

FOOD SECURITY FOR SOUTHERN AFRICA



***Edited by
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University of Zimbabwe UZ/MSU Food Security Project

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CHAPTER FOURTEEN

SORGHUM AND HOUSEHOLD FOOD SECURITY IN LOW RAINFALL AREAS OF ZIMBABWE : A RESEARCH PROPOSAL

C.B. Mbwanda

BACKGROUND

At the initial SADCC meeting in Lusaka in April of 1980, the Heads of State identified the lack of research on sorghum and millet as a critical problem and they agreed to seek external assistance for this task. In 1984 with financial assistance from USAID and the Federal Republic of Germany, the International Crops Research Institute for the Semi- Arid Tropics (ICRISAT) launched a long term (20 year) research programme on sorghum and millet for the SADCC region. Presently a team of seven internationally-recruited scientists is working at the Matopos research station outside Bulawayo in Zimbabwe. The ICRISAT/SADCC research programme is headed by Lee House.

PROBLEM STATEMENT AND RATIONALE

Sorghum is more drought resistant than maize and for this reason it is the most assured crop for the low rainfall (200-600 mm), Natural Regions IV and V of Zimbabwe, most of Botswana, the southern region of Zambia and parts of other SADCC states. However, with the gradual development and dissemination of short season hybrid maize varieties, many rural households are slowly replacing sorghum with maize in local diets. Moreover, maize processing technology is well developed and small maize mills are conveniently located in villages throughout the maize belt. By contrast, sorghum has suffered from a lack of research on high yielding varieties and small-scale home processing machines. In short, the combination of favourable maize prices, relatively

higher yields of maize in normal rainfall years, and the difficulty in home processing of sorghum flour have induced communal (smallholder) farmers to produce maize for family food security needs as well as for the market. However, because of inadequate and variable rainfall, maize crop yields are poor in drought years. The result is food shortages, household food insecurity, and the need for SADCC states to provide food aid and food for work for programmes in these low rainfall areas.

Lee House has already provided the rationale for ICRISAT's long term (20 year) research programme. In Zimbabwe, a small group of researchers in the Department of Research and Specialist Services (R&SS), Environmental Development Agency (ENDA) and the University of Zimbabwe's Food Science group are starting to exchange ideas on how to improve sorghum production and processing technology. It is hoped that the research will enable sorghum to become more competitive with maize in low rainfall areas and that improved small scale processing technology will reduce the cost and drudgery of home processing and increase household food security. It is also hoped that the research will develop new end uses for sorghum, including blending sorghum with wheat flour, developing new convenience foods (e.g. sorghum chips), and expanding the use of sorghum in livestock feed and industrial uses (e.g. paint, plastics).

To my knowledge, no one has ever carried out an economic study of any aspect of sorghum production, processing, marketing and consumption in communal (smallholder) farming areas of Zimbabwe. The purpose of this brief proposal is to lay out my preliminary ideas of a study of sorghum and household food security in low rainfall areas of Zimbabwe. The proposal will be further developed in cooperation with Mike Weber, Rick Bernstein and John Staatz when I am in residence at Michigan State University from January-March 1987. I plan to initiate field research in mid 1987 and to

carry out various studies on sorghum and household food security over the 1987-1990 period as part of my D.Phil programme at the University of Zimbabwe.

SORGHUM AREA PLANTED, PRICES AND CONSUMER DEMAND

Tables I and II show that from 1965 to the present, communal and commercial farmers in Zimbabwe planted an average of 200 000 ha and 10 000 ha of sorghum, respectively. Area planted and yields have increased in response to higher prices and declined during drought years. There is no information available on the extent to which maize has replaced sorghum for home consumption but it is well known that this process has been underway for at least four decades.

Table 1 shows that the government has increased the nominal producer prices of sorghum from Z\$ 80 per ton in 1979/1980 to Z\$ 180 in 1985/86, an increase of 125 percent in six years. Both communal and commercial farmers responded to the dramatic price increases by increasing marketed output. As a result, the Grain Marketing Board (GMB) has accumulated a sorghum stock equivalent to three years' normal GMB domestic sales in early 1987. Presently most of the sorghum surplus in Zimbabwe is the Red Swazi variety that is produced by commercial farmers for the brewing industry. Red sorghum cannot be blended with wheat to make composite flour because of the purplish-pink discoloration of bread. White sorghum is primarily produced by communal farmers for home consumption. However, because of low yields and the lack of cost effective home processing technology, maize has gradually replaced white sorghum in rural diets in low rainfall areas.

The amount of sorghum available to the household is a function of the cost of production and processing sorghum

Table 1: Zimbabwe: Sorghum Production Statistics, 1965-87

	National Output (000 mt)	Commercial Output (000 mt)	Communal Output (000 mt)	GMB Intake (000 mt)	GMB Sales (000 mt)	Domestic Retention (000 mt)	Producer Price Z\$ (mt)	GMB Selling Z\$ (mt)	Area Planned (000 ha)	
									Commercial	Communal (Small- holder)
1965-66	n/a	3	n/a	1	10	n/a	34.48	39.01	13	n/a
1966-67	n/a	26.4	n/a	32	10	n/a	28.66	38.92	19	n/a
1967-68	n/a	26.4	19.5	32	10	n/a	32.88	55.77	17	246
1968-69*	n/a	8.4	38	6	11	n/a	35.16	55.60	13	93
1969-70	147	16	131	11	12	136	55.58	55.60	15	394
1970-71*	69	7	63	3	12	66	37.25	55.60	16	196
1971-72	76	7	69	4	13	72	38.74	54.95	12	239
1972-73	140	20	120	23	15	117	41.65	54.67	14	240
1973-74*	50	28	22	26	21	24	41.81	54.84	21	n/a
1974-75	164	14	150	13	17	151	41.54	54.56	7	n/a
1975-76	136	6	130	6	18	131	41.54	54.56	5	200
1976-77	121	16	105	15	14	106	64.27	71.75	7	210
1977-78	64	17	47	14	14	50	75.00	71.75	11	95
1978-79	73	14	57	17	15	56	75.00	90.00	8	120
1979-80*	50	20	30	22	17	13	80.00	98.00	10	76
1980-81*	83	17	66	23	20	65	105.00	117.00	8	120
1981-82	125	25	100	34.4	18	94.4	115.00	117.00	9	200
1982-83*	17	50	35	26	49	115	117.00	117.00	8	200
1983-84*	52	8	44	23	18	38	120.00	147.00	8	200
1984-85	155	18	37	25	14	34	140.00	165.00	11	156
1985-86	133	52	81	97	29	96	180.00	239.00	19	215
1986-87	-	-	-	84	25	-	180.00	1/ 239.00	-	-

Source: Grain Marketing Board (GMB) and Agriculture Marketing Authority (AMA)

* Drought years

1/ 1 Z\$ = .60 US\$ in January, 1987

Table 2: Zimbabwe: Sorghum Trade Statistics, 1965-87

	National Output (000 mt)	GMB In- take in- cluding Stocks (000 mt)	Imports (000 mt)	GMB Sales (000 mt)	Export	GMB Closing Stock (000 mt)	GMB Producer Prices Z\$ (mt)	GMB Selling Price Z\$ (mt)	World Price US \$ (mt)	GMB Maize Selling Price Z\$ (mt)	GMB Wheat Selling Price (z\$ mt)
1965-66	n/a	1	10	10	9	1	34.48	39.01	61	43.24	62.45
1966-67	n/a	33	-	10	0.34	14	28.66	38.92	67	43.24	62.14
1967-68	n/a	46	-	10	-	2	32.88	55.71	64	43.24	70.16
1968-69*	n/a	8	5	11	-	3	35.16	55.59	64	43.24	71.00
1969-70	147	15	-	12	-	2	55.58	55.60	56	43.24	71.00
1970-71*	69	5	7	12	-	-	37.25	55.60	54	43.24	69.45
1971-72	76	4	9	13	-	1	38.74	54.45	61	43.24	69.29
1972-73	140	24	-	15	-	9	41.65	54.67	62	43.24	69.01
1973-74*	50	35	-	21	8	6	41.81	54.84	174	43.24	65.18
1974-75	164	19	3	17	2	3	41.54	54.56	170	43.24	79.80
1975-76	136	8	12	18	4	2	41.54	54.56	160	51.54	110.00
1976-77	121	17	-	14	-	2	64.27	77.75	142	51.54	121.00
1977-78	64	16	-	14	-	3	75.00	71.25	96	51.54	128.00
1978-79	73	34	-	15	-	6	75.00	90.00	129	57.07	110.00
1979-80*	50	42	-	17	-	4	80.00	98.00	173	63.00	115.00
1980-81*	83	41	-	20	-	16	105.00	117.00	175	89.00	135.00
1981-82	125	64.4	-	18	-	9	115.00	117.00	173	137.00	165.00
1982-83*	67	54	-	26	2.5	4	115.00	117.00	155	137.00	190.00
1983-84*	52	28	9	18	-	11	120.00	147.00	154	157.00	220.00
1984-85	55	46	-	14	-	45	140.00	165.00	153	177.00	250.00
1985-86	133	97	-	29	20	94	180.00 1/	239.00	154	222.00	-
1986-87	-	-	-	-	-	-	-	-	-	-	-

Source: Grain Marketing Board and Agriculture Marketing Authority (AMA)

* Drought years

1/ 1 Z\$ = .60 US\$ in January, 1987

and the availability of substitutes such as maize. Although taste differences do exist between maize and sorghum flours, rural households in the communal areas attribute the substitution of maize for sorghum to time-consuming hand pounding of sorghum to make sorghum flour.

OBJECTIVES

The specific objectives of the proposed study are;

- 1) To describe the evolution of the sorghum subsector with respect to the role of sorghum in meeting rural food security objectives in Zimbabwe.
- 2) To describe the food security situation among households in low rainfall areas.
- 3) To analyse the relative cost and returns of sorghum and maize enterprises among communal farmers in selected low rainfall areas.
- 4) To analyse the constraints on expanding white sorghum production among communal farmers in the three communal areas.
- 5) To analyse the technical, economic and social impact of traditional and improved processing technologies for white sorghum in communal households.
- 6) To assess alternative policy options for the support of sorghum production and processing to increase food security in low rainfall areas.

HYPOTHESES

In this study, it is assumed that with present sorghum varieties and processing technology, the production and consumption of sorghum in the low rainfall areas will continue their historical decline relative to maize.

The following hypotheses will be tested:

1. Improved Production Technology for Food Security in Low Rainfall Areas
 - a) Given the present white sorghum and maize varieties, the returns to maize are higher but more risky than sorghum on communal farms.
 - b) With improved white sorghum varieties, returns will be higher and more stable than maize and farmers will be willing to invest more land, labour and other inputs into sorghum production to improve family income and food security .
2. Improved Mechanical Processing and Food Security
 - a) Improved sorghum processing technology will reduce household labour requirements in processing sorghum flour and increase the supply of sorghum flour available for household consumption. Reduced sorghum processing costs relative to maize will reduce household dependency on maize.

RESEARCH METHODOLOGY

A subsector framework will be used to gain a preliminary understanding of the evolution of the Zimbabwe's sorghum subsector, (Shaffer, 1973). The vertical system has a linked production sequence in which the output of one production stage becomes an input in the next. The performance of each stage is influenced by various factors like technology, institutions, economic policy, and producer and consumer responses.

This study will be confined to two stages in the system: sorghum production and processing. Interlinkages between these and other stages will be studied in order to understand the historical role of sorghum in food security. Over the next 3 to 6 months various informal (Colson, 1984) and formal agricultural household models will be analyzed to determine how to develop a model to help explain household production, storage, consumption and marketing decisions (Singh et al 1986). This phase of the research will be developed in conjunction with John Staatz at MSU over the January-March 1987 period.

The cost and returns of the sorghum and maize enterprises will be collected from farm surveys. The allocation of resources between the two enterprises will be analysed to investigate the current and potential role of sorghum in meeting family goals. Budget comparisons will be made between maize and sorghum crops.

The researcher will work closely with agricultural engineers in ENDA, R&SS, IDR and the SADCC Post Harvest Technology group in comparing the technical, financial, and economic coefficients of hand pounding with improved processing technology for farm families and villages. Data from the IDRC pilot processing machines in Botswana will be evaluated. The processing part of this study should probably be carried out by an M. Phil or D. Phil student in agricultural engineering.

PROPOSED OUTLINE OF FINAL REPORT

1. Introduction

- a) Problem Statement
- b) Background of sorghum subsector in Zimbabwe
- c) Objectives of Study
- d) Hypotheses
- e) Literature review.

2. Research Methodology

- a) Data sources available
- b) Survey approach (i.e. sample design, questionnaires)
- c) Methods of data analysis.

3. Presentation and Analysis of Research Results

4. Policy Recommendations

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