producers and retailers who cannot obtain credits on much cheaper terms from Banks. The former include both the small producers who cannot provide adequate security and the large farmers who because of falling yields and escalating costs have defaulted in part or full on their previous loans. This latter category is increasing rapidly and many of these have had to use sheil. The consequence of all this is that ABS is losing money, the farmers are incurring heavy disguised interest charges which add further to their financial predicament and must hasten the time when they are forced out of business unless some dramatic improvement occurs in the level of returns.

The sheil price is in reality a discounted version of the estimated wholesale price at the time of the next harvest. The estimated base, the next harvest wholesale price, is of course very conservative and unlikely to include any allowances for expected major price rises, in other words it is based on past experience rather than anticipated future levels. The wholesalers have a vested interest in underpaying farmers especially in the time of inflation. The farmer usually is in a bad bargaining position as he needs the money urgently for weeding and harvesting his crop. Consequently the wholesale prices cannot be equated with farmgate prices where the sheil system is in operation. In Damazine in 1977 this discount amounted to 1/3 of the harvest price.

With this caveat a short summary now follows about fluctuations in wholesale prices. These vary between years, between months in the same crop year in a particular market (temporal variations) and between markets at the same point of time (spatial variations). The writer's statistical analysis is described in Chapter 4 for dura. The conclusions reached suggest that for particular markets there was a significant relationship between time and wholesale prices, but the differences between spatial prices were greater than the costs of transport between the low and high price markets. Also the differences between wholesale prices at different points of time at the same crop year appear to be greater than the costs of storage. These temporal and spatial factors indicate imperfections in the marketing system. In that dura is under the control of the private sector and that one exporting company is responsible for the great bulk of the country's exports, suggests the presence of a marketing system where collusion is feasible and greatly to the interest of the wholesalers concerned. As has been mentioned earlier a few large Gedaref merchants dominate the internal dura trade and have an incentive to increase profits by collusion and are all well known to one another socially and in some cases are related. There is a little doubt that in the past these merchants did very well financially. Some of their private fortunes are said to exceed LS one million *

The marketing of sesame is organised by the parastatal Sudan Oilseeds Company. A floor price is fixed which up to 1977 was alleged by farmers to be a maximum price, in that prices seldom went over this level. The producers sold to private merchants usually by auction and the merchants in turn delivered the crop to the Oilseeds Company warehouses in Port Sudan if it was for export, otherwise it was sold to oil pressers in the Sudan. By 1978 local shortages of vegetable oils led to auction market prices exceeding the minimum floor prices on a significant scale.**

11.5 Exports of dura and sesame

The total exports of dura from the Sudan fluctuate widely from year to year mainly due to the amount of dura available inside Sudan for export.*** Usually when grain stocks are low, the Sudan Government

*Reported to the writer by the manager of a commercial bank in Gedaref.

**The writer is indebted to a member of a leading wholesale family for this current information.

***See Table 5.8 and Figure 5.1

will move in to safeguard internal food supplies by banning exports. An export ban was in operation during the writer's visit to Gedaref 1975. This was lifted in December 1975 during the writer's stay, much to the relief of local merchants. Exports were allowed then until June 1977 when another ban was imposed which is still in operation in September 1978. All these regulations of course applied to the official trade although smuggling is said to continue, but made more difficult because of the Civil War in Ethiopia. These bans are resented both by the farmers who blame the low farmgate prices partly on government interference and by the merchants who find it difficult to operate under these "stop go conditions", which inhibit the fulfilment of contracts. The latest available U.N. trade statistic (1975) shows that the Sudan was then the largest exporter of sorghum in the world, a position which has now been lost and others have moved in to exploit the vacuum.*

The Sudan Oilseeds Company has the complete monopoly of exporting sesame. The buying policy of the Company has been described in Chapter 7 where a critique was made of the company's operations. Its inefficiency was considered to be a factor which both added to the costs of marketing and detracted from the prices received in the world market. This unhappy position partly rose from the inexplicable delays in shipping sesame from Port Sudan, delays which resulted in increased storage and bank charges on the one hand and the imposition of penalty clauses in export contracts for failure to meet deadline date . Since the Sudan is the largest exporter of sesame in the world, these inefficiencies are a serious matter in the very competitive environments of international marketing. The fact that the second largest supplier Ethiopia was and continues to be

---

*For example sorghum production in the Argentine has been expanding rapidly and in 1978 the exports of sorghum to Japan (a former customer of the Sudan) were said to be running over two million metric tons.

to the throes of a civil war has probably saved the Sudan's position as the leading sesame exporter.

Beside exporting sesame seed the Sudan exports sesame oil so benefiting from the value added to the raw material by processing. The writer's analysis shows that there is an upward trend to substitute oil exports for those of sesame, unlike the raw material the export of sesame oil is in the hand of the private sector. The by-products of local oil pressing, sesame oil cakes and meals are also exported in small quantities.*

11.6 Illegal marketing of dura and sesame

Illegal marketing covers the evasion of local produce taxes, export duties and in the case of dura exporting when a ban is in operation. In the case of sesame illegal marketing could cover paying the producer below the minimum floor price and exporting the crop by means other than the monopoly of the Sudan Oilseeds Company.

Farmers resent having to pay produce taxes especially when they are doing badly. Local produce taxes go to the local councils who like other government bodies in the Sudan are desperately short of money to meet the aspirations of the local people as regards education, health, clean water and other facilities. Consequently local authorities tend to be unmoved by the Farmers Union's pleas about possible tax reductions while the farmers in their turn grumble about the facilities provided by the local councils in general and the state of the roads in particular.

---

* See Table 9.6 and Figure 9.5 for sesame seed exports from the Sudan also see Table 9.7 and Figure 9.8 for exports of sesame oil from the Sudan.

Farmers therefore have little scruples about evading taxes and the local authorities have little sympathy for the farming community. The situation has developed rather into a battle of wits between the farmer and the tax collector. Since the local authorities suffer from a chronic cash shortage they are unable to employ enough personnel to control the situation and those personnel who they do employ faced by low salaries and rising living costs are subject to corruption. Consequently it would seem that the farmers especially the large successful farmers are in a position to avoid the full rigors of the taxation system. For them taxation has a strong voluntary element.

Another feature demonstrating the lack of effective control on the part of the authorities is the smuggling trade which at present is of diminishing importance not because of any improved control measures on the part of the Sudanese authorities, but because of the civil war in Ethiopia. Even then however some of the large operators in the smuggling trade have succeeded in "incentive payments" to the border guards of both sides to keep the trade going.

Illegal movements of grain both to avoid local taxation and for smuggling to Ethiopia, is normally done at night in lorries hired by the merchants. Roadblocks set up by the police or army are easily evaded and in the comparatively rare occasions when a lorry is caught, bribes can help evade conviction. When the writer was doing his fieldwork in Gedaref he heard several accounts of smuggling exploits. In Damazine he met the son of a former police superintendant at Gedaref who also supplied him with information about the extent of the smuggling trade, and the inability of the authorities both in the Condominium and in the independence period to cope with the situation.

The reason for the smuggling trade in that dura and sesame prices are higher in the Ethiopian side of the border than on the Sudanese side. There is also a lucrative returns cargo in the form of these commodities which may be in short supply in the Sudan and also easily transportable. As far as producers are concerned the existence of the widescale smuggling trade helps to keep up farmgate prices.

11.7 Co-operative marketing in Gedaref and Damazine

Co-operatives are often advocated as a possible solution to farmers marketing problems. In the Central Rainlands of the Sudan co-operatives were started for marketing and other societies for production. Unfortunately these have largely collapsed after a few years of operation, due mainly to inefficiency and the lack of loyalty of their members. If they are more efficient perhaps the members might support them better. Like other organisations the Ministry of Co-operatives lacks sufficient money to supervise the societies effectively.

11.8 Marketing services

Transport, storage, grading, purchasing and financing are all inadequate throughout the Sudan. For example lack of transport is the main constraint in the free flow of goods between surplus regions and results in high prices in the deficit regions and depressed prices in the surplus regions. The poor transport facilities result in the partial isolation of farmers from markets and one region of the Sudan from another especially in the rainy season when most of the roads are impassable. Allied to the poor transport infrastructure the equally defective telephones and mail systems. It is difficult in the light of all this for merchants to obtain precise information on the current market position in different parts of the country let alone move produce quickly from low price to high price areas — one of the basic requirements of a competitive market. In fact if a merchant hears that prices are far lower in a particular town compared to another, and decides to move produce, he faces the high risk that his consignment will be delayed by transport bottlenecks so that by the time the consignment arrives, the prices may have fallen. This situation further discourages the free movement of goods.

The same difficulties of communication prevent farmers from gaining an adequate knowledge of present market conditions and possible future trends. Consequently being conservative they continue to sow similar areas of the same crops year after year.* Because of cash flow problems they also tend to sell the crops at the same time every year, directly at harvest.

Storage facilities on the farm are very limited since in the past and doubtless in the foreseable future, farmers because of shortage of money sell their crops immediately at harvest retaining only the proportion needed for next year's seed and a few sacks for home consumption.**

At the wholesale level the usual practice is to store in sacks either in fenced open yards or in pits in the ground or occasionally

---

* Examination of farmer's cropping records in both the Gedaref and Damazine show that farmers' crop rotations remained very constant from year to year despite changes in market prices. Variations in the farm area sown to dura and sesame respectively were due to climatic conditions rather than price fluctuations. Very few farmers ever attempted a new crop.

** This study has been concerned with the larger farmers who operated commercially and provide the great bulk of the dura and sesame sold both for internal use and export.

in sheds or warehouses. Because of the long dry season it is possible to keep grain and oilseeds in the open for several months after harvest. The crops of course must be housed before the next rainy season starts.

Specialised storage facilities largely belong to the ABS which owns two large silos together with warehouses in the major production areas, and the major port of the country. Because of high storage costs (beside the actual charge, loss of weight occurs through dehydration) these stores are largely under-utilized and on the silos alone the ABS has a total accumulative deficit of over LS 1.2 million at the time of the writer's fieldwork.

Cleaning is another marketing function which tends to be neglected. In the export market the Sudan suffers from a poor reputation for quality compared with some of its competitors a reputation which discounts the values of good samples. Dura is sold according to variety and not the quality of the consignment. Sesame for export is subject to more sophisticated grading regulations but these are not effectively enforced. The deficiencies in grading handicap the marketing of the produce overseas. Foreign traders prefer to buy according to recognised grades (without inspecting each consignment). Consequently they would rather buy from a country with an effective grading system and if they buy from Sudan they would tend to pay less in order to cover the risks of low quality.

Credit is a major constraint both as regards enabling farmers to increase crop yields by adopting better farming practices and also lack of credit forces them to sell at the most disadvantageous time of the year directly at harvest. Hence unit cost of production tend to be higher than they would have otherwise been, and the prices obtained lower. The larger commercially oriented farmers could obtain credit from ABS provided they have not defaulted on previous loans. Many had, so had, to resort together with the smaller farmers to the notorious sheil system, with a consequence that the prices they received were at the time of the writer's fieldwork, around 2/3 of the prices prevailing at harvest time.

The ABS charges a higher rate of interest than the commercial banks who normally were reluctant to lend to agricultural producers unless they have adequate security and few have. The ABS was established to help remedy the problem, but as Chapter 10 shows the bank has accumulated large losses over the years mainly as a result of defaulting debtors and the unprofitable operations of its storage activities. The ABS is in urgent need of fresh capital in order to maintain its present scale of operations let alone expand.

The Commercial Banks however finance the larger merchants, all of whom have adequate security usually in the form of urban properties. In fact a Gedaref bank manager told the writer that he would lend large sums to particular merchants at a day or so notice because he knew them personally and was fully aware of their financial standing and business reputation. Consequently he has no fear of not getting his money back. The large merchant therefore had adequate access to capital and his borrowing facilities were very flexible, so he was able to come to quick decisions regarding the operation of his business transactions. In the writer's opinion if the communications systems in the Sudan were more satisfactory, many of these merchants would be quick to take the opportunities of moving produce from low to high price areas and so improving the competitiveness of the market.

The large merchants' advantage as regards access to capital as opposed to the farmer's disadvantages in this respect, puts the wholesaler in a stronger bargaining position than the producer. The merchants are well aware of this and quite naturally make the most of their bargaining strength. The fact that the Gedaref area as far as marketing is concerned is dominated by a small group of merchants (all interviewed by the writer) meant that the conditions for collusion are present and there is little doubt that the merchants exploited the situation, and imperfect competition resulted.

11.9 The relative efficiency of the Private and Public Sectors.

The present studies give a good comparison of marketing efficiency between the private and public sectors. The fact that dura is handled by the private and sesame by the public arises from political rather than economic decisions. Sesame and other oilseeds were in the past largely in the hands of three companies (see chapter 7 page 173) who were nationalised by the Government in 1970. This action dislocated the system at the time and further re-organisation was necessary when the parastatal Oilseeds Company was established. The effects of all these changes are still being felt and have had a depressing influence on the efficiency of sesame marketing.

In the past large private entrepreneurs played a vital role in the development of the Sudan's economy. They provided scarce risk capital, managerial quality of high efficiency and introduced new technologies into the country. The writer is of the opinion that this was done at a lower cost to the community than if undertaken either directly or indirectly by the state, whether under the colonial regime or in the independence era. The large profits alleged to be made by the private sector, are often cited as a reason for nationalisation. If in fact the private sector made excessive profits .., the surpluses accumulated were largely invested inside the Sudan, especially in the growing industrial sector — agro industries (oil mills, cotton spinning, textiles, fruits and vegetable canning and so on). Other enterprises included import substitution commodities, (tobacco, wood products, clothing, leather goods and others). All these activities contributed both to foreign exchange earnings and foreign exchange savings. The risks on these industrial ventures were borne by the private sector and profits where earned were subject to company taxation. Consequently the state bore no risks and benefited both from revenue collected in taxes and from the contributions to the balance of payments.

The private sector has another major advantage as regards decision making. This is much more flexible because of the shorter chain of consultation and command. State enterprise all over the world is subject to bureaucratic procedures which lead to great delays in decision making. This of course is a major constraint on efficiency. Too often parastatal organisations are started in a hurry with scant regard to whether they are the most appropriate form of organisation to tackle production and marketing problems. The efficient implementation of these organisations usually falls below the initial expectations. The consequences are that many incur large losses which have to be born by the community as a whole. Capital is a very scarce commodity in developing countries, and large scale losses may well set back the growth of an economy. At present (1978) the Sudan is going through a major financial crisis and excess government expenditure has been blamed for the situation. A moratorium has been imposed on the establishment of new government commercial enterprises, following the failure of many major projects.

Dura and sesame production and marketing prove a good example of the contrast between the public and private sectors. The state farms have incurred massive accumulated losses. The MFC which was set up to control and supervise the whole mechanised farming sector and in particular to run the State farms, is in a state of bankruptcy. A chronic shortage of money constrains its activities especially as regards providing technical services to the private sector. The result of this in the newer development areas is land abandonment after only a decade or so of the initial land clearance. Farmers who desert their land easily obtain fresh virgin land so practising a system of shifting mechanised cultivation which both destroys the eco—system and heightens the risk of wind and water erosion. Some alarm has been expressed especially after the International Conference — on Desertification — at Nairobi in 1977. The Professor of Geography at the University of Khartoum warned that the Sudan Government is in danger of turning the Central Rainlands into a dustbowl.

The private sector has been accused of strip mining the soil to snatch a quick profit. The Mechanised Farming Corporation (MFC) has the legal powers to prevent the exploitation of the soil, these should be enforced and a strong soil conservation programme operated.

Credit also presents an adverse comparison as regards the public sector. Before the banking system was nationalised, managers were able to use their judgement about who they lent to and could grant loans quickly. The main criteria for lending was the business reputation of their client, and his repayment record. The nationalisation of banking took away much of the decision making role of the local manager, and long bureaucratic delays followed. The State Agricultural Bank which now is the body responsible for the agricultural sector is criticised by farmers for delays in granting credits which lead to losses of farm output since timeliness is very important in farming operations. In addition the Bank has a bad record in recovering loans (about 50 percent of loans advanced are said to be overdue in 1977). A formal request has been made to the World Bank for a loan to restore the financial position of the Agricultural Bank.

In fact the record of the various parastatal organisations concerned with the production aspects of mechanised farming is very depressing and large losses have been incurred, while the support given to the private sector is not effective. Obviously something is radically wrong. In the writer's opinion this is largely due to inept management. The private sector could not carry such losses so in order to survive would have to make drastic improvements to managerial efficiency.

In comparison there is a successful large scale private sector of dura and sesame producers in the Gedaref area. In theory a person is only supposed to have 1000 to 1500 feddans each, but in practice these successful Gedaref operators have multiple holdings and some farm up to 25,000 feddans. This practice is considered inequitable, but the standards of farming are high and the land is kept in more or less permanent cultivation. Hence it would be desirable to encourage, not prohibit, successful private farmers expanding their activities. They would not only make a significant impact on the level of output, but also act as unofficial demonstration farms which would difuse good managerial and technical practices in their neighbourhood.

As regards marketing, the deficiencies of the State enterprises are reflected again. The losses on the Gedaref and Port Sudan silos add to the financial difficulties of the Agricultural Bank. By the year 1975 the outstanding debts on silos amounted to Ls 1.2 million. The main reason for the losses is that the silos capacities were not utilised to the full. In fact the writer wonders why the Bank did not make more efforts to attract customers, possibly by reducing its charges. Most of the cost of silos is fixed, consequently it is sensible to secure a high rate of utilisation. Another marketing function performed by the Bank is a by-product of its banking activities. Farmers in debt are supposed to deliver their crops at harvest to the Bank, which sells the crops on their behalf, then deducts the money owing together with storage charges and other expenses. Farmers complained bitterly about delays in selling and in receiving payments. One common complaint is that when sales are delayed, the Bank charges storage costs and interest for the extra period concerned. Farmers allege that these delays are due to the incompetence of the Bank.

The Bank is also concerned with the marketing of inputs to the agricultural sector. These inputs are farm machinery and spare parts. This trading enterprise was the only division of the Bank to operate at a profit in 1977, but the Farmer's Union argues that this profit is gained as a result of economising on after sale service; the high mark up of 25 percent on machinery sales is supposed to cover carrying a large range of spare parts, but it is alleged that the 25 percent margin largely went to cover the running expenses of the whole organisation. It is worth mentioning in this context that when it was proposed to transfer the machinery division to another organisation, the bank's officials argued that to do so would deprive the Bank of a very useful addition to its income, which went towards the costs of running its branches and head offices. On the other hand farmers found it very difficult to obtain spare parts for their machinery, and output fell as a result of breakdowns and delays. A recent World Bank recommendation was that the ABS should concentrate on banking activities and give up dealing in machinery and spare parts.

The general impression gained by the writer was that when banking, machinery and spare parts were in the hands of the private sector, the operation concerned went more smoothly.

The inadequacies of the public sector are a major constraint on transport. Sudan Railways Corporation is unsuccessful in maintaining running schedules and the delays in transportation are a major source of complaints. Road transport is in private hands and has a much higher reputation for the reliability of its services despite the adverse conditions of the roads which impose excessive wear and tear on vehicles. The railways have a smooth track so giving better service condition than the roads. Yet not only do trains fail to maintain their timetables, but the number of engines and wagons out of order at the same time is excessively high. It is doubtful whether the private road transport sector has such a high proportion of vehicles out of order at the same time. Sudan Railways has a cash flow problem and is actively seeking foreign loans for the purchase of spare parts for locomotives and rolling stock. The private road sector on the other hand is said to be very profitable and is attracting new entrants including several large Arab/Sudanese companies.

To turn to the actual marketing process the record of the parastatal Oilseeds Company is not very impressive. There is strong evidence of excessive marketing costs and the profits that are made go largely to the Government, not in the form of higher prices paid to producers. In fact it seems that the producer has to bear both the incidence of excessive marketing costs and the Government's share of profits. Farm gate prices are lower as a consequence and so act as a disincentive to producers. When the world prices of sesame increased significantly in the primary commodities world price boom in the early 1970's, the Sudanese producers did not benefit much.

Inefficiencies in the sesame marketing process include long delays in fulfilling export orders so incurring penalty clauses and excessive interest and storage costs. Examination of the Company's accounts show high charges incurred by failure to move crops quickly to the export markets. A common excuse given is that transport delays on Sudan Railways constrain the fulfilment of delivery contracts with the Company's customers. Another indication of the inefficiencies of the Company is shown by the ability of a rival private firm (Osman Salih Company) to deny markets and even on one occasion to secure the bulk of Sudanese oilseeds exports and then market them.

A comparison now follows between State and private marketing organisations. Dura marketing is dominated by a few large merchants and one firm in particular is responsible for 80 percent of exports, while at Gedaref a few large merchants were responsible for handling a major proportion of the crop (see Table 3.2). Taking the figures on page 142 and a F.O.B. world price at Port Sudan of LS 70 per m. ton, the distribution margins are in the region of 40 percent, a figure which because of its magnitude suggests very successful oligopolistic marketing practices. A study of the market prices both at Gedaref and F.O.B Port Sudan show that the rises in world prices in the period 1973 have not been passed on to the producer to any marked extent. Internally also there are other indications of imperfect competition. The spatial and temporal price differences are greater than would be expected under conditions of perfect competition. Perhaps the more dramatic evidence of this is given by some 1977 figures collected for the World Bank. Producers at Damazine were receiving in the region of LS 27.5 per m. ton at harvest time while consumers in Khartoum were paying the equivalent of LS 93.5 a m. ton. Assuming LS 6 for transport cost, the distribution margins are approximately LS 60 a m. ton; a profit margin of nearly 180 percent. This great profit resulted from a severe shortage of grain in Khartoum, partly because of a misjudgement of the size of the harvest and partly because of transport bottlenecks. When the writer revisited Khartoum in 1979, the retail price of dura was still high and grain was in short supply. Given these facts by which the private sector through oligopoly reaped excessive profits, it might be expected that the state with a monopoly organisation would do better if it wished to acquire a large profit from marketing.

From trade statistics and the profits and trading accounts of the Sudan Oilseeds Company, it is possible to gain some impression of underpayments of sesame producers. Taking a producer price of LS 107 per m. ton, (see Table 7.4), it will be seen from the same Table that costs of distribution excluding taxes amounted to LS 71 ? a m. ton. This however includes LS 41 ? approximately, for cost at Port Sudan, caused largely by delays in shipping so incurring additional storage charges. Against this must be set the very low charge of LS 4 per m. ton for dura incurred at Port Sudan. This would suggest that the private sector moves its produce quickly to overseas markets.

Another indication of inefficiency is given by the comparison of export prices given in Table 9.6 and the corresponding import prices in Europe. The export prices are given in Table 9.6 and the import prices in Table 9.17. It will be noted that there is a considerable gap between the F.O.B. price Port Sudan and the C.I.F. price Western Europe. A gap which to the writer widens very significantly after the nationalisation of oilseeds exports in 1970. By 1975 the export price of Sudanese sesame F.O.B. Port Sudan was LS 215 while the import price in W. Europe was LS 323 a very wide margin which must exceed its transfer costs. Some of the margins are due to penalty clauses and the writer suspects that often the officials responsible for the sale of the crop are fully aware of market possibilities. [illegible]. The gap between the export and import price is approximately LS 108, assuming that transport and insurance to Europe cannot account for a third of this, then the loss to the Sudan is considerable. Finally it is necessary to make an estimate of the excessive costs incurred by the Oilseeds Marketing Company in terms of the costs to the producer reflected in lower farm gate prices. Taking a farmgate price of LS 107 and taking only conservative allowances for extra storage costs incurred at Port Sudan and a loss of potential prices to be earned in Europe, this would have amounted to LS 56 a m. ton*.

---

* The gap between F.O.B. Port Sudan and C.I.F. Western Europe is approximately LS108 a m. ton on the figure given on the Table, assuming that of this represents C.I.F. charges, then the remaining one third is assumed to be accounted for in diffrence in compiling the trade statistics and the residual one third is then assumed to originate from the inefficiency of the Sudan Oilseeds Company. To this is then added LS 20 a m.ton the approximately ½ the access storage costs at the Port caused by delays in forwarding.

As regards dura it has been seen that the profits of the marketing system estimated at LS 24 a m.ton were only slightly smaller than LS 30 per m. ton received by the producer while the actual costs of marketing were considerably smaller at LS 16 a m. ton. Consequently it could be argued from these figures that the private sector performed the actual marketing process at not too great a cost but that profits were excessively high. Assuming that the profits were cut by half, this would have allowed another LS 12 a m. ton to the producer giving a farmgate price of LS 42 a m. ton. This represents a loss of 40 percent over the sale price he would have otherwise, given these assumptions.

The interesting point is that if the producer had received the higher prices estimated for dura and sesame, the whole mechanised farming in the Sudan would be in a much healthier financial position. Part of this plight can obviously be blamed on marketing. The private sector has exploited the producer by excessive profit, but it would seem that nationalisation has made the situation worse as regards the underpayment of producers since they have now to bear the heavy costs of the parastatal companies' inefficiencies. With both private oligopoly and state monopoly the producer loses and his consequent loss in incentives threatens the economy of the country. Competition in marketing is perhaps the answer both as regards the reduction in costs and profit margins.

APPENDICES

Appendix A1

Cotton: Area, Production and Average Yield by Production Centres and by Varieties

Final Estimates 1975/76 & Provisional 1976/77

Production/ Centre	Type of Cotton	Area (Fed.)	Prod. M.T.	Aver. yield Kg/F	Area (Fed.)	Prod. M.T.	Aver. yield Kg/f
Gezira & Managil	Egyptian	380,711	148,096	389	484,893	250,000	517
Kosti	"	82,742	35,082	424	67,475	23,000	341
E.Duiem	"	44,103	12,481	283	26,610	12,000	451
Blue Nile	"	88,786	42,608	480	70,334	37,000	526
Private Pump Scheme (White Nile)	"	6,145	2,609	425	10,000	5,000	500
Upper Nile	"	20,000	3,380	169	21,000	7,000	333
TOTAL (A)	Egyptian	622,469	244,256	392	680,312	334,000	491
New Halfa	Acala	81,290	20,322	250	109,105	56,000	513
Tokar	"	64,199	10,400	162	11,700	350	30
Gash	"	-	-	-	13,142	3,000	228
Suki	"	37,000	22,237	601	38,510	36,000	935
Guneid	"	14,914	6,338	425	15,000	7,000	467
Zeidab	"	6,616	3,868	603	6,616	3,650	552
TOTAL (B)	Acala	204,019	63,165	310	194,073	106,000	546
Nuba Mountains	American	118,837	18,657	157	115,660	16,000	138
Kassala (Gedaref)	"	15,000	2,025	135	14,000	4,000	286
Blue Nile	"	11,184	1,510	135	10,475	2,000	191
South Kordofan	"	3,326	665	200	3,000	300	100
Equatoria	"	16,000	1,760	110	12,000	1,500	125
TOTAL (C)	American	164,347	24,617	150	155,135	23,800	153
Grand Total (A+B+C)	All Varieties	990,835	332,038	335	1,029,529	463,000	442

Notes: Egyptian and Acala types are grown under irrigation except in Tokar and Gash, where Acala is grown on flooded land. American cotton is all rainfed.

Source: Ministry of Agriculture, Department of Agricultural Economics, Khartoum, Sudan.

Appendix A2

Sorghum (Dura): Area, Production & Average Yield 1975/76 (Final & 1976/77 (Provisional)

Production Centre	1975/76			1976/77		
	Area (feddan)	Prod. (M. T.)	Av. Yield (kg/fd)	Area (feddan)	Prod. (M.T)	Av. Yield (Kg/fd)
Northern Province	18,499	84,170	455	15,000	6,000	460
Nile Province	68,664	30,512	444	25,000	10,000	400
Khartoum Province	7,510	1,126	150	10,000	2,000	200
Gedaref (Mechn.)	2,000,000	706,000	352	1,910,000	522,000	273
Gash	50,000	12,500	250	19,000	4,000	211
Tokar	28,000	8,456	302	4,000	600	150
Gezira & Managil	341,257	204,754	600	324,000	174,000	542
Gezira (trad.)	90,000	22,500	250	70,000	16,000	229
Blue Nile (trad.)	535,000	105,400	310	300,000	72,000	240
Blue Nile (mech.)	499,361	153,803	308	524,000	180,000	344
Blue Nile (irrig.)	56,046	12,442	222	48,000	8,000	167
White Nile (trad.)	288,000	86,400	300	180,000	45,000	250
White Nile (Mech.)	51,020	32,467	636	140,000	42,000	300
Duiem (irrig.)	46,416	10,258	221	21,000	44,000	190
Kosti (irrig.)	21,060	3,180	151	9,000	1,400	155
South Kordofan (mech.)	182,440	69,330	380	193,000	86,000	445
South Kordofan (trad.)	376,351	101,614	270	356,000	130,000	365
North Kordofan (trad.)	328,869	53,960	164	631,000	91,000	144
South Darfur (mechn.)	5,700	695	120	7,000	800	114
South Darfur (trad.)	338,150	88,940	263	300,000	90,000	300
North Darfur (trad.)	54,500	11,556	212	12,000	49020	190
Upper Nile (mech.)	316,805	135,788	428	258,000	84,000	326
Upper Nile (trad.)	200,000	42,000	210	175,000	30,000	171
Bahr El Gazal (trad.)	200,000	32,000	160	225,000	45,000	200
Equatoria (trad.)	210,000	58,5800	180	230,000	58,000	252
TOTAL	6,313,648	2,068,651	328	6,016,000	1,749,800	291

Source: Ministry of Agriculture

Department of Agricultural Economics, Khartoum, Sudan.

Appendix A3

Sesame: Area, Production & Average Yield
1975/76 (Final) & 1976/77 (Provisional)

Production Centre	1975/76			1976/77		
	Area Fed.	Prod. M. T.	Av. Yield Kg/f	Area Fed.	Prod. M. T.	Av. Yield Kg/f
Gedaref (Mech)	346,630	33,600	97	400,000	59,000	152
Blue Nile (Mech)	142,835	13,700	96	117,000	16,000	137
Blue Nile (Trad)	150,000	15,000	100	75,000	11,000	140
White Nile (Trad)	122,260	22,200	182	80,000	10,000	220
North Kordofan (Trad)	950,520	71,300	75	900,000	63,000	70
S.Kordofan (mech)	12,105	950	77	35,000	-	135
S.Kordofan (Trad)	135,940	18,350	135	80,000	10,000	125
South Dafur (mech)	400	40	100	1,000	100	100
South Darfur (Trad)	175,000	15,750	90	175,000	17,000	-
North Darfur (Trad)	16,000	1,200	75	15,000	1,500	100
Upper Nile (Mech)	45,110	4,510	100	23,000	2,500	109
Upper Nile (Trad)	6,000	550	90	5,000	500	100
Bahr Elghazal (Trad)	75,000	10,500	140	88,000	10,000	110
Equatoria (Trad)	38,000	9,500	200	60,000	7,000	112
Total Sudan	2,215,800	217,150	98	2,054,000	207,600	101

Source: Ministry of Agriculture,
Department of Agricultural Economics, Khartoum, Sudan

Appendix A4

Groundnuts: Area, Production & Average Yield
1975/76 (Final) & 1976/77 (Provisional)

Production Centre	1975/76			1976/77		
	Area (fed.)	Prod (M.T.)	Av. Yield Kg/f	Area (fed.)	Prod. (M.T.)	Av. Yield Kg/f
Khartoum	200	120	600	200	100	500
Nile Province	1,070	642	600	1,000	500	500
Gezira & Managil	423,600	325,000	767	250,000	190,000	760
New Halfa	53,800	31,473	585	38,130	26,000	681
Blue Nile (Irrig)	46,320	32,424	700	45,000	33,000	723
Blue Nile (Trad)	15,000	4,500	300	15,000	5,000	350
White Nile (Trad)	78,150	28,130	360	80,000	28,000	350
White Nile (Irrig)	4,000	3,400	850	13,000	11,000	847
South Kordofan (trad)	132,864	47,830	360	59,000	24,000	406
South Kordofan (mech)	600	240	400	-	-	-
North Kordofan (Trad)	593,947	222,720	375	418,000	115,000	275
South Darfur (Trad)	434,790	136,680	314	600,000	198,000	330
North Darfur (Trad)	88,000	25,860	294	85,000	24,000	280
Upper Nile (Trad)	1,500	450	300	1,000	300	300
Bahr Elghazal (Trad)	50,000	12,500	250	65,000	17,000	260
Equatoria (trad)	115,000	33,000	290	115,000	33,000	290
Total Sudan	2,038,841	904,969	444	1,785,330	704,900	395

Source: Ministry of Agriculture
Department of Agricultural Economics, Khartoum, Sudan

Appendix A5

Percentage Shares of Main Customers
1971 — 1975
- Exports -

Customers	1971	1972	1973	1974	1975
E.E.C.	28.8	32.8	36.3	39.5	41.2
Other West Europe	2.7	4.0	4.8	4.5	5.0
Peoples Republic of China	4.9	10.0	14.9	9.7	8.6
U.S.S.R.	16.1	0.4	-	1.3	2.4
Other Socialist Countries	7.8	7.7	5.2	3.9	9.7
Egypt	5.0	5.7	3.8	3.0	7.0
Japan	7.2	8.1	11.1	3.5	4.3
U.S.A.	3.3	3.0	1.9	5.7	2.2
India	10.5	18.4	5.8	3.8	1.5
Others	9.2	9.9	16.2	25.1	18.1
Total	100.0	100.0	100.0	100.0	100.0

Source: Bank of Sudan (based on customs data)

Appendix A6

Percentage Shares of Main Suppliers

1971 – 1975

- Imports -

Suppliers	1971	1972	1973	1974	1975
E.E.C.	29.6	33.5	37.4	30.3	37.6
Other West Europe	4.4	3.4	3.6	3.1	3.3
Japan	4.2	4.0	6.0	5.3	10.1
U.S.A.	2.5	4.1	7.1	8.9	8.5
India	19.7	16.0	7.6	11.5	7.3
Peoples Republic of China	6.7	7.5	6.7	9.1	4.5
U.S.S.R.	6.8	4.5	6.0	1.0	0.4
Other Socialist Countries	9.7	7.7	7.0	4.7	4.7
Egypt	5.9	4.4	2.4	2.3	1.7
Others	10.5	14.9	16.2	23.8	21.9
Total	100.0	100.0	100.0	100.0	100.0

Source: Bank of Sudan (based on customs returns)

Appendix A7

Exports, Imports and Visible Balance of Trade

(1961 - 1975)

LS Million

Year	Exports [1]	Imports [2]	Surplus (+) or Deficit (-)
1961	62.2	82.9	- 20.7
1962	79.0	89.3	- 10.3
1963	78.7	97.6	- 18.9
1964	68.6	95.5	- 26.9
1965	67.9	72.2	- 4.3
1966	70.7	77.4	- 6.7
1967	74.7	81.2	- 6.5
1968	81.1	89.7	- 8.6
1969	86.2	92.5	- 6.3
1970	102.3	108.3	- 6.0
1971	114.4	115.4	- 1.0
1972	124.4	117.9	+ 6.5
1973	152.2	151.8	+ 6.4
1974	122.0	247.5	-125.5
1975	152.5	359.9	-207.4

Source: Department of Statistics 1961-1975

[1] Domestic exports and re-exports : value (FOB)

[2] Value (CIF)

Appendix A8

Exports of Vegetable Oils and Oilcakes from Sudan
1974 - 1975

	1974		1975	
Product	Quantity (M. tons)	Value (000LS)	Quantity (M. tons)	Value (000LS)
Groundnut oil	5,659	1,118	6,840	1,073
Groundnut cakes	21,501	1,405	31,776	915
Cottonseed oil	-	-	10,523	3,531
Cottonseed cakes	55,799	1,887	94,504	2,027
Sesame oil	1,321	340	294	79
Sesame cakes	3,613	258	30,213	972

Source: Statistics Section, Department of Agricultural Economics CAS. VOL 1, No. 2 June 1976.

Appendix A9

Sudan Exports of Livestock, Hides and Skins 1974 - 1975

Year	Cattle		Sheep and goats		Camels		Cattle Hides		Sheep skins	
	No. (000 head)	Value (000LS)	No. (000 head)	Value (000LS)	No. (000 head)	Value (000LS)	Quantity (tons)	Value (000LS)	Quantity (tons)	Value (000LS)
1964	12	300	80	574	25	1,126	1,572	251	1457	523
1965	10	276	224	1,683	33	1,804	3,539	529	1416	488
1966	17	519	161	1,956	31	1,688	3,461	623	1616	570
1967	9	282	215	1,746	48	2,976	2,162	451	1451	633
1968	7	219	201	1,719	53	3,146	3,018	580	1468	681
1969	9	314	225	2,985	54	3,410	3,250	618	1721	759
1970	21	769	174	1,525	45	2,872	3,744	694	1409	674
1971	21	823	122	1,127	51	2,418	3,350	626	2060	939
1972	14	571	152	1,552	-	-	3,839	766	2491	1822
1973	15	639	163	1,681	-	-	2,936	748	2531	1956
1974	25	1739	291	4,015	4	1	5,319	1181	2809	2493
1975	2	142	71	1,041	2	160	1,912	560	1947	1770

Source: Statistics Section, Department of Agricultural Economics, CAS Vol. 1 No. 2, June 1976.

Appendix A10

Imports of Foodgrains into Sudan
1964 - 1975

Year	Wheat		Wheat Flour		Rice	
	Quantity (000 tons)	Value (000LS)	Quantity (000 tons)	Value (000LS)	Quantity (000 ton)	Value (000Ls)
1964	55	1,620	52	1,898	6	264
1965	55	1,677	50	1,527	4	208
1966	81	820	88	2,830	5	270
1967	49	1,355	123	3,506	7	485
1968	66	1,427	79	2,138	7	485
1969	32	716	51	1,125	10	706
1970	195	4,601	25	657	11	677
1971	176	4,731	7	226	9	486
1972	225	4,925	5	164	9	514
1973	190	8,305	-	-	13	819
1974	94	7,095	16	859	9	1,164
1975	119	7,880	4	185	-	-

Source: Statistics Section, Department of Agricultural Economics, CAS, VOL. 1 No, 2.

Appendix A11

Imports of Agricultural Requisites into Sudan
1964 - 1975

Year	Fertilizers		Insecticides		Agricultural Machinery	Sacks
	Quantity (000 tons)	Value (000LS)	Quantity (000 tons)	Value (000LS)	Value (000LS)	Value (000LS)
1964	56	1,450	3	909	807	1,839
1965	78	2,141	6	1,414	609	2,539
1966	74	2,160	6	1,791	1,243	2,524
1967	66	2,089	6	1,937	888	1,465
1968	38	944	7	2,189	1,031	1,594
1969	60	1,397	6	2,134	1,011	2,409
1970	79	1,658	7	2,521	3,135	3,022
1971	86	1,937	10	3,709	1,250	3,751
1972	194	2,496	9	2,900	2,729	4,560
1973	189	3,760	9	3,536	1,499	5,093
1974	259	7,134	10	6,921	2,708	7,890
1975	167	7,331	12	11,501	5,058	8,582

Source: Statistics Section, Department of Agricultural Economics,
CAS, Vol. 1, No. 2

Appendix A12

Imports of Sugar, Tobacco and Beverages into Sudan
1964 - 1975

Year	Sugar and Sugar Preparations		Tobacco		Tea		Coffee	
	Quantity (000tons)	Value (000LS)	Quantity (000tons)	Value (000LS)	Quantity (000tons)	Value (000LS)	Quantity (000tons)	Value (000LS)
1964	124	8,918	755	1,204	11	3,643	11	1,842
1965	190	5,198	547	1,027	10	3,374	10	1,308
1966	88	3,073	420	778	12	4,072	14	1,930
1967	79	1,767	722	523	10	3,087	11	1,829
1968	166	4,422	690	1,109	13	4,013	15	2,091
1969	84	2,899	596	980	10	2,210	4	453
1970	138	5,307	655	1,138	19	4,955	14	1,909
1971	205	9,581	714	1,290	14	4,004	12	1,635
1972	138	9,982	836	1,773	18	6,138	14	1,889
1973	206	18,341	691	1,500	17	5,307	7	2,004
1974	121	29,821	876	1,955	17	5,857	9	2,709
1975	132	38,288	1,502	3,444	10	4,046	8	2,472

Source: Statistics Section, Department of Agricultural Economics, CAS. Vol. 1, No. 2.

Appendix B_1

Coefficient of determination (R square)	=	0.79790
Coefficient of multiple correlation (R)	=	0.89325
Standard error	=	509.38042
Durbin Watson Test	=	1.98365

Analysis of variance

Square of variation	Sum of square	Degree of Freedom	Mean square
Regression	21512556.72338	1	21512556.72338
Error	5448836.75726	21	259468.41701

Seq num	Observed Areas	Predicted Areas	Residual
1	1636.000	1823.598	-187.5978
2	2075.000	1969.397	105.6028
3	1934.000	2115.197	-181.1966
4	2135.000	2260.996	-125.9960
5	2492.000	2406.795	85.20455
6	2607.000	2552.295	54.40514
7	3252.000	2698.394	553.6057
8	3251.000	2844.194	406.8063
9	3067.000	2989.993	77.00692
10	3516.000	3135.792	380.2075
11	3517.000	3281.592	235.4081
12	3277.000	3427.391	-150.3913
13	3158.000	3573.191	-415.1907
14	3199.000	3718.990	-519.9901
15	3183.000	3864.790	-681.7895
16	4700.000	4010.589	689.4111
17	2823.000	4156.388	-1333.388
18	4299.000	4302.188	- 3.188
19	4894.000	4447.987	446.0128
20	4555.000	4593.787	- 38.78656
21	4095.000	4739.586	-644.5860
22	5301.000	4885.385	415.6146
23	5864.000	5031.185	832.8152

Appendix B_2

Coefficient of determination (R^2)	=	0.49791
RSQ change	=	0.49791
Coefficient of multiple correlation (R)	=	0.70563
Durbin Watson test	=	2.27974
Standard error Analysis of variance	=	272.02577

Square of variation	Sum of squares	Degree of Freedom	Mean Square
Regression	1541046.52249	1.	1541046.52249
Error	1553958.43359	21.	73998.02065

variables in the equation

variable	B	Beta	Std Error B	F
years	39.02273	0.70563	8.55106	20.826
(constant)	740.77075			

Dependent variable : Production from variable list 1
regression list 1

Seq num	Observed Production	Predicted Production	Residual
1	515.0000	779.7935	-264.7935
2	635.0000	818.8162	-183.8162
3	613.0000	857.8389	-244.8389
4	860.0000	896.8617	- 36.86166
5	1067.0000	935.8844	131.1156
6	1139.0000	974.9071	164.0929
7	1372.0000	1013.930	358.0702
8	1313.0000	1052.953	260.0474
9	1051.0000	1091.975	- 40.97530
10	1434.0000	1130.998	303.0020
11	1266.0000	1170.021	95.97925
12	1349.0000	1209.043	139.9565
13	1137.0000	1248.066	-111.0662
14	1095.0000	1287.089	-192.0889
15	851.0000	1326.112	-475.1117
16	1980.0000	1365.134	614.8656
17	870.0000	1404.157	-534.1571
18	1453.0000	1443.180	9.820158
19	1535.0000	1482.203	52.79743
20	1591.0000	2521.225	69.77470
21	1300.0000	1560.248	-260.2480
22	1638.0000	1599.271	38.72925
23	1744.0000	1638.293	105.7065

$$y = 740.77075 + 39.02273\ t$$
$$(272.025)$$

Appendix B_3

Coefficient of determination (R-Square) = 0.13890

Coefficient of determination adjusted = 0.13890

Coefficient of multiple correlation (R) = 0.37269

Durbin-Watson test = 1.48444

Analysis of variance

Square of variation	Sum of squares	Degree of Freedom	Mean squares
Regression	7785.81917	1	7785.81917
Error	48267.48518	21	2298.45168

Table of Residuals

Seq num	Observed Yield	Predicted Yield	Residual
1	315.0000	386.3370	-71.33696
2	306.0000	383.5632	-77.56324
3	317.0000	380.7895	-63.78953
4	403.0000	378.0158	24.98419
5	428.0000	375.2421	52.75791
6	437.0000	372.4684	64.53162
7	422.0000	369.6947	52.30534
8	404.0000	366.9209	37.07905
9	343.0000	364.1472	-21.14723
10	408.0000	361.3735	46.62648
11	360.0000	358.5998	1.400198
12	412.0000	355.8261	56.17391
13	360.0000	353.0524	6.947628
14	342.0000	350.2787	- 8.278656
15	267.0000	347.5049	-80.50494
16	421.0000	344.7312	76.26877
17	308.0000	341.9575	-33.95751
18	344.0000	339.1838	4.816206
19	314.0000	336.4101	-22.41008
20	349.0000	333.6364	15.36364
21	317.0000	330.8626	-13.86265
22	309.0000	328.0889	-19.08893
23	298.0000	325.3152	-27.31522

Appendix B4

Rainfall at Selected Centres during Production Seasons
July-November 1974 and 1975

1974

(Rainfall in Millimeters)

Centre	July	August	September	October	November	Total
Shendi	64.0	7.0	11.0	-	-	82.0
Atbara	14.0	16.8	5.6	TR.	-	364.0
Khartoum	55.4	12.0	4.7	TR.	-	72.1
Sennar	130.5	75.0	94.0	8.0	-	307.5
Singa	102.0	184.0	36.0	40.0	-	362.0
El Roseris	230.0	169.0	151.0	-	-	550.0
Gedaref	175.4	273.1	771.0	11.3	-	536.9
El Obeid	208.1	93.0	38.4	0.3	-	339.8
Bara	149.4	27.8	17.3	TR.	TR.	194.5
Um Rwaba	148.0	130.0	51.0	-	-	329.0
Zalinge	137.4	117.3	165.2	1.0	-	420.9
El Ginaina	143.2	179.2	34.0	TR.	-	325.9
Kadugli	168.7	143.3	179.2	89.7	5.2	586.1
Dilling	166.0	130.0	189.0	-	-	485.0
Malakal	163.0	90.0	270.0	46.0	11.5	580.5
Renk	131.6	105.5	63.3	36.0	-	336.4
Tonj	221.0	182.0	154.0	70.0	-	627.0
Juba	237.2	92.4	131.1	54.0	21.9	536.6
Yei	183.0	67.5	188.0	94.0	55.0	587.5
Yambio	115.5	261.5	160.0	126.5	13.5	677.0
Wau	70.9	233.5	200.7	81.8	4.6	591.5

1975

Centre	July	August	September	October	November	Total
Shendi	12.0	26.0	5.0	-	-	43.0
Atbara	3.5	88.7	TR.	-	-	92.2
Khartoum	0.9	50.1	47.8	-	-	98.8
Medani	66.9	230.4	75.8	6.5	-	379.6
Sennar	120.3	264.7	69.4	TR.	-	454.4
Singa	184.0	260.0	59.0	-	-	509.0
El Demazin	198.9	147.1	247.1	12.6	14.4	620.1
Kosti	60.3	259.4	87.1	-	-	406.8
El Duiem	21.7	181.2	21.0	TR.	-	223.9
Gedaref	125.2	187.1	207.7	1.7	1.3	523.0
Kassala	36.6	103.2	106.9	TR.	-	246.7
E. Obied	87.2	59.1	42.9	TR.	-	189.2
Rashad	87.1	97.0	279.0	40.0	-	509.1
Zalinge	154.6	135.7	147.3	TR.	-	437.6
El Ginaina	149.5	162.5	36.6	-	-	348.6
Nyala	98.2	106.4	66.9	-	-	271.5
Kadugli	170.2	119.4	178.8	44.7	-	513.1
El Fasher	52.4	52.7	28.3	-	-	133.4
Malakal	210.5	211.2	168.5	83.7	TR.	673.9
Renk	160.5	87.0	154.0	21.5	4.0	427.0
Juba	88.4	274.4	112.9	74.2	34.4	584.4
Wau	109.7	267.7	288.6	132.8	0.6	799.4

Source: Ministry of Agriculture, Department of Agricultural Economics, Khartoum, Sudan

Appendix 85

A. Number and Area of Mechanised Crop Production Schemes by Province (As of April 1976)

	Established up to 1968/69		1969/70 to-date		Total to-date	
Province	No. of Schemes	Area (Fed.)	No. of Schemes	Area (Fed.)	No. of Schemes	Area (Fed.)
Kassala	1,245	1,245,000	264	395,500	1,509	1,640,000
Blue Nile	298	298,000	559	746,000	857	1,044,000
White Nile	-	-	117	175,500	117	175,500
S.Kordofan	-	-	239	292,500	239	292,500
Upper Nile	60	120,000	202	303,000	262	423,000
Total	1,603	1,633,000	1,381	1,912,500	2,984	3,575,500

B. Mechanised State Farms

Farm	Area (feddan)
Samsam	70,000
Agadi	200,000
Habila	30,000
Nertity Um Agaga	70,000
Goz Rom	30,000

Source: Ministry of Agriculture, Department of Agricultural Economics, Khartoum, Sudan.

Appendix B6

The increase and percentage increase in the prices of one tractor during 1971 - 1975

Type of Tractors	Price in 1971 LSD	Price in 1975 LSD	Percentage increase
John Deere	1,965	6,269	219
Massey-Ferguson	1,754	5,663	223
Ford	1,594	4,837	204
Nuffield	1,424	4,300	202
One Trailer	780	1,140	49.1

The increases in the prices of gasoline

Year	Price/gallons/m/ms
1969	95.5
1971	130.5
1973	260.5
1975	360.5

Source: Mechanised Farming Corporation (MFC) 1975, Khartoum, Sudan

Appendix 87

Sorghum: (dura): Average cost of production per Feddan Gedaref Mechanised Crop Production Schemes 1975/76 season

Agricultural Operations	Cost of prod. per fed. LS	% Cost of total cost
1. Annual depreciation of machines	0.733	7.87
2. Annual insurance of machines	0.029	.31
3. Maintenance and spare parts	0.486	5.22
4. Houses depreciation	0.111	1.19
5. Barrel depreciation	0.057	.61
6. Permanent labour	0.851	9.14
7. Petroleum products & drinking water	1.196	12.84
8. Weeding	1.953	20.96
9. Harvesting	1.617	17.36
10. Transportation	0.768	8.25
11. Materials used	1.514	16.25
Total	9.315	100

Source: Ministry of Agriculture, Department of Agricultural Economics, Khartoum, Sudan.

Appendix B8

Sorghum (dura): Average cost of production/feddan
Mechanised Crop Production, Schemes
in Blue Nile Province 1975/76 season

Operation	Average cost fed. LS
Prep. of land & sowing:	
Fuel	.550
Driver's wages	.525
Greaser's wages	.125
Maintenance and spare parts	.600
Annual depr. of machines	.400
Seeds	.105
Weeding	.881
Sub-Total	3.186
Harvesting:	
Cutting & Collecting	1.675
Threshing by combine	.719
Sub-Total	2.394
Transportation:	
Sacking & porting	.188
Transport to the market	.401
Labour transportation	.242
Sub-Total	.831
Materials used:	
Sacks & strings	.763
Labour food	.800
Annual depr. of houses	.020
Sub-Total	1.583
Grand Total	7.994

NB. Average yield/feddan 5 sacks

Source: Ministry of Agriculture, Department of Agricultural Economics

Appendix B9

Sorghum: Average cost of Production/feddan
Blue Nile Province 1976/77 season

Item	LS per feddan
A. Fixed costs:	
1. Annual deprec. of agricultural machines	.887
2. Maintenance and spare parts	.539
3. Insurance	.036
4. Annual deprec. of local houses	.049
5. Annual deprec. of barrels	.067
6. Land rent	.050
7. Administration costs	.500
8. Interest on capital	1.244
9. Permanent labour	.958
Sub-Total	4.330
B. Running costs:	
1. Petroleum products & drinking water	1.284
2. Weeding	1.233
3. Harvesting	1.064
4. Transportation of crop	.788
5. Meals for labour	.605
6. Seeds	.067
7. Sacks and strings	.470
Sub-Total	5.511
Grand Total	9.841

Profit and loss account/feddan

Average yield	...sacks...	1.55
Price/sack	LS/m/ms	3.100
Total return	LS/m/ms	4.805
Total costs	LS/m/ms	9.841
NET		-5.036

Source: Ministry of Agriculture, Department of Agricultural Economics, Khartoum, Sudan.

Appendix B10

Sorghum: Average cost of production per feddan in two Districts of Northern Kordofan 1976-1977

Item	Eastern District	Western District
A. Agricultural Operation:	LS per feddan	
1. Cleaning	.780	.426
2. Pre-planting weeding	-	-
3. Planting	.640	.227
4. Replanting	-	-
5. First weeding	1.704	1.989
6. Second weeding	1.010	.426
7. Harvesting	2.567	.742
8. Sacking & handling	.086	.255
9. Transporting the crop	.766	.085
Sub-Total	7.553	4.150
B. Materials & Others:		
1. Seeds	.182	.227
2. Sacks	1.299	.460
3. Thread	-	.014
4. Meals for labour	-	.085
5. Shelter for labour	-	-
Sub-Total	1.481	.786
Grand Total	9.034	4.936

Profit of loss account per feddan:

	Eastern D.	Western D.
1. Yield per feddan (in sacks)	3.9	1.3
2. Price/sack	3.633	4.500
3. Total return	14.169	5.850
4. Total cost	9.034	4.936
5. Net	+5.135	+ .914

Source: Ministry of Agriculture, Department of Agricultural Economics, Khartoum, Sudan.

Appendix B11

Sorghum: Average production cost per feddan
Southern Kordofan Province 1976/77 season

Item	LS per feddan
A. Agricultural operations	
1. Land cleaning	.674
2. Pre planting weeding	.050
3. Planting	.604
4. Re-planting	.061
5. First weeding	1.427
6. Second weeding	.750
7. Harvesting	1.085
8. Transporting the crop	.331
Sub-Total	4.982
B. Materials	
1. Seeds	.348
2. Sacks	.581
3. Thread	.023
4. Meals for labour	.062
5. Shelter for labour	.015
Sub-Total	1.029
Grand Total	6.011

Total Return: 2.127 sacks @ LS/MMS 4.046 ... 8.606
Total Cost: 6.011

NET +2.595

Source: Ministry of Agriculture, Department of Agricultural Economics, Khartoum, Sudan.

Appendix B12

Sorghum: Average cost of production per feddan in two districts of Southern Darfur Province 1976/77 season

Item	Garsella	Ad Elganam
A. Agricultural operations	LS per feddan	
1. Land cleaning	.800	.649
2. Pre planting weeding	.337	-
3. Planting	.658	.487
4. Re-planting	.294	-
5. First weeding	1.523	2.841
6. Second weeding	.811	2.597
7. Harvesting	2.289	2.078
8. Sacking and handling	.173	.119
9. Transporting the crop	1.121	.243
Sub-Total	8.006	9.014
B. Materials & others:		
1. Seeds	.263	.162
2. Sacks	1.613	1.104
3. Thread	.054	.075
4. Meals for labour	.740	.325
5. Shelter for labour	.072	-
Sub-Total	2.742	1.666
Grand Total	10.748	10.680

Profit and loss account per feddan:

	Garsella	Adelganam
1. Yield/feddan (in sacks)	4.67	2.600
2. Price/sack	4.459	6.000
3. Total return	20.824	15.600
4. Total cost	10.748	10.680
5. Net	+10.076	+ 4.920

Source: Ministry of Agriculture, Department of Agricultural Economics, Khartoum, Sudan.

Appendix C1

Coefficient of determination (R square)	= 0.10433
Coefficient of multiple correlation (R)	= 0.32300
Standard error	= 165.80115
Durbin Watson Test	= 2.32802

Analysis of Variance

Square of variation	Sum of squares	Degree of Freedom	Mean Square
Regression	57636.81353	1	57636.81353
Error	494820.38643	18	57490.02147

Variable	B	Beta	Std Error B	F
Years	9.30977	0.32300	6.42940	2.097
(Constant)	460.44737			

Dependent Variable - Price

Seq num	Observed Price	Predicted Price	Residuals
1	552.0000	469.7571	82.24286
2	540.0000	479.0669	60.93308
3	469.0000	488.3767	-19.37669
4	614.0000	497.6865	116.3133
5	533.0000	506.9962	26.00376
6	289.0000	516.3060	-227.3060
7	430.0000	525.6158	-95.61579
8	408.0000	534.9256	-126.9256
9	523.0000	544.2353	-21.23534
10	689.0000	553.5451	135.4549
11	437.0000	562.8549	-125.8549
12	550.0000	572.1647	-22.16466
13	996.0000	581.4744	414.5256
14	335.0000	590.7842	-255.7842
15	381.0000	600.0940	-19.09398
16	764.0000	609.4038	154.5962
17	664.0000	618.7135	45.28647
18	483.0000	628.0233	-145.0233
19	458.0000	637.3331	-179.3331
20	849.0000	646.6429	202.3571

$$Y = 460.447 + 9.30977\, t$$

Appendix C2

Coefficient of determination (R square)	= 0.27149
Coefficient of multiple correlation (R)	= 0.52104
Standard Error	= 263.03147
Durbin Watson Test	= 1.92841

Analysis of Variance

Square of variation	Sum of squares	Degree of Freedom	Mean square
Regression	464085.7988	1	464085.79887
Error	1245339.95113	18	69185.55284

Variable	B	Beta	Std Error B	F
Years	26.41729	0.52104	10.19992	6.708
(Constant)	526.86842			

Dependent Variable - Price

Seq num	Observed Price	Predicted Price	Residual
1	556.0000	553.2857	2.714286
2	574.0000	579.7030	-5.703008
3	760.0000	606.1203	153.8797
4	649.0000	632.5376	16.46241
5	588.0000	658.9549	-70.95489
6	568.0000	685.3422	-117.3722
7	505.0000	711.7895	-206.7895
8	602.0000	738.2068	-136.2068
9	852.0000	764.6241	87.37594
10	854.0000	791.0414	62.95865
11	733.0000	817.4586	-84.45865
12	628.0000	843.8759	-213.8759
13	1579.0000	870.2932	708.7068
14	944.0000	890.7105	47.28947
15	965.0000	923.1278	41.87218
16	1343.0000	949.5451	393.4549
17	700.0000	975.9624	-275.9624
18	600.0000	1002.380	-402.3797
19	732.0000	1028.797	-296.7970
20	1353.0000	1055.214	297.7857

$$Y = 526.8684 + 26.4172\ t$$

Appendix C3

Coefficient of determination (R square)	= 0.58732
Coefficient of multiple correlation (R)	= 0.62235
Standard Error	= 176.07307
Durbin Watson Test	= 1.62578

Analysis of Variance

Square of variation	Sum of squares	Degree of Freedom	Mean Square
Regression	352774.69512	1	352774.69512
Error	558031.05489	18	31001.72527

Variable	B	Beta	Std Error B	F
Years	23.03233	0.62235	6.82782	11.37920
(Constant)	470.41053			

Dependent Variable – Price

Seq num	Observed Price	Predicted Price	Residuals
1	710.0000	493.4429	216.5571
2	566.0000	516.4752	49.52481
3	621.0000	539.5075	81.49248
4	586.0000	562.5398	23.46015
5	650.0000	585.5722	64.42782
6	336.0000	608.6045	-272.6045
7	419.0000	631.6368	-212.6368
8	637.0000	654.6692	-17.66917
9	615.0000	677.7015	-62.70150
10	836.0000	700.7338	135.2662
11	600.0000	723.7662	-123.7662
12	683.0000	746.7985	-63.79850
13	710.0000	769.8308	-59.83083
14	552.0000	792.8632	-240.8632
15	984.0000	815.8955	168.1045
16	1118.0000	838.9278	279.0722
17	985.0000	861.9602	123.0398
18	800.0000	884.9925	-84.99248
19	637.0000	908.0248	-271.0248
20	1200.0000	931.0571	268.9429

$$Y = 470.41053 + \underset{(6.8278)}{23.0323}\, t$$

1

Appendix D1

Coefficient of determination $(R)^2$	= 0.02745
Coefficient of multiple correlation (R)	= 0.16569
Standard error	= 42.19921
Durbin Watson Test	= 1.19330

Analysis of variance

Square of variation	Sum of square	DF	Mean square
Regression	1156.21231	1	1156.21231
Error	40957.78769	23	1780.77338

	B	Beta	Std Error B	B
Years	0.94308	0.16560	1.17040	0.649
(constant)	40.28308			

Seq num	Observed Quantity	Predicted Quantity	Residual
1	10	41.22615	-31.22615
2	24	42.16960	18.16923
3	55	43.11231	11.88769
4	72	44.05538	27.94462
5	8	44.99846	-36.99846
6	18	45.04154	-27.94154
7	55	46.88462	8.115385
8	12	47.82769	-35.82769
9	73	48.77077	24.22923
10	171	49.71383	121.2862
11	93	50.65692	42.34308
12	76	51.60000	24.40000
13	74	52.54308	21.45692
14	61	53.48615	7.513846
15	112	54.42923	57.57077
16	79	55.37231	23.62769
17	1	56.31538	-55.31538
18	55	57.25846	12.258462
19	2	58.20154	-56.20154
20	2	59.14462	-57.14462
21	37	60.08769	-23.08769
22	56	61.03077	-5.030769
23	46	61.97385	-15.97385
24	98	62.91692	35.08308
25	48	63.86000	-15.86000

$$Y = 40.28308 + 0.94308\ t$$
$$(1.1704)$$

1

Appendix D2

Coefficient of determination (R square) = 0.05060

Coefficient of multiple correlation (R) = 0.22493

Standard error = 1057.6690

Durbin Watson Test = 1.3373

Analysis of variance

Square of variation	Sum of Squares	Degree of Freedom	Mean Squares
Regression	1371160.5073	1	1371160.50732
Error	25729269.65331	23	1118663.89796

Seq num	Observed Value	Predicted Value	Residual
1	175.0000	1322.295	-1147.295
2	439.0000	1322.056	-883.0555
3	1075.000	1321.816	-246.8162
4	1136.000	1321.577	-185.5769
5	1580.000	1321.338	258.6624
6	356.0000	1321.698	-965.0982
7	112.0000	124.2829	-12.28293
8	295.0000	1320.620	-1025.620
9	1657.000	1320.380	336.6197
10	2793.000	1320.141	1472.859
11	1845.000	1319.902	525.0983
12	1479.000	1319.662	159.3376
13	1619.000	1319.423	299.5770
14	1539.000	1319.148	219.8163
15	1442.000	1318.944	123.0556
16	1872.000	1318.705	553.2949
17	1600.000	1318.466	-1302.466
18	1071.000	1318.226	-247.2265
19	43.00000	1317.987	-1274.987
20	61.00000	1317.748	-1256.748
21	1136.000	1317.509	-181.5085
22	1619.000	1317.269	301.7308
23	1246.000	1317.030	-71.02989
24	4817.000	1316.791	3500.209
25	2366.000	1316.551	1049.449

Variable in the Equation

Variable	B	Beta	Std Error B	F
Years	-0.23932	-0.2249	0.21616	1.226
(Constant)	1322.53414			

Dependent variable value

Appendix E1 Sesame Oil Mills in The Sudan

Name & Owner of Oil Mill	Place	No. of Pressers	Origin of press	Age of press	Capacity of the oil mill Ton/24 hrs.
Attaya Oil Mill	Ed Dueim	1	England	4	1.2
Abou Hassanin Oil Mill	" "	2	Germany	4	3.0
Ahmed Koko Oil Mill	Kosti	2	England	17	5
Artalo Oil Mill	Tandalti	1	India	6	5
Tandalti Oil Mill	Tandalti	2	Germany	9	6
Mohamed Oil Mill	Um Ruaba	3	Germany	10	10
Kordofan Oil Mill	Um Ruaba	1	India	13	13
The Sun Oil Mill	Um Ruaba	1	Germany	5	5
Kobani Oil Mill	Um Ruaba	3	Germany	20	10
Osman Mohmed Oil Mill	Um Ruaba	2	Germany	22	2.2
Nair Oil Mill	Um Ruaba	3	Germany	15	15
Mohamed El Hassan Oil Mill	Um Ruaba	2	Germany	8	19
Abdulla Oil Mill	Um Ruaba	1	Germany	14	6
Fadal Oil Mill	Um Ruaba	1	England	11	9
Abazeid Oil Mill	El Rahad	8	England	18	20
El Rahad Oil Mill	El Rahad	2	Germany	6	5.6
Mussa Oil Mill	El Rahad	1	Germany	16	9
El Watania Oil Mills	El Obeid	5	England	12	13
Awad Oil Mill	El Obeid	2	India	6	30
East Kordofan Oil Mill	El Obeid	2	England	9	5
The Soap Oil Mill	El Obeid	1	Germany	7	10
El Fadila Oil Mill	El Obeid	2	Germany	11	5
El Hallal Oil Mill	El Obeid	1	Germany	19	2

Appendix E2

Coefficient of determination (R square)	= 0.80329
Coefficient of multiple correlation (R)	= 0.89627
Standard error	= 303.05376
Durbin Watson Test	= 1.28308

Analysis of variance

Square of variation	Sum of squares	Degree of Freedom	Mean Sq.
Regression	7876048.69940	1	7876048.69940
Error	1928673.21347	21	91841.58159

Seq num	Observed Areas	Predicted Areas	Residuals
1	326.0000	270.3696	155.6304
2	422.0000	258.5889	163.4111
3	378.0000	346.8083	31.19170
4	636.0000	435.0277	200.9723
5	793.0000	523.2470	269.7530
6	365.0000	611.4664	-246.4664
7	747.0000	699.6858	47.31423
8	991.0000	787.9051	203.0949
9	693.0000	876.1245	-183.1245
10	981.0000	964.3439	16.65613
11	776.0000	1052.563	-276.5632
12	1184.000	1140.783	43.21739
13	1116.000	1229.002	-113.0020
14	948.0000	1317.221	-369.2213
15	924.0000	1405.441	-481.4407
16	1234.000	1493.660	-259.6601
17	1321.000	1581.879	-260.8794
18	1359.000	1670.099	-311.0988
19	1857.000	1758.318	98.68182
20	1921.000	1846.538	74.46245
21	2874.000	1934.757	939.2431
22	2193.000	2022.976	170.0237
23	2199.000	2111.196	87.80435

$$Y = 82.1\overset{5}{4}020 + \underset{(9.52641)}{88.21937}\ X$$

Appendix E3

Coefficient of determination (R square)	= 0.65390
Coefficient of multiple correlation (R)	= 0.80864
Standard error	= 428.31967
Durbin Watson Test	= 1.45851

Analysis of Variance

Sq. of variation	Sum of squares	Degree of Freedom	Mean sq.
Regression	7278757.18909	1	7278757.18909
Error	3852612.54944	21	3852612.54944

Seq num	Observed Production	Predicted Production	Residual
1	670.0000	858.5870	-188.5870
2	690.0000	943.3953	-253.3953
3	990.0000	1028.204	- 38.20356
4	1500.000	1113.012	386.9881
5	1530.000	1197.820	332.1798
6	1410.000	1282.628	127.3715
7	1540.000	1367.437	172.5632
8	1750.000	1452.245	297.7549
9	1270.000	1537.053	-267.0534
10	2230.000	1621.862	608.1383
11	1420.000	1706.670	-286.6700
12	1740.000	1791.478	- 51.47826
13	1840.000	1876.287	- 36.28656
14	1600.000	1961.095	-361.0949
15	1340.000	2045.903	-705.9032
16	1870.000	2130.711	-260.7115
17	1540.000	2215.520	-675.5198
18	1750.000	2300.328	-550.3281
19	2970.000	2385.136	584.8636
20	2960.000	2469.945	490.0553
21	3400.000	2554.753	845.2470
22	2378.000	2639.561	-261.5613
23	2816.000	2724.370	91.63043

$$Y = 773.77866 + \underset{(13.46411)}{84.80830}\, X$$

Appendix E4

Coefficient of determination (R^2)	= 0.62444
Coefficient of multiple correlation (R)	= 0.79021
Standard Error	= 27.25342
Durbin Watson Test	= 2.05748

Analysis of Variance

Sq. of variation	Sum of squares	Degree of Freedom	Mean sq.
Regression	25933.92194	1	25933.92194
Error	15597.73024	21	742.74906

Variables in the Equation

Variable	B	Beta	Std Error B	F
Years	-5.06225	-0.79021	0.85670	34.916
(Constant)	234.31225			

Dependent Variable: Yield From variable list 1

regression list 1

Seq num	Observied Yield	Predicted Yield	Residual
1	206.0000	229.2500	- 23.25000
2	164.0000	224.1877	- 60.18775
3	262.0000	219.1255	42.87451
4	236.0000	214.0632	21.93676
5	193.0000	209.0010	- 16.00099
6	250.0000	203.9387	46.06126
7	206.0000	198.8765	7.123518
8	177.0000	193.8142	- 16.81423
9	183.0000	188.7520	- 5.751976
10	238.0000	183.6897	54.31028
11	183.0000	178.6275	4.37230
12	147.0000	173.5652	- 26.56522
13	165.0000	168.5030	- 3.502964
14	169.0000	163.4407	5.559289
15	145.0000	158.3785	- 13.37846
16	152.0000	153.3162	- 1.316206
17	117.0000	148.2540	- 31.25395
18	129.0000	143.1917	- 14.19170
19	160.0000	138.1294	21.87055
20	154.0000	133.0672	20.93281
21	119.0000	128.0049	- 9.004941
22	109.0000	122.9427	- 13.94269
23	128.0000	117.8804	10.11957

$$Y = 234.3122 - \underset{(0.85670)}{5.06225}\,X$$

Appendix E5

Area of Sesame Seed by Province - As Percentage of Total Sesame Areas in the Sudan 1967/68 - 1976/77

Province	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77
Blue Nile	24	25	30	16	15	15	21	21	19	14
Kassala	26	24	24	15	19	14	20	17	16	19
Kordofan	45	35	41	64	58	66	49	53	49	49
Darfur	5	3	4	3	4	3	4	3	9	9
Upper Nile	-	-	1	-	1	1	2	2	2	2
Bahr El Ghazal	-	13	-	2	2	1	3	3	3	4
Equatoria	-	-	-	-	1	-	1	1	2	3
Total	100	100	100	100	100	100	100	100	100	100

Source: The writer's own computation from Table 6.2

Appendix E6

Production of Sesame Seed by Province as Percentage of
Total Production in the Sudan 1967/68 - 1976/77

Province	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77
Blue Nile	41	40	32	~~30~~ 20	42	23	28	26	24	19
Kassala	24	25	29	14	18	18	29	12	16	28
Kordofan	32	21	34	60	33	53	33	53	41	35
Darfur	3	-	3	2	2	2	5	3	8	9
Upper Nile	-	-	1	-	-	1	1	2	2	1
Bahr El Ghazal	~~4~~ x	14	1	4	4	2	3	3	5	5
Equatoria	-	-	-	-	1	1	1	1	4	3
Total	100	100	100	100	100	100	100	100	100	100

Source: The writer's own computation from Table 6.3

Appendix E7

Cost of production of sesame
Year 1975/76

Item	Cost/200 feddans LS
Food, water for labour	334
Seed	26
Wages	772
Machinery cost	434
Permanent labour	98
Hut maintenance and small tools	26
Sacks and transport to market	58
Total	1,748

Cost per feddan = $\frac{1748}{200}$ = LS 8.74

Labour	=	69% of total costs		
Machinery	=	25%	"	"
Another	=	6%	"	"
Total		100		

Appendix E8

Sesame: Average cost of production/feddan Gedaref Mechanised Crop Production Schemes 1975/76 season

Items	average cost feddan/L.S.
Annual Depreciation of Agric.	
Implements	0.733
Insurance	0.029
Maintenance and spare parts	0.486
Annual deprec. of local houses	0.111
Annual deprec. of barrels	0.057
Land rent	0.050
Administration cost	0.500
Interest on capital	1.244
Sub-Total (a)	3.210
Permanent labour	0.851
Petroleum products and drinking water	1.196
Weeding	2.436
Harvesting	3.333
Transporting the crop	0.363
Other materials used	0.704
Sub-Total (b)	8.883
Grand Total (a + b)	12.093

Profit & loss account/feddan

Average yield		.135 M. T.
Total cost	LS m/mS	12.093

Source: Ministry of Agriculture, Department of Agricultural Economics, Khartoum, Sudan.

Appendix E9

Sesame: Average cost of production/feddan Southern Darfur Province 1975/76 season

Item	Cost/Fed.
A. Agricultural operations	
1. Cleaning	1.063
2. Weeding before sowing	.481
3. Sowing	.602
4. Re-sowing	.060
5. Weeding (first)	1.358
6. Weeding (second)	.266
7. Harvesting	1.013
8. Sacking and handling	.234
9. Transportation	.107
Sub-Total	5.184
B. Materials & others	
1. Seeds	.535
2. Sacks	.631
3. Thread	.030
4. Labour food	.409
5. Local houses for labour	-
Sub-Total	1.605
Grand Total	6.789

Profit & loss account per feddan

Average yield		.110
Total cost	LS/mms	6.789

Source: Ministry of Agriculture, Department of Agricultural Economics Khartoum, Sudan.

Appendix E10

Sesame: Average cost of production/feddan
Northern Kordofan Province 1975/76 season

Item	Average cost/ Feddan (mms)
A. Agricultural operations	
1. Cleaning	.275
2. Weeding before sowing	-
3. Sowing	.231
4. Re-sowing	.105
5. First weeding	.807
6. Second "	.395
7. Harvesting	.488
8. Sacking, handling	.025
9. Transportation	.086
Sub-Total (a)	2.412
B. Materials & others	
1. Seeds	.249
2. Sacks	.140
3. Strings	.029
4. Labours food	.132
5. Local houses per labour	-
Sub-Total (b)	.550
Grand Total	2.962

Profit & loss account/feddan

average yield		.075 M.T.
Total costs	LS/mms	2.962

Source: Ministry of Agriculture, Department of Agricultural Economics, Khartoum, Sudan.

Appendix E11

Sesame: Average cost of producer per feddan in two districts of Northern Kordofan Province 1976/77 season

Items	Northern District	Eastern District
A. Agricultural operations:		
1. Land cleaning	.977	.206
2. Re-planting weeding	-	-
3. Planting	.319	.180
4. Re-planting	.057	.016
5. First weeding	1.555	1.364
6. Second weeding	0.599	.754
7. Harvesting	.833	.559
8. Sacking and handling	-	.009
9. Transporting the crop	0.081	.108
Sub-Total	4.421	3.496
B. Materials and others:		
1. Seeds	.267	.571
2. Sacks	.202	.182
3. Thread	-	
4. Meals for labour	.106	
5. Shelter for labour	-	
Sub-Total	.575	.753
Grand Total	4.996	4.249
Profit & loss account per feddan:		
1. Yield/Feddan (in sacks)	.7	.6
2. Price/sack	8.920	9.266
3. Total return	6.244	5.560
4. Total cost	4.996	4.249
5. Nett	+1.248	1.311

A.M./Saida.
Source: Ministry of Agriculture, Department of Agricultural Economics Khartoum, Sudan.

Appendix E12

Sesame: Average cost of production/feddan
Blue Nile Province 1976/77 season

Item	LS/mms
A. Fixed costs	
1. Annual depreciation of Agricultural machines	.887
2. Maintenance and spare parts	.539
3. Insurance	.036
4. Annual depreciation of local houses	.049
5. Annual depreciation of barrels	.067
6. Land rent	.050
7. Administration costs	.500
8. Interest on capital	1.244
9. Permanent labour	.958
Sub-Total	4.330
B. Running costs	
1. Petroleum products and drinking water	1.284
2. Weeding	1.566
3. Harvesting	.389
4. Transporting the crop	1.638
5. Meals for labour	.831
6. Seeds	.234
7. Sacks and strings	.246
Sub-Total	6.188
Grand Total	10.518

Profit & loss account/feddan

Average yield	sacks	.8
Price/sack	LS/mms	7.960
Total return	LS/mms	6.368
Total cost	LS/mms	10.518
Net	LS/mms	- 4.150

Source: Ministry of Agriculture, Department of Agricultural Economics, Khartoum, Sudan.

Appendix F1

First:

The Sudanese white sesame should contain:

1. 48 percent oil minimum
2. 2 percent foreign materials
3. 6 percent humidity maximum
4. 3 percent fatty acid
5. 3 percent other colour of sesame.

Second:

The Sudanese red sesame should contain:

1. It should be red or brown m
2. 52 percent oil content minimum
3. 2 percent foreign materials
4. 6 percent humidity
5. 3 percent fatty acid maximum
6. 3 percent other colour of sesame.

Third:

The mixed Sudanese sesame should have the following specification:

1. It contains red sesame, white sesame or brown.
2. 50 per cent of oil content minimum
3. 2 percent foreign materials
4. 6 percent humidity maximum
5. 3 percent fatty acid

Appendix F2

Illustration of how transport costs contribute to the high marketing margins obtaining in Sudan.

Source/ Destination	Approx. distance Km.	Mode	Bag/ Bulk	LSD/Ton	Unit cost LSD/ton/kg.
Gedaref-Port Sudan	750	rail	bulk	6.71	0.009
" "	750	road	bulk	16.50	0.022
Renk-Kosti	170	road	bag	5.50	0.032
Gedaref-Khartoum	480	road	bag	7.00	0.015
Habila-Dilling	80	road	bag	3.33	0.042
Habila-Dibeibat	120	road	bag	4.44	0.037
Habila-El Obeid	240	road	bag	7.78	0.032
Dilling-El Obeid	160	road	bag	5.56	0.035
Kadugli-El Obeid	300	road	bag	11.11	0.037

Source: I.M.F. Confidential Report, 1977

Appendix F3

Quantities of Sesame purchased by local merchants at Gedaref Auction Market During October and November 1974

Name	Quantity/Kantar
1. Danial Rofael	33487
2. Mohamed Ahmed Sanhori	29865
3. Muktar Babikir	19499
4. Abdel rahman Mohamed	18453
5. Hana Rofael	17612
6. Hashim Hassan	12930
7. Halwiate Saed	11996
8. El Tahir Talab	11742
9. Musa Mohamed Abas	9087
10. Abdel Hadi Ahmed	8333
11. El Sarief El Hashmi	7715
12. Danial Rofael	7657
13. Musa Abrahiem	7377
14. Madani Osman	7203
15. Abdelkariem Mohamed	6424
16. El tom Abdelgadir	6171
17. Moawya Mussa	5694
18. Yussif El Wakni	5486
19. Serelkatim Osman	5348
20. El Amin El Sayed	5099
21. Mustefa Nasir	5017
22. Badir El Deien Babikir	5005
23. Gossif Danial	4957
24. Mustafa El Sayed	4763
25. Mahmoud Ahmadi	4600
26. Kofu Nayil	4491
27. Suliman El Mubarak	4357
28. Mohamed Hassan	4318
29. Hashim Mahmoud	4025
30. Mahadi Ahmed	3990
31. Ahmed Gaffar	3953

32. Suliman Abrahiem	3841
33. Hassan Ahmed	3706
34. Faysal Mustapha	3667
35. Ali El Hadarri	3579
36. Abrahiem Abdel Magid	3526
37. Amanwiel Hanna	3458
38. Assam Abdelrahman	3449
39. Baballa El Taieb	3380
40. Babikir Mohamed	3140
41. Motasim El Mubarak	3183
42. Abdelraheim Mohamed	3023
43. Makkawi Hassan	2877
44. Abdelrahiem Abrahiem	2867
45. Ahmed El Azrak	2794
46. Yussif Arab	2786
47. El Sayed Abdelmagid	2752
48. Ahmed Kuboshia	2701
49. Mahmoud Arab	2461
50. George Danial	2391
51. Mohamed Mustapha	2340
52. El Naiema Abdelmagied	2239
53. Omer Abdelrahman	2187
54. El Taieb Abdelhafiz	2185
55. Mohamed Ahmed	2064
56. El Amin Ezaeldien	2027
57. El Taieb Elbashier	1960
58. Abdel Hafiz Mahmoud	1799
59. Hassan Assar	1765
60. Ahmed Omer	1693
61. Jadat Danial	1599
62. Elsir Omer	1454
63. Muamar Abdelrahman	1440
64. Elamam Abdalla	1425
65. Abdalla Yussif	1406
66. Eldirdiri Elmubarak	1362

67.	Abbas Elkidir	1264
68.	Abdelgadir Mohamed	1237
69.	Hashim Abdelmagied	1122
70.	Mohamed Hassan	1097
71.	Esmaiel Elsameen	1037
72.	Mustapha Elnaiema	1026
73.	Yussif Abou	956
74.	Mustaph Makawi	917
75.	Hylana Awadalla	900
76.	Hassan Abrahiem	832
77.	Rahama Mohamed	831
78.	Rabeieh Yussif	825
79.	Abdelrahiem Abbas	739
80.	Abdelmoniem Ali	716
81.	Awadalla Osman	637
82.	Elhadi Eltahir	584
83.	Madani Osman	460
84.	Salih Mustapha	424
85.	Eltayieb Abrahiem	330
86.	Eldawi Osman	317
87.	Ezadien Mustaph	313
88.	Mustapha Mohamed	239
89.	Abdalla Mohamed	226
90.	Osman Elkalifa	198
91.	Eljak Gyllany	197
92.	Yussif Abdellatief	156
93.	Abdelmagied Shams	144
94.	Abrahiem Mussa	138
95.	Mohamed Elhibir	91
96.	Hydar Mohamed	22

Appendix F4

Frequency Distribution of No of Merchants Purchasing different quantities of Sesame in Gedaref Auction Market in 1974

Quantity	Frequency	Total Quantity
Under 100 Kantar	2	113
100 to 1000 Kantars	22	11079
1000 to 2000 Kantars	16	22686
2000 to 3000 Kantars	14	34671
3000 to 4000 Kantars	13	45895
4000 to 5000 Kantars	7	31511
5000 to 6000 Kantars	6	31649
6000 to 7000 Kantars	2	12595
7000 to 8000 Kantars	4	29952
8000 to 9000 Kantars	1	8333
9000 to 10000	1	9087
over 10000 Kantars	8	155584
Total	96	393155

Source: Appendix F3

Appendix F5

The cumulative percentages of number of merchants and the cumulative percentages of the quantities of sesame purchased in Gedaref Auction Market

No. of Merchants			Total quantities purchased		
No.	%	Cumulative %	No.	%	Cumulative %
2	2.1	2.1	113	0.03	0.0
22	22.9	25.0	11079	2.9	2.9
16	16.7	14.7	22686	5.8	8.7
14	14.6	56.3	34671	8.9	17.6
13	13.5	69.8	45895	11.7	29.3
7	7.3	77.1	31511	8.0	37.3
6	6.3	83.4	31649	8.0	45.3
2	2.1	85.5	12595	3.2	48.5
4	4.2	89.7	29952	7.6	56.1
1	1.0	90.7	8333	2.1	58.2
1	1.0	91.7	9087	2.3	60.5
8	8.3	100.0	155584	39.5	100.0
96	100		393155	100	

Source: Computed by the writer using data from Appendix F3

Appendix F6

Coefficient of determination $(R)^2$	=	0.80109
Coefficient of multiple correlation (R)	=	0.89504
Standard error	=	474.11099
Durbin Watson Test	=	0.94684

Analysis of variance

	Sum of squares	DF	Mean Square	F
Regression	5431686.09515	1	5431686.09515	24.16432
Residual	1348687.40486	6	224781.23414	

Variable in the Equation

variable	B	Beta	STD Error B	F
years	359.61905	0.89504	73.15691	24.164
(constant)	1392.96429			

Dependent variable Price

Variable entered in step number 1 years

Segnum	observed price	Predicted Price	Residual
1	2000.000	1752.583	247.4167
2	2246.000	2112.202	133.7976
3	2748.000	2471.821	276.1782
4	2534.000	2831.440	-297.4405
5	2603.000	3191.060	-588.0595
6	3107.000	3550.679	-443.6786
7	3836.000	3910.298	- 74.29762
8	5016.000	4269.917	746.0833

$$Y = n \tfrac{1}{3}\, b_t \qquad (\ )$$

$$Y = 1392.9642 + 359.61905_t$$

$$(73.15691)$$

Appendix F7

Coefficient of determination $(R)^2$	=	0.79541
Coefficient of multiple correlation (R)	=	0.89186
Standard Error	=	524.89118
Durbin Watson Test	=	0.93101

Analysis of variance

	Sum of squares	DF	Mean Square	F
Regression	6426868.33929	1	6426868.33929	23.32711
Residual	1653064.53571	6	275510.75595	

Variable in the Equation

Variable	B	Beta	STD Error B	F
years	391.17857	0.89186	80.99247	23.327
(Constant)	1282.82143			

Dependent variable Price

Variable entered in step number 1 years

Seqnum	Observed Price	Predicted Price	Residual
1	2167.000	1674.000	493.0000
2	2070.000	2065.179	4.821429
3	2462.000	2456.357	5.642857
4	2689.000	2847.536	-158.5357
5	2714.000	3238.714	-524.7143
6	2924.000	3629.893	-705.8929
7	4133.000	4021.071	111.9286
8	5186.000	4412.250	773.7500

$$Y = a + b_t \qquad (\quad)$$

$$Y = 1282.8214 + 391.1785_t$$

$$(80.9924)$$

Appendix G1

Production of oilseeds by major producing countries
for 1965 - 1975

Production of soyabean

Countries	1965		1970		1975	
	Quantity '000 tons	Percentage of total	Quantity '000 tons	Percentage of total	Quantity '000 tons	Percentage of total
U S A	23014	63.0	30675	66.0	41406	60.6
China	11036	30.4	11645	25.0	12062	17.6
Brazil	523	1.4	1509	3.2	10200	14.9
U S S R	421	1.2	595	1.2	600	0.9
Indonesia	410	1.1	498	1.1	560	0.8
Japan	230	0.6	126	0.3	126	0.2
Canada	219	0.6	283	0.6	367	0.5
Korea D.P.R.	200	0.6	228	0.5	263	0.4
Korea Rep.	174	0.5	232	0.5	320	0.5
Mexico	58	0.1	215	0.5	545	0.8
Colombia	50	0.1	96	0.2	168	0.2
Others	170	0.4	372	0.9	1739	2.5
World	36505	100.0	46474	100.0	68356	100.0

Source: F.A.O. Production Yearbook 1975

Percentages computed by the writer

Appendix G2

Production of coconuts

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
Philippines	7089	26.9	6484	24.7	9069	30.6
Indonesia	5588	21.2	5413	20.6	6500	21.9
India	3741	14.2	4514	17.2	4589	15.5
Sri Lanka	2017	7.6	1882	7.2	1650	5.6
Thailand	1217	4.6	967	3.7	820	2.8
Mexico	1115	4.2	992	3.8	960	3.2
Malaysia	945	3.6	1071	4.1	794	2.7
Papua New Guinea	710	2.7	776	3.0	795	2.7
Brazil	265	1.0	328	1.2	236	0.8
Fiji	260	1.0	249	0.9	281	0.9
New Hebrides	209	0.8	227	0.9	260	0.9
Ghana	229	0.9	201	0.8	300	1.0
Mozambique	275	1.0	407	1.5	400	1.3
Tanzania	274	1.0	321	1.2	300	1.0
Others	2439	9.2	2443	9.3	2676	9.0
World	26373	100.0	26275	100.0	29630	100.0

Source: F.A.O. Production Yearbook 1975

Percentages computed by the writer

Appendix G3

Production of cottonseed

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
U.S.A.	5522	25.0	3690	16.7	3175	13.8
U.S.S.R.	3725	16.9	4416	19.9	5130	22.3
China	3298	14.9	3992	18.0	4337	18.9
India	1994	9.0	1908	8.6	2450	10.7
Brazil	855	3.9	1277	5.8	1015	4.4
Mexico	998	4.5	550	2.5	335	1.5
Egypt	961	4.4	884	4.0	730	3.2
Pakistan	834	3.8	1114	5.0	1020	4.4
Turkey	527	2.4	640	2.9	745	3.2
Syria	296	1.3	234	1.1	240	1.0
Sudan	289	1.3	467	2.1	432	1.9
Iran	273	1.2	288	1.3	328	1.4
Argentina	268	1.2	249	1.1	270	1.2
Peru	218	1.0	153	0.7	141	0.6
Nicaragua	207	0.9	112	0.5	200	0.9
Others	1797	8.1	2181	9.8	2416	10.5
World	22062	100.0	22155	100.0	22964	100.0

Source: F.A.O. Production Yearbook
Percentages computed by the writer

Appendix G4

Production of groundnuts

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
India	4263	26.6	6111	33.2	6600	34.5
China	2426	15.1	2772	15.0	2800	14.6
Nigeria	1978	12.3	1581	8.6	280	1.5
Senegal	1121	7.0	583	3.2	1300	6.8
U.S.A.	1084	6.8	1351	7.3	1750	9.1
Brazil	743	4.6	928	5.0	441	2.3
Indonesia	405	2.5	468	2.5	541	2.8
Argentina	439	2.7	235	1.3	375	2.0
South Africa	197	1.2	318	1.7	288	1.5
Cameroon	141	0.9	178	1.0	165	0.9
Burma	288	1.8	529	2.9	500	2.6
Niger	277	1.7	220	1.2	100	0.5
Thailand	131	0.8	190	1.0	260	1.4
Malawi	157	1.0	190	1.0	165	0.9
Mali	153	1.0	158	0.9	120	0.6
Others	2235	13.9	2616	14.2	432	17.9
World	16038	100.0	18428	100.0	19117	100.0

Source: F.A.O. Production Yearbook
Percentage computed by the writer

Appendix G5

Production of sunflower seed

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
USSR	5449	68.5	6144	62.0	5000	51.9
Argentina	757	9.5	1140	11.5	732	7.6
Turkey	160	2.0	375	3.8	488	5.1
South Africa	73	0.9	96	1.0	214	2.2
Bulgaria	357	4.5	407	4.1	420	4.4
Romania	564	7.1	770	7.8	724	7.5
Yugoslavia	265	3.3	264	2.7	273	2.8
Spain	9	0.1	159	1.6	338	3.5
USA	20	0.3	86	0.9	625	6.5
Others	303	3.8	476	4.8	826	8.6
World	7959	100.0	9917	100.0	9640	100.0

Source: FAO Production Yearbook
Percentages computed by the writer

Appendix G6

Production of palm oil

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Nigeria	574	42.4	488	26.5	470	16.1
Indonesia	157	11.6	217	11.8	370	12.7
Malaysia	150	11.1	431	23.4	1265	43.3
Zaire	120	8.9	180	9.8	165	5.6
Ivory Coast	18	1.3	50	2.7	140	4.8
Cameroon	44	3.2	54	2.9	60	2.1
Ghana	37	2.8	60	3.3	24	0.8
Angola	32	2.4	80	4.3	40	1.4
Colombia	2	0.1	27	1.5	57	2.0
Sierra Leone	39	2.9	48	2.6	55	1.9
Benin	27	2.0	36	2.0	47	1.6
Others	155	11.4	173	9.4	230	7.9
World	1355	100.0	1844	100.0	2923	100.0

Source: FAO Production Yearbook
Percentages computed by the writer

Appendix G7

Production of palm kernels

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
Nigeria	462	40.5	295	24.1	295	21.1
Brazil	186	16.3	235	19.2	245	17.5
Zaire	75	6.6	132	10.8	74	5.3
Sierra Leone	54	4.7	65	5.3	52	3.7
Benin	50	4.4	57	4.6	70	5.0
Cameroon	48	4.2	56	4.6	60	4.3
Malaysia	35	3.1	92	7.5	248	17.7
Indonesia	33	2.9	49	4.0	82	5.9
Ivory Coast	17	1.5	20	1.6	36	2.6
Mexico	25	2.2	28	2.3	30	2.1
Others	156	13.7	197	16.1	205	14.7
World	1141	100.0	1226	100.0	1397	100.0

Source: FAO Production Yearbook
Percentages computed by the writer

Appendix G8

Production of rapeseed

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
India	1474	28.1	1564	23.4	2211	27.2
China	1143	21.8	992	14.8	1254	15.4
Canada	513	9.8	1637	24.5	1635	20.1
Poland	504	9.6	566	8.5	700	8.6
France	334	6.4	592	8.9	532	6.6
Sweden	216	4.1	192	2.9	332	4.1
Pakistan	215	4.1	250	3.7	248	3.1
German Dem. Repub.	214	4.1	180	2.7	270	3.3
Fed. Repub. of Germany	107	2.0	185	2.8	199	2.4
Others	533	10.1	531	7.9	740	9.1
World	5253	100.0	6689	100.0	8121	100.0

Source: FAO Production Yearbook

Percentages computed by the writer

Appendix G9

Production of sesame seed

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
India	424	25.0	562	25.7	420	21.1
China	368	21.7	367	16.8	372	18.7
Sudan	160	9.4	297	13.6	~~271~~ 281	~~13.6~~ 14.1
Mexico	154	9.1	179	8.2	140	7.0
Burma	62	3.7	132	6.0	130	6.5
Nigeria	61	3.6	60	2.7	66	3.3
Colombia	58	3.4	28	1.3	30	1.5
Venezuela	54	3.2	125	5.7	60	3.0
Turkey	34	2.0	36	1.6	35	1.8
Ethiopia	33	1.9	81	3.7	100	5.0
Uganda	30	1.8	17	0.8	17	0.8
Afghanistan	34	2.0	30	1.5	40	2.0
Egypt	22	1.3	20	0.9	18	0.9
Bangladesh	24	1.4	27	1.2	29	1.5
Saudi Arabia	18	1.1	17	0.8	18	0.9
Thailand	18	1.1	20	0.9	33	1.7
Others	140	8.3	190	8.7	~~211~~ 201	~~10.6~~ 10.1
World	1694	100.0	2188	100.0	1990	100.0

Source: FAO Production Yearbook

Percentages computed by the writer

Appendix G10

Production of safflower seed

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
USA	271	57.8	170	25.6	180	18.3
Mexico	80	17.1	288	43.4	31	54.1
India	75	16.0	142	21.4	196	20.0
Ethiopia	28	6.0	36	5.4	25	2.5
Australia	10	2.0	9	1.4	18	1.8
USSR	3	0.6	7	1.1	3	0.3
Israel	1	0.2	-	-	2	0.2
Turkey	1	0.2	1	0.2	1	0.1
Spain	-	-	8	1.2	17	1.7
Others	-	-	2	0.3	9	0.9
World	469	100.0	663	100.0	982	100.0

Source: FAO Production Yearbook

Percentages computed by the writer

Appendix G11

Coefficient of determination (R^2)	= 0.09899
Coefficient of multiple correlation (R)	= 0.31462
Standard Error	= 151.91437
Durbin Watson Test	= 2.22237

Analysis of Variance

	Sum of square	DF	Mean Square	F
Regression	354961.10588	1	35496.10588	1.53809
Residual	323091.64412	14	23077.97458	

Variable in the Equation

Variable	B	Beta	STD Error B	F
Years	10.21765	0.31462	8.23871	1.538
(Constant)	736.02500			

Dependent variable .... Quantity

Seqnum	Observed Quantity	Predicted Quantity	Residual
1	764.0000	746.2426	17.75735
2	625.0000	756.4603	-131.4603
3	772.0000	766.6779	5.322059
4	696.0000	776.8956	-80.89556
5	1014.000	787.1132	226.8868
6	706.0000	797.3309	-91.33088
7	737.0000	807.5485	-70.54853
8	759.0000	817.7662	-58.76618
9	847.0000	827.9838	19.01618
10	1126.000	838.2015	287.7985
11	819.0000	848.4191	-29.41912
12	863.0000	858.6368	4.363235
13	865.0000	868.8544	-3.854412
14	924.0000	879.0721	44.92794
15	1079.000	889.2897	189.7103
16	570.0000	899.5074	-329.5074

$$y = z + b_t$$

$$y = 736.025 + 10.2176_t$$
$$(8.23871)$$

Appendix E12

Coefficient of determination $(R)^2$	=	0.21470
Coefficient of multiple correlation (R)	=	0.46336
Standard Error	=	2334.77297
Durbin Watson Test	=	3.15612

Analysis of Variance

Square of variation	Sum of squares	DF	Mean Square
Regression	5961474.06030	1	5961474.06030
Error	21804659.28344	14	5451164.82086

Variable in the equation

Variables	B	Beta	STD Error B	F
Years	583.65714	0.46336	558.11749	1.094
(Constant)	13440.86667			

Dependent variable value from variable list
regression list

Seqnum	Observed value	Predicted Value	Residual
1	13905.00	14024.52	-119.38
2	12875.00	14608.18	-1733.181
3	17447.00	15191.84	2255.162
4	14755.00	15775.50	-1020.495
5	19165.00	16359.15	2805.848
6	14755.00	16942.81	-2187.810
7	17983.00	17526.47	+456.53
8	20645.00	18109.26	+2535.74
9	19058.00	18693.78	+354.22
10	26010.00	19277.44	+6732.56
11	23178.00	19861.09	+3316.91
12	24854.00	20444.75	+4410.25
13	17559.00	21028.41	+3469.41
14	36036.00	21612.06	+14423.94
15	42278.00	22195.72	+20082.28
16	24510.00	22779.38	+1730.62

$$y = 13440.866 + \underset{(558.1174)}{583.6571\,t}$$

Appendix G13

Coefficient of determination $(R)^2$	= 0.63587
Coefficient of multiple correlation (R)	= 0.79741
Standard Error	= 48.46924
Durbin Watson Test	= 1.48415

Analysis of variance

Square of variation	Sum of square	DF	Mean square
Regression	57434.00294	1	57434.00294
Error	32889.74706	14	2349.26765

Variable in the equation

Variable	B	Beta	Std Error B	F
Years	12.99706	0.79741	2.62861	24.448
(Constant)	150.90000			

Dependent variable - price

From variable list

Regression list

Seqnum	Observed price	Predicted Price	Residual
1	182.0000	163.8971	18.10294
2	206.0000	176.8941	29.10588
3	226.0000	189.8912	36.10882
4	212.0000	202.8882	9.111765
5	189.0000	215.8853	-26.88529
6	209.0000	228.8824	-19.88235
7	244.0000	241.8784	2.120588
8	272.0000	254.8765	17.12353
9	225.0000	267.8735	-42.87353
10	231.0000	280.8706	-49.87059
11	283.0000	293.8676	-10.86765
12	288.0000	306.8647	-18.86471
13	203.0000	319.8618	-116.8618
14	390.0000	332.8588	57.14118
15	392.0000	345.8559	46.14412
16	430.0000	358.8529	71.14706

$$y = 150.900 + \underset{(2.62861)}{12.99706t}$$

Appendix G14

Coefficient of determination $(R)^2$	= 0.00945
Coefficient of multiple correlation (R)	= 0.09721
Standard Error	= 1333.41924
Durbin Watson Test	= 2.38710

Analysis of Variance

Square of variation	Sum of square	Degree of freedom	Mean Square
Regression	237468.26538	1	237468.26538
Error	24892096.17211	14	1778006.86943

Variable in the equation

Variable	B	Beta	Std Error B	F
Years	36.42794	6.09721	72.31481	0.134
(Constant)	713.55000			

Dependent variable: quantity - from variable list

regression list

Segnum	Observed Quantity	Predicted Quantity	Residual
1	817.0000	739.9779	77.02206
2	972.0000	766.4059	205.5941
3	2179.000	792.8338	1386.166
4	781.0000	819.2618	-38.26176
5	786.0000	845.6897	-59.68971
6	616.0000	872.1176	-256.1176
7	720.0000	898.5456	-178.5456
8	607.0000	924.9735	-317.9735
9	182.0000	951.4015	0769.4015
10	190.0000	977.8294	-787.8294
11	41.00000	1004.257	-963.2574
12	50.00000	1030.685	-980.6853
13	176.0000	1057.112	-881.1132
14	5260.000	1083.541	4176.459
15	26.00000	1109.969	-1083.969
16	1608.000	1136.397	471.6029

$$y = 713.5500 + \underset{(72.3148)}{26.4279t}$$

Appendix G15

Coefficient of determination $(R)^2$	= 0.53245
Coefficient of multiple correlation (R)	= 0.72969
Standard error	= 29.21565
Durbin Watson Test	= 1.09620

Analysis of variance

Square of variation	Sum of square	Degree of freedom	Mean Squa
Regression	13608.23824	1	13608.238
Error	11949.76176	14	853.55441

Variable in the equation

Variable	B	Beta	Std Error B	F
Years	6.32647	0.72969	1.58444	15.943
(Constant)	114.22500			

Dependent variable: price - from variable list

regression list

Seqnum	Observed Price	Predicted Price	Residual
1	122.0000	120.5515	1.448529
2	143.0000	126.8779	16.12206
3	158.0000	133.2044	24.79559
4	142.0000	139.5309	2.469118
5	127.0000	145.8574	-18.85753
6	153.0000	152.1838	0.8161765
7	163.0000	158.5103	4.489706
8	173.0000	164.8368	8.163235
9	146.0000	171.1632	-25.16324
10	154.0000	177.4897	-23.48971
11	195.0000	183.8162	11.18382
12	173.0000	190.1426	-17.14265
13	145.0000	196.4691	-51.46912
14	168.0000	202.7956	-34.79559
15	257.0000	209.1221	47.87794
16	269.0000	215.4485	53.55147

$$y = 114.225 + \underset{(1.5844)}{6.32647t}$$

Appendix G16

Coefficient of determination $(R)^2$	= 0.01453
Coefficient of multiple correlation (R)	= 0.12055
Standard error	= 1123.00424
Durbin Watson test	= 2.02476

Analysis of variance

Sq.of variation	Sum of square	Degree of freedom	Mean square
Regression	74393.19995	1	74393.19995
Error	5044554.13330	14	1261138.53333

Variable in the equation

variable	B	Beta	Std Error	F
Years	-65.20000	-0.12055	268.44936	0.059
(constant)	1657.86667			

Dependent variable - value from variable list regression list

Seqnum	Observed value	Predicted Value	Residual
1	997.0000	1592.667	-895.6667
2	1389.000	1527.467	-138.4667
3	3443.000	1462.267	1980.733
4	1109.000	1397.067	-288.0667
5	998.0000	1331.867	-333.8667
6	942.0000	1266.667	-324.6667
7	1173.000	1201.467	-28.467
8	1050.000	1136.266	-86.266
9	265.0000	1072.066	-807.066
10	292.0000	1005.866	-713.866
11	79.00000	940.666	-861.666
12	86.00000	875.466	-789.466
13	255.0000	810.266	-555.266
14	8836.000	745.066	+8090.934
15	66.00000	679.866	-613.866
16	432.0000	614.866	-182.866

$$y = 1657.8667 - \underset{(268.449)}{65.2000t}$$

Appendix G17

Coefficient of Determination (R^2)	= 0.20649
Coefficient of multiple correlation (R)	= 0.45441
Stnd. error	= 6389.91536
Durbin Watson test	= 2.31374

Analysis of variance

Sq.of variation	Sum of square	Degree of freedom	Mean Squar
Regression	170438256.10937	1	17438256.109
Error	654982189.89844	14	46784442.135

Variable in the equation

Variable	B	Beta	Std.error B	F
Years	-708.01765	-0.45441	370.94649	3.64305
(constant)	23423.15000			

Dependent variable quantities from variable list

regression list

Segnum	Observed Quantity	Predicted Quantity	Residual
1	12939.00	22715.13	-9776.132
2	33278.00	22007.11	11270.89
3	17285.00	21399.10	-4014.097
4	13550.00	20591.08	-7041.079
5	22336.00	19883.06	2452.438
6	24256.00	19175.04	5080.956
7	25199.00	18467.03	6731.974
8	10110.00	17759.01	-7649.009
9	12127.00	17050.99	04923.991
10	28841.00	16342.97	12498.03
11	16631.00	15634.96	996.0441
12	15881.00	14926.94	954.0618
13	14699.00	14218.92	480.0794
14	11605.00	1351.90	-1905.903
15	14196.00	12802.89	1393.115
16	5547.000	12094.87	-6547.868

$$y = 23423.1500 - \underset{(370.9464)}{708.0176t}$$

Appendix G18

Coefficient of determination $(R)^2$ = 0.69356

Coefficient of multiple correlation (R) = 0.83280

Standard error = 1.86701

Durbin Watson test = 2.17125

Analysis of variance

Square of variation	Sum of squares	Degree of freedom	Mean square
Regression	31.55714	1	31.55714
Error	13.94286	14	3.48571

Variable in the equation

Variable	B	Beta	Std Error B	F
Years	1.34286	0.83280	0.44630	9.053
(constant)	25.80000			

Dependent variable: Price From variable list
regression list

Seqnum	Observed Price	Predicted Price	Residual
1	29.0000	27.14286	1.857143
2	26.0000	28.48571	-2.485714
3	29.0000	29.82857	-0.8285714
4	32.0000	31.17143	0.8285714
5	34.0000	32.51429	1.485714
6	33.0000	33.85714	-0.8571429
7	30.0000	35.20002	-5.2002
8	31.0000	36.54288	-5.54288
9	32.0000	37.88574	-5.88574
10	28.0000	39.2285	-11.2285
11	32.0000	40.57146	-8.57146
12	35.0000	41.91432	-6.91432
13	31.0000	43.25718	-12.25718
14	32.0000	44.60004	-12.60004
15	72.0000	45.9429	26.0571
16	32.0000	47.28575	-15.28575

$$y = 25.80000 + \underset{(0.44630)}{1.34286}t$$

Appendix G19

Trade in oilseeds 1965-1975 by major trading countries

Soyabean - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
USA	6196.0	88.8	11839.1	93.8	12496.0	75.9
China	576.6	8.3	410.0	3.2	360.0	2.2
Canada	82.6	1.2	28.6	0.2	9.0	0.1
Brazil	75.3	1.1	289.6	2.3	3334.0	20.3
Paraguay	1.3	-	0.9	-	102.0	0.9
Romania	-	-	-	-	-	-
Others	43.4	0.6	53.5	0.4	158.0	1.0
World	6975.2	100.0	12621.5	100.0	16459.0	100.0

Soyabean - major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Japan	1847.5	27.8	3244.8	26.5	3334.0	21.3
Fed. Rep. of Germany	1292.9	19.5	2074.6	16.9	3464.0	22.1
Italy	449.5	6.8	845.3	6.9	1217.0	7.8
Denmark	404.2	6.1	535.4	4.4	402.0	2.6
Netherlands	392.0	5.9	1105.6	9.0	1282.0	8.2
Spain	340.9	5.1	1230.7	10.1	1737.0	11.1
United Kingdom	287.0	4.3	365.7	3.0	754.0	4.8
Belgium	139.9	2.1	324.5	2.7	698.0	4.5
France	109.5	1.6	442.6	3.6	416.0	2.7
Others	1370.8	20.6	2072.0	17.0	2373.0	15.1
World	6634.2	100.0	12241.2	100.0	15677.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G20

Copra major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Philippines	866.2	63.6	425.2	46.3	761.0	70.1
Indonesia	126.0	9.2	185.1	20.1	30.0	2.8
Papua New Guinea	74.7	5.5	85.6	9.3	96.0	8.8
Sri Lanka	41.6	3.1	15.5	1.7	1.0	0.1
New Hebrides	28.7	2.1	31.2	3.4	27.0	2.5
Mozambique	28.6	2.1	45.1	4.9	27.0	2.5
Malaysia (Sabah)	24.9	1.8	15.0	1.6	31.0	2.9
British Solomons	24.9	1.8	21.4	2.3	25.0	2.3
Pacific Is.	12.7	0.9	14.2	1.5	7.0	0.6
West Samoa	12.6	0.9	9.8	1.1	20.0	1.8
Gilbert Is.	9.2	0.7	5.8	0.6	6.0	0.5
Tonga	7.0	0.5	8.0	0.9	19.0	1.7
Others	105.6	7.7	56.8	6.2	35.0	3.2
World	1362.7	100.0	918.7	100.0	1085.0	100.0

Copra - major importers

Coontires	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
USA	278.9	20.6	197.6	22.4	-	-
Fed. Rep. Ger.	242.5	17.9	150.6	17.1	413.0	40.6
Netherlands	136.0	10.0	77.9	8.8	167.0	16.4
France	95.6	7.1	54.5	6.2	64.0	6.3
Japan	94.2	7.0	126.9	14.4	90.0	8.9
Sweden	69.4	5.1	55.4	6.3	39.0	3.8
United Kingdom	56.5	4.2	32.0	3.6	29.0	2.8
Australia	33.0	2.4	28.3	3.2	7.0	0.7
Singapore	26.7	2.0	17.2	1.9	27.0	2.7
Norway	22.1	1.6	19.0	2.2	11.0	1.1
Others	299.5	22.1	123.8	14.0	169.0	16.6
World	1354.4	100.0	883.2	100.0	1016.0	100.0

Source: FAO Trade Yearbook. Percentages computed by writer

Appendix G21

Rapeseed - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Canada	275.0	40.2	705.8	57.3	676.0	69.5
France	126.4	18.5	200.4	16.3	47.0	4.8
Sweden	73.5	10.8	53.5	4.3	118.0	12.1
Denmark	45.2	6.6	28.0	2.3	56.0	5.8
F.D.R.	4.8	0.7	36.9	3.0	10.0	1.0
Others	158.8	23.2	207.1	16.8	66.0	6.8
World	683.7	100.0	1231.7	100.0	973.0	100.0

Rapeseed- major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Italy	132.5	20.7	216.8	19.9	12.0	1.1
F.D.R.	109.8	17.2	75.1	6.9	117.0	10.8
Japan	108.2	16.9	344.9	31.6	659.0	61.2
Bangládesh	73.2	11.5	89.0	8.2	43.0	4.0
Algeria	59.4	9.3	58.5	5.4	40.0	3.7
U.K.	32.7	5.1	51.3	4.7	45.0	4.2
Netherlands	20.5	3.2	35.7	3.3	48.0	4.4
USA	14.4	2.3	38.2	3.5	32.0	3.0
France	4.5	0.7	62.3	5.7	40.0	3.7
Mexico	0.1	-	12.9	1.2	-	-
Others	83.6	13.1	105.8	9.7	41.0	3.8
World	638.9	100.0	1090.5	100.0	1077.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G22

Palm Kernels - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Nigeria	422.2	63.5	185.3	40.5	173.0	51.0
Sierra Leone	50.1	7.5	59.9	13.1	29.0	8.6
Indonesia	32.9	4.9	42.4	9.3	32.0	9.4
Cameroon	21.5	3.2	22.7	5.0	12.0	3.5
Togo	15.3	2.3	17.1	3.7	6.0	1.8
Ivory Coast	14.3	2.2	18.1	4.0	29.0	8.6
Angola	14.3	2.2	12.5	2.7	5.0	1.5
Guinea	12.0	1.8	13.0	2.8	9.0	2.6
Malaysia	0.1	-	5.2	1.1	25.0	7.4
Others	82.0	12.3	80.9	17.7	19.0	5.6
World	664.7	100.0	457.1	100.0	339.0	100.0

Palm kernels - major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
U.K.	207.0	31.1	38.0	8.8	75.0	25.6
F.R.G.	126.0	18.9	76.0	17.7	42.0	14.3
Netherlands	113.0	17.0	146.0	34.0	98.0	33.4
France	66.0	9.9	60.0	14.0	12.0	4.1
Poland	26.0	3.9	13.0	3.0	-	-
Japan	22.0	3.3	33.0	7.7	7.0	2.4
Portugal	17.0	2.6	12.0	2.8	7.0	2.4
Malaysia	-	-	-	-	20.0	6.8
Denmark	14.0	2.1	18.0	4.2	17.0	5.8
Switzerland	7.0	1.1	4.0	0.9	9.0	3.1
Others	67.0	10.1	30.0	7.0	6.0	2.0
World	665.0	100.0	430.0	100.0	293.0	100.0

Source: FAO Trade Yearbook. Percentage computed by the writer

G23

Sunflower seed - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Bulgaria	91.5	38.3	97.3	20.4	4.0	1.1
USSR	83.7	35.1	142.7	29.9	61.0	17.4
Romania	18.7	7.8	44.3	9.3	1.0	0.3
Hungary	10.4	4.4	24.1	5.0	27.0	7.7
Yugoslavia	9.0	3.8	118.4	24.8	1.0	0.3
Tanzania	6.9	2.9	10.0	2.1	3.0	0.8
Canada	6.2	2.6	2.6	0.5	8.0	2.3
China	4.7	2.0	2.3	0.5	3.0	0.8
USA	-	-	1.8	0.4	210.0	59.8
G.D.R.	0.5	0.2	0.2	-	-	-
France	0.4	0.2	22.2	4.6	8.0	2.3
Australia	-	-	-	-	15.0	4.3
Others	6.6	2.8	11.8	2.5	10.0	2.8
World	238.6	100.0	477.7	100.0	351.0	100.0

Sunflower seed - major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
G.D.R.	65.0	33.0	92.5	17.9	40.0	12.4
Italy	63.0	32.0	179.7	34.7	4.0	1.2
F.R.G.	32.6	16.5	79.0	15.3	126.0	39.2
Czechoslovakia	16.6	8.4	65.0	12.6	60.0	18.7
Australia	5.0	2.5	6.3	1.2	-	-
Japan	3.9	2.0	45.4	8.8	2.0	0.6
Belgium	2.6	1.3	1.5	0.3	4.0	1.2
France	0.4	0.2	1.9	0.4	22.0	6.8
Netherlands	1.0	0.5	17.2	3.3	3.0	0.9
Portugal	-	-	4.1	0.8	24.0	7.5
Others	6.9	3.5	25.3	4.9	36.0	11.2
World	197.0	100.0	517.9	100.0	321.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G24

Safflower seed - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
USA	171.7	96.5	59.9	76.8	73.8	100.0
Others	6.3	3.5	18.1	23.2	-	100.0
World	178.0	100.0	78.0	100.0	73.8	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G25 Trade in vegetable oils 1965-1975 by major Trading Countries

Soyabean oil-major exporters

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
USA	545.1	78.8	674.5	59.8	353.0	25.9
Denmark	41.3	6.0	56.4	5.0	34.0	2.5
Netherlands	17.5	2.5	86.5	7.7	162.0	11.9
Canada	15.8	2.3	21.4	1.9	2.0	0.1
F. R. G.	15.5	2.2	69.0	6.1	294.0	21.6
Belgium	6.0	0.9	27.4	2.4	85.0	6.2
Japan	5.6	0.8	13.2	1.2	-	-
France	4.0	0.6	29.3	2.6	80.0	5.9
Spain	0.1	-	85.6	7.6	41.0	3.0
Romania	-	-	5.3	0.5	-	-
Others	40.5	5.9	57.3	5.1	-	-
World	691.4	100.0	1125.9	100.0	1364.0	100.0

Soyabean oil - major importers

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
Pakistan	50.5	7.6	88.5	8.9	63.0	4.6
Morocco	44.5	6.7	38.5	3.9	77.0	5.6
India	40.5	6.1	78.5	7.9	4.0	0.3
Iran	27.6	4.1	96.8	9.8	153.0	11.2
Netherlands	22.9	3.4	35.9	3.6	74.0	5.4
Tunisia	22.2	3.3	28.2	2.9	54.0	4.0
Peru	14.0	2.1	21.3	2.2	54.0	4.0
Sweden	8.1	1.2	37.6	3.8	42.0	3.1
Italy	1.8	0.3	37.1	3.7	107.0	7.8
France	1.2	0.2	37.2	3.8	90.0	6.6
Others	434.1	65.0	489.8	49.5	242.4	34.0
World	667.4	100.0	989.4	100.0	713.8	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G26

Groundnut oil - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Senegal	142.5	34.3	146.1	34.0	209.0	51.6
Nigeria	92.2	22.2	90.3	21.0	-	-
Argentina	79.2	19.1	42.6	9.9	-	-
USA	27.7	6.7	14.5	3.4	12.0	3.0
Gambia	16.3	3.9	16.0	3.7	14.0	3.4
France	11.5	2.8	20.4	4.7	44.0	10.8
China	5.0	1.2	7.0	1.6	11.0	2.7
Netherlands	4.2	1.0	3.0	0.7	6.0	1.5
F.R.G.	3.8	0.9	3.4	0.8	10.0	2.5
Brazil	-	-	31.9	7.4	38.0	9.4
Others	33.0	7.9	54.5	12.7	61.0	15.1
World	415.4	100.0	429.0	100.0	405.0	100.0

Groundnut oil - major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
France	155.6	36.7	142.6	33.1	180.0	44.0
U.K.	69.5	16.4	95.8	22.2	29.0	7.0
F.R.G.	49.1	11.6	52.3	12.1	38.0	9.2
Dominican Rep.	15.1	3.6	5.5	1.3	6.0	1.4
Hong Kong	10.4	2.5	12.3	2.9	14.0	3.4
Netherlands	10.1	2.4	9.4	2.2	9.0	2.2
Belgium	9.0	2.1	21.4	5.0	21.0	5.1
Switzerland	5.3	1.3	3.8	0.9	8.0	2.0
Singapore	5.0	1.2	6.0	1.4	1.0	0.2
Italy	0.2	-	8.2	1.9	24.0	5.9
Others	94.4	22.3	73.4	17.0	23.8	7.9
World	423.7	100.0	430.7	100.0	341.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G27

Coconut oil - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Philippines	241.4	50.8	338.0	54.9	614.0	59.6
Sri Lanka	88.3	18.6	57.9	9.4	50.0	4.8
Netherlands	35.9	7.6	31.9	5.2	67.0	6.5
Papua N. Guinea	25.9	5.5	21.7	3.5	27.0	2.6
Malaysia	18.3	3.9	42.5	6.9	36.0	3.5
Singapore	17.1	3.6	38.1	6.2	26.0	2.5
Fiji	15.0	3.2	19.0	3.1	16.0	1.6
Mozambique	6.5	1.4	7.3	1.2	4.0	0.4
F. R. G.	1.3	0.3	12.4	2.0	115.0	11.1
Fr. Polynesia	0.3	0.1	10.8	1.8	11.0	1.1
Others	24.8	5.2	36.2	5.9	65.0	6.3
World	474.8	100.0	615.6	100.0	1031.0	100.0

Coconut oil - major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
USA	174.7	38.1	260.5	43.7	409.0	42.7
F. R. G.	55.3	12.1	31.6	5.3	36.0	3.8
UK	42.7	9.3	48.1	8.1	38.0	4.0
Canada	18.0	3.9	21.5	3.6	26.0	2.7
Italy	15.8	3.4	19.8	3.3	32.0	3.3
China	10.8	2.4	20.9	3.5	44.0	4.6
Singapore	10.0	2.2	14.1	2.4	15.0	1.5
South Africa	6.8	1.5	10.1	1.7	12.0	1.2
Poland	6.0	1.3	6.3	1.1	12.0	1.2
France	3.9	0.9	18.7	3.1	47.0	4.9
Others	114.1	24.9	144.8	24.3	287.0	30.0
World	458.1	100.0	596.4	100.0	958.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G28

Cottonseed oil - major exporters

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
USA	255.6	72.4	154.8	63.2	297.0	79.2
China	22.2	6.3	7.7	3.1	4.0	1.0
USSR	20.8	5.9	26.2	10.7	28.0	7.5
Syrian Arab Repub.	15.8	4.5	8.4	3.4	-	-
Sudan	9.8	2.8	9.1	3.7	11.0	2.9
Uganda	8.7	2.5	9.0	3.7	-	-
Israel	2.0	0.6	5.0	2.0	11.0	2.9
Guatemala	1.9	0.5	1.4	0.6	4.0	1.0
Nicaragua	1.3	0.4	9.3	3.8	11.0	2.9
Argentina	1.1	0.3	1.0	0.4	-	-
Others	13.6	3.9	13.2	5.4	-	-
World	352.8	100.0	245.1	100.0	375.0	100.0

Cottonseed oil - major importers

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
F.R.G.	79.1	21.0	31.6	11.6	13.0	2.9
UK	33.1	8.8	41.1	15.1	8.0	1.7
Egypt	28.8	7.7	56.2	20.6	280.0	61.4
Iran	26.7	7.1	1.3	0.5	19.0	4.1
Canada	21.6	5.7	14.0	5.1	11.0	2.4
G.D.R.	20.8	5.5	26.2	9.6	29.0	6.4
Venezuela	15.4	4.1	15.8	5.8	38.0	8.3
Sweden	7.0	1.9	4.7	1.7	10.0	2.2
Japan	2.1	0.6	3.8	1.4	10.0	2.2
El Salvador	1.4	0.4	1.6	0.6	2.0	0.4
Others	139.9	37.2	76.6	28.1	36.0	7.9
World	375.9	100.0	272.9	100.0	456.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G29

Palm oil - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Nigeria	152.4	24.7	7.6	0.8	31.0	1.5
Malaysia	143.2	23.2	402.0	44.4	1035.0	50.6
Indonesia	125.9	20.4	159.1	17.6	386.0	18.9
Zaire	79.0	12.8	118.9	13.1	55.0	2.7
Singapore	47.7	7.7	133.3	14.7	140.0	6.8
Benin	13.3	2.2	15.0	1.7	14.0	0.7
Cameroon	12.9	2.1	8.4	0.9	9.0	0.4
Netherlands	5.7	0.9	19.3	2.1	57.0	2.8
Ivory Coast	1.2	0.2	12.5	1.4	114.0	5.6
Papua N. Guinea	-	-	-	-	18.0	0.9
Others	36.7	5.9	30.1	3.3	187.0	9.1
World	618.0	100.0	906.2	100.0	2046.0	100.0

Palm oil major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
UK	117.2	20.1	162.7	18.2	206.0	10.8
F.R.G.	102.6	17.6	115.9	13.0	210.0	11.0
Netherlands	64.5	11.0	89.3	10.0	186.0	9.8
Iraq	50.1	8.6	66.0	7.4	116.0	6.1
Singapore	48.8	8.3	140.8	15.8	128.0	6.7
France	36.7	6.3	41.1	4.6	50.0	2.6
Italy	32.0	5.5	42.9	4.8	51.0	2.7
Belgium	27.7	4.7	25.5	2.9	30.0	1.6
Japan	16.4	2.8	40.3	4.5	108.0	5.7
USA	3.0	0.5	63.9	7.2	442.0	23.2
Others	85.4	14.6	103.4	11.6	68.1	4.3
World	584.4	100.0	891.8	100.0	1593.8	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G30

Sunflower seed oil - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
USSR	221.2	70.1	351.0	48.0	388.0	62.2
Argentina	35.5	11.2	101.2	13.8	-	-
Romania	33.0	10.5	119.1	16.3	110.0	17.6
Hungary	15.0	4.8	18.9	2.6	29.0	4.6
F.R.G.	6.1	1.9	11.6	1.5	19.0	3.0
Bulgaria	1.0	0.3	46.9	6.4	20.0	3.2
Netherlands	0.2	0.1	38.6	5.3	7.0	1.1
Belgium	-	-	20.2	2.8	13.0	2.1
France	-	-	7.3	1.0	20.0	3.2
Yugoslavia	-	-	3.4	0.5	-	-
Others	3.8	1.2	13.3	1.8	18.0	2.9
World	315.7	100.0	731.2	100.0	624.0	100.0

Sunflower seed oil - major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1970 Quantity '000 tons	1970 % of total
F.R.G.	69.1	20.2	130.4	18.7	105.0	15.1
Cuba	49.9	14.6	54.7	7.8	70.0	10.1
G.D.R.	42.8	12.5	50.8	7.3	50.0	7.2
Czechoslovakia	25.2	7.4	45.2	6.5	35.0	5.0
Iran	20.0	5.8	15.5	2.2	46.0	6.6
Algeria	16.0	4.7	23.1	3.3	30.0	4.3
Switzerland	10.7	3.1	28.3	4.0	27.0	3.9
Belgium	9.2	2.7	36.3	5.2	23.0	3.3
Netherlands	8.3	2.4	51.8	7.4	21.0	3.0
France	1.3	0.4	58.1	8.3	91.0	13.1
Spain	-	-	-	-	76.0	10.9
Austria	-	-	-	-	19.0	2.7
Others	89.6	26.2	204.7	29.3	101.0	14.5
World	342.1	100.0	698.9	100.0	694.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G31

Palm kernel oil - major exporters

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
Zaire	32.9	30.2	50.3	29.6	28.0	10.8
Netherlands	19.7	18.1	31.5	18.5	30.0	11.6
Benin	17.0	15.6	18.6	10.9	16.0	6.2
Brazil	12.0	11.0	14.4	8.5	1.0	0.4
F.R.G.	7.2	6.6	3.2	1.9	7.0	2.7
UK	4.6	4.2	0.2	0.1	1.0	0.4
Paraguay	3.1	2.8	6.6	3.9	4.0	1.5
Nigeria	1.0	0.9	32.8	19.3	19.0	7.3
Switzerland	0.8	0.7	0.6	0.4	1.0	0.4
Malaysia	-	-	2.3	1.4	109.0	42.1
Others	10.5	9.7	9.6	5.6	43.0	16.6
World	108.8	100.0	170.1	100.0	259.0	100.0

Palm kernel oil - major importers

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
USA	37.9	40.6	37.4	23.5	72.0	26.0
F.R.G.	14.5	15.5	22.6	14.2	17.0	6.2
Italy	10.1	10.8	9.9	6.2	12.0	4.3
France	6.1	6.5	9.9	6.2	22.0	8.0
Canada	4.5	4.8	5.2	3.3	5.0	1.8
South Africa	2.9	3.1	2.0	1.3	4.0	1.4
Netherlands	1.6	1.7	19.5	12.2	41.0	14.8
Argentina	1.6	1.7	1.9	1.2	4.0	1.4
Belgium	1.5	1.6	9.0	5.7	4.0	1.4
UK	0.9	1.0	33.4	21.0	64.0	23.2
Others	11.8	12.6	8.4	5.3	31.0	11.2
World	93.4	100.0	159.2	100.0	276.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G32

Rapeseed oil - major exporters

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
France	32.3	34.1	39.4	22.0	118.0	33.4
F.R.G.	24.5	25.9	33.0	18.1	64.0	18.1
Sweden	16.4	17.3	20.0	11.2	39.0	11.0
Poland	7.8	8.2	37.6	21.0	52.0	14.7
China	3.8	4.0	16.7	9.3	12.0	3.4
Japan	3.6	3.8	6.9	3.9	2.0	0.6
Netherlands	1.2	1.3	7.4	4.1	33.0	9.3
Canada	-	-	-	-	20.0	5.7
Hungary	-	-	8.0	4.5	7.0	2.0
Hong Kong	-	-	1.2	0.7	1.0	0.3
Others	5.1	5.4	8.7	4.9	5.0	1.4
World	94.7	100.0	178.9	100.0	353.0	100.0

Rapeseed oil - major importers

Countries	1965		1970		1975	
	Quantity '000 tons	% of total	Quantity '000 tons	% of total	Quantity '000 tons	% of total
Algeria	12.7	18.0	16.3	9.9	25.0	9.0
Netherlands	11.2	15.9	6.1	3.7	9.0	3.2
F.R.G.	7.7	10.9	15.0	9.1	19.0	6.8
Hong Kong	3.7	5.2	21.6	13.1	24.0	8.6
Czechoslovakia	3.0	4.2	20.0	12.2	1.0	0.4
Italy	0.6	0.8	22.1	13.5	14.0	5.0
India	0.3	0.4	0.1	0.1	6.0	2.2
UK	0.3	0.4	14.7	8.9	7.0	2.5
Morocco	-	-	1.3	0.8	84.0	30.2
Chile	-	-	2.5	1.5	21.0	7.5
Others	31.1	44.1	44.6	27.1	68.0	24.4
World	70.6	100.0	164.3	100.0	278.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G33

Trade in Oilmeals 1965 – 1975
By Major Trading Countries

Soyabean meal - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
USA	1968.9	70.3	3660.4	68.2	3783.0	43.3
Canada	232.0	8.3	150.8	2.8	59.0	0.7
F.R.G.	202.3	7.2	264.9	4.9	569.0	6.5
Netherlands	116.3	4.2	365.3	6.8	229.0	6.4
Denmark	116.2	4.1	130.0	2.4	71.0	0.8
Brazil	105.1	3.8	525.4	9.8	3128.0	35.8
Belgium	26.6	0.9	131.3	2.4	212.0	2.4
Italy	7.1	0.3	10.1	0.2	29.0	0.3
Norway	4.3	0.1	57.9	1.1	134.0	1.5
Paraguay	3.5	0.1	23.4	0.4	31.0	0.4
Others	19.1	0.7	51.4	1.0	170.0	1.9
World	2801.4	100.0	5370.9	100.0	8745.0	100.0

Soyabean meal - major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
France	485.8	19.9	843.3	17.5	1496.0	17.7
F.R.G.	470.2	19.2	997.6	20.7	766.0	9.0
UK	247.7	10.1	248.3	5.1	250.0	3.0
Denmark	223.3	9.1	242.9	5.0	443.0	5.2
Netherlands	162.5	6.6	530.9	11.0	850.0	10.0
Belgium	113.7	4.6	346.0	7.2	383.0	4.5
Italy	109.0	4.5	264.9	5.5	448.0	5.3
Hungary	40.4	1.6	228.0	4.7	390.0	4.6
Czechoslovakia	9.0	0.4	34.0	0.7	310.0	3.7
Poland	-	-	103.0	2.1	539.0	6.4
Others	584.8	24.0	990.6	20.5	2592.0	30.6
World	2446.4	100.0	4829.5	100.0	8467.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G34

Groundnut meal - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
India	735.2	49.1	655.1	43.9	536.0	46.3
Senegal	196.4	13.1	199.7	13.4	301.0	26.0
Argentina	131.7	8.8	64.6	4.3	29.0	2.5
Brazil	121.8	8.1	201.2	13.5	37.0	3.2
Nigeria	114.5	7.6	162.1	10.9	8.0	0.7
Burma	67.1	4.5	40.0	2.7	10.0	0.9
Sudan	18.1	1.2	36.5	2.4	32.0	2.8
Gambia	16.3	1.1	18.5	1.2	30.0	2.6
France	14.4	1.0	16.4	1.1	14.0	1.2
Niger	6.7	0.4	11.1	0.7	17.0	1.5
Others	75.4	5.1	87.1	5.9	144.0	12.4
World	1497.6	100.0	1492.3	100.0	1158.0	100.0

Groundnut meal - major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
UK	488.5	37.5	374.0	22.4	211.0	17.8
France	190.7	14.6	243.3	14.6	254.0	21.5
F. R. G.	111.6	8.6	114.7	6.9	82.0	6.9
Hungary	99.1	7.6	64.4	3.9	44.0	3.7
Czechoslovakia	82.1	6.3	190.0	11.4	70.0	5.9
Japan	37.1	2.9	141.9	8.5	26.0	2.2
Belgium	34.1	2.6	52.5	3.2	32.0	2.7
Netherlands	19.2	1.5	12.3	0.7	9.0	0.8
Poland	-	-	200.0	12.0	205.0	17.3
USSR	-	-	99.4	6.0	70.0	5.9
Others	239.4	18.4	174.7	10.4	180.0	15.2
World	1301.8	100.0	1667.2	100.0	1183.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G35

Cottonseed meal - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Turkey	153.7	14.0	176.0	13.8	218.0	19.5
Syria	127.9	10.9	80.8	6.3	9.0	0.8
Sudan	123.4	10.6	183.5	14.4	94.0	8.4
India	104.6	8.9	105.7	8.3	192.0	17.2
Argentina	88.3	7.6	88.8	7.0	42.0	3.8
Uganda	69.8	6.0	77.4	6.1	16.0	1.4
Tanzania	42.5	3.6	34.5	2.7	43.0	3.9
Nicaragua	12.6	1.1	38.0	3.0	60.0	5.4
Brazil	0.9	0.1	161.5	12.7	20.0	1.8
Colombia	-	-	55.8	4.4	43.0	3.9
Others	433.9	37.2	273.2	21.3	378.0	33.9
World	1167.6	100.0	1275.2	100.0	1115.0	100.0

Cottonseed meal - major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Denmark	392.2	29.9	251.8	27.2	499.0	45.9
UK	239.1	18.3	197.2	15.2	35.0	3.2
F. R. G.	187.6	14.3	268.6	20.8	179.0	16.5
Sweden	110.7	8.5	96.5	7.4	71.0	6.5
Czechoslovakia	73.0	5.6	85.0	6.6	40.0	3.7
Belgium	47.5	3.6	56.1	4.3	17.0	1.6
Norway	38.1	2.9	68.2	5.3	21.0	1.9
Hungary	23.6	1.8	14.7	1.1	27.0	2.5
Lebanon	-	-	29.3	2.3	28.0	2.6
Poland	-	-	9.7	0.8	70.0	6.4
Others	197.5	15.1	116.5	9.0	100.0	9.2
World	1309.3	100.0	1293.6	100.0	1087.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G36

Copra meal - major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
F.R.G.	320.5	64.6	386.0	69.6	374.0	57.1
Denmark	65.7	13.2	28.5	5.1	30.0	4.6
Sweden	39.1	7.9	11.7	2.1	32.0	4.9
Netherlands	22.8	4.6	90.5	16.3	181.0	27.6
Malaysia	12.9	2.6	14.6	2.6	14.0	2.1
Belgium	11.2	2.3	12.5	2.3	13.0	2.0
Singapore	8.9	1.8	2.9	0.5	2.0	0.3
France	2.5	0.5	2.7	0.5	1.0	0.2
Sarawak	-	-	1.0	0.2	1.0	0.2
Others	12.4	2.5	4.1	0.8	7.0	1.0
World	496.0	100.0	554.5	100.0	655.0	100.0

Copra meal - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Philippines	184.9	39.8	243.9	42.8	303.0	43.5
Indonesia	125.8	27.0	207.9	36.5	396.0	42.5
Netherlands	41.0	8.8	17.5	3.1	9.0	1.3
Papua N.G.	13.9	3.0	11.2	2.0	15.0	2.1
Sri Lanka	9.5	2.0	11.3	2.0	4.0	0.6
Thailand	8.9	1.9	8.1	1.4	2.0	0.3
Fiji	5.4	1.2	7.2	1.3	4.0	0.6
Tanzania	4.4	1.0	6.1	1.1	6.0	0.9
Singapore	4.3	0.9	15.7	2.7	11.0	1.6
Mozambique	4.3	0.9	5.2	0.9	4.0	0.6
Others	62.8	13.5	35.6	6.2	43.0	6.2
World	465.2	100.0	569.7	100.0	697.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G37

Sunflower seed meal - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Argentina	275.9	78.2	403.8	72.2	188.0	52.5
Turkey	56.0	15.9	92.7	16.6	26.0	7.3
Italy	14.6	4.1	7.1	1.3	-	-
Uruguay	4.4	1.2	19.0	3.4	6.0	1.7
Netherlands	1.3	0.4	5.2	0.9	4.0	1.1
France	0.5	0.1	0.2	-	6.0	1.7
F.R.G.	0.2	0.1	6.3	1.1	16.0	4.5
Denmark	0.1	-	0.1	-	-	-
USSR	-	-	24.0	4.3	1.0	0.3
Others	-	-	0.5	0.2	111.0	31.0
World	353.0	100.0	558.9	100.0	358.0	100.0

Sunflower seed meal - major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
UK	69.4	19.7	77.3	13.3	11.0	3.1
Netherlands	69.4	19.7	90.8	15.6	16.0	4.5
F.R.G.	51.1	14.5	134.5	23.2	157.0	43.8
Denmark	50.4	14.3	117.0	20.2	53.0	14.8
France	27.5	7.8	58.8	10.1	14.0	3.9
Belgium	27.4	7.8	58.9	10.1	25.0	7.0
Hungary	12.4	3.5	20.7	3.6	44.0	12.3
Bulgaria	12.0	3.4	10.0	1.7	20.0	5.6
Czechoslovakia	2.0	0.6	8.0	1.4	13.0	3.6
Poland	-	-	-	-	-	-
Others	30.4	8.7	4.3	0.8	5.0	1.4
World	352.0	100.0	580.3	100.0	358.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G38

Rapeseed meal - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Italy	52.3	30.1	68.8	29.9	3.0	1.1
F.R.G.	37.8	21.6	40.5	17.6	80.0	29.4
France	30.8	17.6	65.2	28.3	65.0	23.9
Algeria	28.5	16.3	27.1	11.8	28.0	10.3
Pakistan	17.0	9.7	0.1	-	38.0	14.0
Ethiopia	4.6	2.6	2.2	1.0	3.0	1.1
Netherlands	0.4	0.2	3.4	1.5	20.0	7.3
Morocco	-	-	5.0	2.2	7.0	2.6
Denmark	-	-	1.7	0.7	5.0	1.8
Chile	-	-	15.0	6.5	-	-
Others	3.2	1.9	1.4	0.5	23.0	8.5
World	174.6	100.0	230.4	100.0	272.0	100.0

Rapeseed meal - major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 %of total	1975 Quantity '000 tons	1975 % of total
UK	55.4	32.0	63.4	23.7	49.0	15.6
F.R.G.	43.4	25.0	65.8	24.6	41.0	13.1
Netherlands	26.4	15.2	35.7	13.4	85.0	27.1
Belgium	24.9	14.4	35.1	13.1	48.0	15.3
Denmark	10.1	5.8	16.8	6.3	44.0	14.0
France	5.6	3.2	5.7	2.1	7.0	2.2
Austria	5.1	2.9	8.0	3.0	1.0	0.3
Japan	-	-	0.5	0.2	-	-
Norway	-	-	36.0	13.5	35.0	11.2
Italy	-	-	0.4	0.1	2.0	0.6
Others	2.5	1.5	-	-	2.0	0.6
World	173.4	100.0	267.4	100.0	314.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

Appendix G39

Palm Kernel meal - major exporters

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
Netherlands	66.2	44.3	73.6	30.0	44.0	11.8
Benin	16.1	10.8	18.1	7.4	19.0	5.1
Denmark	7.9	5.3	11.6	4.7	7.0	1.9
Nigeria	3.9	2.6	33.3	13.6	20.0	5.3
Paraguay	1.9	1.3	1.9	0.8	-	-
Cameroon	1.3	0.9	2.0	0.8	5.0	1.3
Malaysia	-	-	0.6	0.2	145.0	38.8
China	-	-	-	-	10.0	2.7
Zaire	-	-	50.7	20.7	40.0	10.7
Brazil	-	-	48.3	19.7	45.0	12.0
Others	52.3	34.8	4.9	2.1	39.0	10.4
World	149.6	100.0	245.0	100.0	374.0	100.0

Palm kernel meal - major importers

Countries	1965 Quantity '000 tons	1965 % of total	1970 Quantity '000 tons	1970 % of total	1975 Quantity '000 tons	1975 % of total
F. R. G.	217.9	96.2	227.3	94.2	299.0	89.0
France	8.4	3.7	8.1	3.4	6.0	1.8
Belgium	0.3	0.1	1.8	0.7	5.0	1.5
Netherlands	-	-	0.4	0.2	21.0	6.2
Sweden	-	-	3.5	1.5	3.0	0.9
Others	-	-	0.2	-	2.0	0.6
World	226.6	100.0	241.3	100.0	336.0	100.0

Source: FAO Trade Yearbook. Percentages computed by the writer

REFERENCES

REFERENCES

(1) Sudan Almanac 1970 – 1971:
An official Hand Book compiled by the Ministry of Information and Culture. Khartoum – Sudan.

(2) Department of Statistics:
Census of Population 1975
Khartoum – Sudan.

(3) Holt, P.M.
History of the Sudan, Weidenfeld and Nicholson London 1961

(4) Ministry of Agriculture, Food and Natural Resources:
Annual Report 1974 Khartoum – Sudan.

(5) Reports by the Mechanised Farming Corporation: (MFC) 1974 Khartoum – Sudan.

(6) Sudan Cotton Review:
The Cotton Section, Ministry of Finance and Economics, Khartoum – April 1965.

(7) Sudan Cotton Review:
The Cotton Public Corporation Issue No 16 – October 1974 Khartoum – Sudan.

(8) Sudan Year Book of Agricultural Statistics:
Statistics Division, Department of Agricultural Economics – Ministry of Agriculture, Food and Natural Resources. Democratic Republic of the Sudan Khartoum – June 1974/75.

(9) The Oilseeds Company Ltd:
Annual Report 1974 Khartoum – Sudan

(10) The Gum Arabic Company Ltd:
Annual Report 1974 Khartoum – Sudan

(11) Report of Public Animal Production:
Corporation of the Ministry of Agriculture
Food and Natural Resources 1975 Khartoum.

(12) Ministry of Finance and Economics:
Economic Survey 1964 — 1970 Khartoum — Sudan.

(13) Ministry of Finance and Economics:
Sudan Economics and Financial Review
January — June 1974.

(14) The Ten Year Plan of Economic and Social Development 1961/62 — 1970/71:
Published by the Economic Planning Secretariat, Ministry of Finance and Economics. Khartoum — Sudan.

(15) The Five Year Plan of Economic and Social Development 1971 — 1975:
Published by the Economic Planning Secretariat, Ministry of Finance and Economics, Khartoum — Sudan 1971.

(16) Bank of the Sudan:
Annual Report 1964 and 1969

(17) Bank of Sudan:
Annual Report 1974/75

(18) Bank of the Sudan:
Annual Reports for 1971 — 1975

(19) Ministry of Finance, Planning and National Economy, Repayment Section
1974/1975 Khartoum — Sudan.

(20) Department of Statistics:
Annual Reports 1969/70 — 1973/74
Khartoum — Sudan.

(21) Bank of the Sudan:
Economic and Financial Bulletin years 1971 —1975
Khartoum — Sudan.

(22) Economic Survey 1975:
Central Planning & Economic Studies Administration the National Planning Commission, Khartoum, Sudan

(23) Department of Statistics:
Foreign Trade Bulletin 1961 — 1975
Khartoum — Sudan.

(24) Current Agricultural Statistics:
Statistics Division, Department of Agricultural Economics, Ministry of Agriculture, Food and Natural Resources (CAS) Volume 1 No. 2.

(25) Long, R.G. (1953):
Mechanisation in Agriculture in the Rainlands of the Sudan, 1948 — 51, Ministry of Agriculture
Khartoum — Sudan.

(26) Mechanical Crop Production Scheme:
Working Party Report, Ministry of Agriculture 1954.

(27) Year Book of Agriculture Statistics:
Statistic Section, Ministry of Agriculture, Food and Natural Resources, Khartoum 1974.

(28) Kuwait's Arab Development Fund:
Sudan Mechanised State Farm, September 1971.

(29) Agabwi, K.A.:
Some Development in Rainfed Agriculture in Central Sudan, Sudan Notes and Records, Volume XLIX, pp (71 — 28).

(30) Faisal, M.A. :
Effect of Rainfall on yield of Dura at Kenana Research Station, 1973.

(31) Faisal M, Ali and Farauk A. Salih :
Effect of Late Sowing on Yield of Dura in the Central Rainland of the Sudan, Kenana Research Station 1974.

(32) Reported to the Writer by:
The Manager of MFC in Gedaref and at Damazine
during the writer's fieldwork January 1975

(33) Faisal, M.A. :
Rotation Responses of Dura at Kenana Research Station 1973.

(34) Ministry of Agriculture, Food & Natural Resources.
Production Requirement, Costs of Dura in the Central Rainland of the Sudan 1968, 1974, 1975 and 1976, Mechanised Crop Production Schemes.

(35) The World Bank for Reconstruction and Development:
Appraisal of Second Mechanised Farming Project Report No. PA — 1260 April 1972.

(36) Arizona Land and Cattle Company — International Corporation Affiliate of Triad 1974.
The Identification and Preparation of Agricultural Development Projects in the Sudan.

(37) The Arab Organisation for Agricultural Development:
Economic study on Dura and Oilseeds in the Mechanised Crop Production Schemes in the Sudan 1975.

(38) Ministry of Agriculture:
Annual Report of the Mechanised Farming Corporation Khartoum — Sudan 1975/76.

(39) Ministry of Agriculture:
Department of Agricultural Economic and Statistics — Khartoum.

(40) Reported to the Writer by:
A number of Farmers and the Manager of MFC during the writer's visit to Gedaref and Damazine in 1975.

(41) Reported to the Writer by:
The Manager of Khartoum based haulage Company Khartoum 1975

(42) Seen and Reported to the Writer by:
The Managers of Agricultural Bank and Commercial Banks

(43) Simpson, Morag C (1966):
"Khartoum Food Supplies" A study in the Production and Marketing of six basic Foodstuffs. Research Bulletin No. 2 Department of Rural Economy, University of Khartoum, Faculty of Agriculture.

(44) Sudan Almanac 1960/61:
An official Hand Book compiled by the Ministry of Information and Culture, Khartoum and also reported to the writer by The Market Superintendant and his Assistants.

(45) Reported to the Writer by:
The Manager of the Agricultural Bank in Gedaref

(46) Reported to the Writer by:
The Manager of the Agricultural Bank in Gedaref

(47) Reported to the Writer by:
The villagers who hold small parcels of land near their village. December 1975.

(48) Reported to the Writer by:
The owner of a tractor repaire yard in Gedaref December 1975.

(49) Hepe Spaull (1965):
The Co-operative Movement in the World today. Barry and Rockliff, London.

(50) Reported to the Writer by:
The Inspector of the Co-operative Office in Gedaref December 1975.

(51) Reported to the Writer by:
The Inspector of the Co-operative Office in Damazine January 1976.

(52) Khidir Mahassin (1967)
"Development of Agricultural Co-operation in the Sudan MSc Thesis. Department of Rural Economy, University of Khartoum.

(53) Reported to the Writer by:
The Manager of Commercial Bank in Gedaref

(54) Spinks, G.R. :
Myths about Agriculture Markets, Teaching Forum Series A/D/C New York November 1972.

(55) Whetham, Edith H. :
Agricultural Marketing in Africa , Oxford University Press 1972

(56) Seen and Reported to the Writer by:
The large merchants in Gedaref

(57) Reported to the Writer by:
The merchants in Gedaref

(58) Reported to the Writer by:
The Manager of a Sudanese Transport Company in Khartoum.

(59) Reported to the Writer by:
The Manager of the Agricultural Bank Port Sudan.

(60) Reported to the Writer by:
The Manager of the Ginning Factory in Swakin.

(61) Reported to the Writer by:
The Merchants of Dura in Gedaref.

(62) Reported to the Writer by:
The Manager of the silo in Gedaref. 1976

(63) Ministry of Economics, Commerce and Supply :
Residual Control Ordinance which endows the Minister of Supply and Internal Trade with the right to supervise the Exportation Policy and to prohibit exports, especially of staple food. Khartoum 1963

(64) Abott, J.C. (1962)
"The Role of Marketing in the Development of Backward Agricultural Economies" Vol. 44, May 1962.

(65) F.A.O.1962
Marketing, its Role in Increasing Productivity, Freedom from Hunger Campaign Basic No. 4 study.

(66) Abdel Rahman El Hadri
Dura Production and Marketing in the Mechanised Crop Production Schemes Department of Rural Economy — Faculty of Agriculture. University of Khartoum.

(67) Reported to the Writer by:
The large merchants in Gedaref Market (Su..)

(68) Reported to the Writer by
The Auction Market Superintendant and his Assistant December 1975.

(69) Harlow A. A. (1960)
"The Hog Cycle and the Cobweb Theorem". Journal of Farm Economics XL11, November 1960.

(70) Schultz, T.W.
Transforming Traditional Agriculture, Connecticut, Yale University Press 1964.
New Haven.

(71) Dantwala, M.L., and Falcon, W.P.
Real Effects of Foreign Surplus Disposal in Underdeveloped Economics, further comment. Quarterly Journal of Economics 1977: pp 323 — 326. 1963.

(72) Mellor, J.W.
Increasing Agricultural Production in Early Stage of Economic Development relation problems and prospects in Haroldsen, Edwin O, ed, One tool in International Economic Development. P. 219 — 244. Ames. Iowa State.

(73) Bauer, P.T. and Yamey, B.S.
A case study of response to Price in Underdeveloped Countries. Economic Journal 69 P.800 — 805. 1959.

(74) Wharton, C.R. :
Subsistance Agriculture and Economic Development
London, Cas, 1970.

(75) Misra, B and Sinha :
A study of problems of marketable surplus in foodgrains, in village of Bihar. Indian Journal of Agricultural Economics 16.p. 63 — 67. 1961.

(76) Mathur, R.N. and Ezekiel, H :
Marketable surplus of food and price fluctuation in a developing Economy.

(77) Krishnan, T.N.
Farm supply response in the Punjab (India — Pakistan) a case study of cotton, unpublished Ph.D thesis Chicago, Illinois, Library University of Chicago.

(78) Olson, R.O.
Impact and Implications of Foreign surplus disposal on Underdeveloped Economics.
Journal of Farm Economics 42.1960.

(79) Laing, R.G.
Mechanisation in Agriculture in the Rainlands of the Sudan.
Anglo — Egyptian — Sudan — 1948

(80) CAS — Vol.1 No. 2 1976
Current Agricultural Statistics, Statistics Section Department of Agricultural Economics. Sudan.

(81) Ministry of Industry. Khartoum 1972
The Report of the Committee Formed by the Council of Ministers. April 1972.

(82) Richard L. Kohls
Marketing of Agricultural Products Department of Agricultural Economics. Purdue University.

(83) Warren C. Waite and Harry C. Trelogin
Agricultural Market Prices. Second Edition.

(84) Department of Statistics Sudan
"Internal Statistics" Khartoum 1975.

(85) Gedaref Auction Market, Sudan
Reported to the Writer by:
The Superintendant and his Assistant
December 1975.

(86) Trade Year Book (1975)
Food and Agriculture Organisation of the
United Nations (FAO) Rome.

(87) Department of Statistics, Sudan
Foreign Trade Statistics Annual Report 1975

(88) U.N. Department of Economic Affairs
Instability of Export Markets of Underdeveloped
Countries. New York 1951.

(89) Ministry of Commerce Sudan
Annual Report 1977

(90) Reported to the Writer by:
A Number of small Farmers and small Merchants
in Gedaref City

(91) Reported to the Writer by
Friendly Merchant in Gedaref City.

(92) Department of Statistics
Foreign Trade Statistics Annual Reports 1973,1974 and 1975

(93) The Agricultural Research Corporation (ARC)
Reported to the Writer by:
The Director of the Gezira Research Station —
Wad — Medani

(94) The Kenana Research Station.
Reported to the Writer by:
The Director of Kenana Research Station

(95) Abu Ni'ama Research Station
Reported to the Writer by:
The Director of Abu'Ni'ama Research Station.

(96) Hodeiba Research Station
Reported to the Writer by:
The Director of Hodeiba Research Station

(97) Department of Agricultural Economics
Statistics Division. Ministry of Agriculture,Food & Natural Resources, Khartoum, June 1976.

(98) Sudan Year Book of Agricultural Statistics
Annual Report Year 1977.

(99) Reported to the Writer by:
Many Farmers and Merchants in Gedaref

(100) Dr. Osman A. Hakin
The Feasibility of Groundnuts Decortication in the Rahad Scheme November 1974.

(101) Ministry of Commerce (1970)
The law of Public Companies of 1969/70
Khartoum Sudan.

(102) Ministry of Commerce (1976)
Regulations on the Grading of Sesame

(103) Reported to the Writer by :
A number of Farmers at Damazine.

(104) CAS — Vol 1, No. 2
Current Agricultural Statistics, Statistic Section, Department of Agricultural Economics June 1976.

(105) International Labour Office (1975)
Final Report of the ILO/UNDP Employment Mission 1975.

(106) Octomay Trading Corporation (1973)
Annual Report.

(107) The Sudan Oilseeds Company(1975)
Annual Report

(108) Cournot A. (1897)
"Economic Cycles : Their law and Cause".
The Macmillan Company, New York.

(109) Octmay Trading Corporation and Sudan Oilseeds Co.
Extracted by the Writer from their Books.

(110) Reported to the Writer by:
The Manager of the Sudan Oilseeds Company in Khartoum 1976.

(111) Reported to the Writer by:
The Director of Abu Ni'ama Research Station.

(112) Abstracted by the Writer from:
The Gedaref Auction Market Books January 1975.

(113) Harper, W.M.
The M & E Handbook series — statistics
Second Edition July 1971

(114) Department of Statistics, Sudan
Internal Statistics Khartoum 1970/71

(115) Trade Year Book 1965 — 1970 — 1975
Food and Agriculture Organisation of the United Nations (FAO) Rome

(116) Production Year Book for 1965 — 1970 — 1975
Food and Agricultural Organisation of the United Nations (FAO) Rome.

(117) T.K. Warley
Agricultural Producers and their Markets — Basil Blackwell Oxford 1967.

(118) Debebe Agonafer
Analysis of the Production and Marketing of Sesame Seed in Ethiopia.
Unpublished MSc Thesis — Haile Selassie I University 1975.

(119) Thoman, R.S. and Conkling, E.
Geography of World Trade, Prentice Hall, Englowood Cliffs, N.J. 1967.

(120) U.N. F.A.O.
Production Year Book 196 – 1975 inclusive
and U.N. F.A.O. Trade Year Book 1960 – 1975

(121) NIE, Norman H, Dent, Dale H and Hull (1970)
Statistical Package for Social Science
McGraw Hill Book Company, New York 1970.

(122) Department of Statistics
Sudan Foreign Trade 1960 – 1975 Khartoum

(123) U.N. F.A.O.
Trade Year Book 1965, 1970 and 1975.

(124) Sudan Oilseeds Company Ltd.
Annual Report of 1977.

(125) U.N. F.A.O.
Production Year Book 1952 – 1974 inclusive
and U.N. F.A.O. Trade Year Book 1952 – 1974.

(126) Barzati Sergio
"The Underdeveloped areas within the Common
Market" Princeton University Press U.S H 1965

(127) The Lome Convention (1975):
Report covering Trade, Aid and Co-operation links
between the Nine and the 46 Developing Countries
in Africa, the Carribean and the Pacific.

(128) Department of Statistics
Foreign Trade Statistics, Annual Report 1975

(129) Leslie W. Rodger
Marketing in a Competitive Economy 1965

(130) Al-Sheik A.M.
Some Economic consequences of the fluctuations in Yield,
Mimeograph (Arabic) Ministry of Agriculture Khartoum 1970

(131) MILLAD Saad Hanna.
The Role, Significance and Implication of
Mechanical Farming in the Rainlands of

QUESTIONNAIRE FORMS USED IN THE MERCHANTS AND EXPORTERS SURVEYS

QUESTIONNAIRE FOR MERCHANTS :

Code ....

NAME	Date ....
	Town ....

1) Seasonality of Purchases

What Proportion of your Total Purchases Fall in

Nov	Dec	Jan	Feb	other months

Comment ....

2) Seasonality of Sale

Are your sales spread evenly throughout the year

Yes ....

No ....

If No 1) when are your peak periods ....

2) when are your slack periods ....

(132) Dr Shewki M. Bangheuli.

Agricultural Extension and it-
Relation to Agricultural Research
Food foundation workshop
Khartoum 1976

(133) World Bank Third mechanised Farming
Project Report
Washi

3) What are your purchases of dura last year :

Variety	Sacks
Feterita	.....
Mayo	.....
Mugod	.....
Othere	.....
Total	.....

4) What are your purchases of sesame last year :

Variety	Sacks
White	.....
Red	.....
Mixed	.....

Comment ....

5) Where do you buy from

Producer	Other Merchants	Others	specify ....
Producer Co — operative	Auction Markets		

6) What proportion of your Dura do you send to different parts of the country

....

7) Do you send dura to Port Sudan for export

Yes ....

No ....

If yes : Proportion : ....

---

8) What proportion of sesame do you send to Port Sudan for export

....

---

9) Transport to Different Parts of the Country :

Rail .... Cost ....

Road .... Cost ....

---

10) Are you satisfied with the present transport arrangement

....

---

11) How many motor lorries do you own ....

---

12) How do you sell your dura and sesame

Wholesalers	Retailers	other	specify

13) Seasonal Prices
per sack paid to Producers last year :

Dura	Nov :	Dec :	Jan :	Feb :	Mar :	Apr
	May :	Jun :	Jul :	Aug :	Sep :	Oct
Sesame	Nov :	Dec :	Jan :	Feb :	Mar :	Apr
	May :	Jun :	Jul :	Aug :	Sep :	Oct

Comment

14) What are the values of your sales in	Normal month	Good month	Bad month
Dura			
Sesame			

Marketing

15) Costs of dura and sesame last year :

	Dura	Sesame
Taxes		
Labour		
Purchases of stock		
Transport		
Sacks		
other		
Total		

16) Have you a relation in the dura and sesame Trade

Growers Merchants Other

---

17) Have you any other occupation

Yes

No

If Yes, Specify

---

18) How much capital is needed to Finance your business ?

---

19) Do you sell dura and sesame on credit

Yes

No

If Yes, what proportion of sales are on credit and rate of interest usually charged

---

20) Do you Advance money to producers

Yes

No

---

21) Do you store dura and sesame after harvest

Yes

No

If Yes, How many sacks have you normally in stock

22) Where do you store normally

Matmura for Dura

Your own stores

Rented stores

Silos

---

23) If you have your own stores, what storage capacity have you got :

---

24) What are the main risks in your business :

---

25) What improvement would you like to see

QUESTIONNAIRE FOR EXPORTERS

Code ....

General Information :

1) Type of Business —

Private owned	Private company	Public company	Co-op	State Orgn

If other, specify ....

2) Establishment date of present form of business ....

Is this the same as date when the business started ?

Yes	No

If No, a) is the present business a successor to one single firm ?

Yes	No

If Yes, what type of firm ....

If No, b) is it an amalgamation of one type or several types ?

Yes	No

Specify types ....

3) What Agricultural commodities do you export NOW ?

Dura	G'nuts	Sesame	Other Oilseeds	Fruit/Veg	Othe

4) What other Agric. commodities did you export in the past ?

commodities ....

year stopped ....

5) Comment on why you stopped exporting a particular commodity

....

....

6) Are you primarily engaged in exporting Agric. commodities ?

Yes	No

(i.e. 90 % of turnover or more)

If No, list other activities and give approximate share of of turnover last year among all activities ....

activities ....

% share ....

7) Who do you buy from, and rough % distribn. of what from each (by volume) ?

Commodity	Direct from producer	Agents in prodn area	Other m'chants	Other ....
Dura % distribn g'nuts % distribn				

Commodity	Direct from producer	Agents in prodn area	Other m'chants	Other...... ....
Sesame % distr. Gum Arab. % distr. Other .... % distr				

8) How many metric tons of each commodity did you handle last year ?

Comm.	Stock in hand at begin. last season	Purchases of current crop	Sales	Wastage	Stock in hand at end seaso
Dura					
G'nuts					
Sesame					
Gum					
Other					

Stock in hand + Purchases — Sales — Wastage = Stock in hand at end season

9) a) What % of last season's crop did you export directly yourself ?

DURA ....%

(other) ....%

b) If you did not export the whole crop yourself who did you sell it to ?

DURA ....

(other) ....

c) When you exported directly, who did you sell it to ?

....

d) To what countries did you export the commodity directly last year (give.% distribn. between countries) ?

....% ....%

10) What were terms of trade ?

F.O.B.	C.I.F	Penalties/ Clauses	Quality Specificn.	Others ....

Comment on types of penalties and quality specificn. & other conditions ....

GLOSSARY OF LOCAL TERMS

Feddan	:	Area measure equal to 4200 sq meters
DURA	:	Sorghum (Sorghum vulgare)
SIMSIM	:	Sesame (Sesamum Indicum)
MFC	:	Mechanised Farming Corporation
M.C.P.S	:	Mechanised Crop Production Schemes
A.B.S.	:	Agricultural Bank of the Sudan

WEIGHTS

1 Kilogram	=	2.20462 Pounds = 2.2258 Rottles
1 Pound	=	1.0096 Rottles
1 Rottle	=	0.9905 Pounds = 0.4493 kgs.
1 Metric Ton	=	1,000 Kgs.
	=	2,204.62 Pounds
	=	2,225.8 Rottles
	=	22.258 Small Kantar
	=	0.98421 Long Ton
	=	1.10231 Short Ton

AREA

1 Feddan	=	4,200 Sq M
	=	0.420 Hectare
	=	1.0379 Acres
1 Acre	=	0.964 Feddan
	=	0.405 Hectare
1 Sq Km	=	100 Hectare
	=	238.1 Feddans
1 Sq Mile	=	616.67 Feddans
	=	640 Acres