

PA-APR-364
Somali Democratic Republic

Ministry of Agriculture

Directorate of Planning and Statistics/Food Security Project

Primary Agricultural Characteristics
of Maize and Sesame Producing
Villages in the Middle and Lower
Shebele Regions

by
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John S. Holtzman

WORKING PAPER No. 3
March 1987.

Working Paper Series

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MSU-MOA-USAID Food Security Project
February 1987**

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DIRECTORATE OF PLANNING & STATISTICS (MOA)

Working Paper

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Acknowledgements

The Directorate of Planning and Statistics is undertaking collaborative research in the food security area with the Department of Agricultural Economics at Michigan State University. We wish to acknowledge the financial and substantive support of the Ministry of Agriculture of Somalia and the United States Agency for International Development (USAID) in Mogadishu in the food security research area. Researchers from the Africa Bureau and the Bureau of Science and Technology of USAID/Washington have made it possible for Michigan State University researchers to participate in this research, and to help conduct field research in Somalia.

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Part I. Background and Methodology of the Survey

1. BACKGROUND

1.1 Introduction

The Food Security Project, carried out collaboratively with the Planning Department of the MOA, is conducting applied research on maize and sesame production, marketing and trade in the Lower and Middle Shabelle regions of Somalia. The reconnaissance survey was aimed at building baseline information on farming and village characteristics, and was carried out by the Food Security Project researchers during September 1986.

1.2 Objectives

The objectives of the village reconnaissance survey were threefold. First, the survey was designed to generate baseline data on crop mix, use of purchased inputs, access to inputs and improved agricultural technology, farm resources, agricultural product marketing, and the effects of market liberalization at the farm level in 39 villages reflecting the considerable diversity of the Lower and Middle Shabelle. Second, these baseline data were collected to illustrate the similarities and differences between these two regions. Third, the reconnaissance survey findings have been used in the selection of 10 villages for further farm level research.

1.3 Study Area

The Lower and Middle Shabelle regions are characterized by largely irrigated agriculture and higher rainfall than most other regions of Somalia. Proximity to Mogadishu and relatively good network of roads make these regions accessible and well integrated with the major urban market in Somalia. Both the availability of water and accessibility of the Lower and Middle Shabelle offer considerable potential for expanding production and marketing of maize and sesame. Increasing local production of these crops and improving the efficiency of the marketing system will strengthen Somalia's food security, helping to reduce the increasing dependence on imported cereals, cereal products, and vegetable oils.

2. SAMPLE SELECTION

2.1 Sampling Design

The lack of detailed village list and maps of the irrigation infrastructure was an impediment to conducting systematic sampling design. The available 1975 military topographical maps to the scale of 1:100,000 and 1:200,000 were, however, outdated with respect to the more recently established irrigation infrastructure. Thus, a sketch-map was prepared for the planning of the survey based on superimposing the Lahmeyer irrigation maps with those of the Ministry of National Planning's census enumeration areas of the two regions.

Thirty-nine villages were purposively selected among a

possible villages in irrigated or potentially irrigable areas in order to capture the diversity of crops mix, input use, market access and participation and farmer resources.

2.2 Selected Villages

In the reconnaissance survey, four of the five Lower Shabelle districts and all of the two Middle Shabelle districts in which the Shabelle river passes through were enumerated (See Table 1 for the selected districts and village).

The survey involved a single visit to a sample of 39 purposively selected villages in the Middle and Lower Shabelle regions. Twenty-eight villages in the Lower Shabelle and eleven villages in the Middle Shabelle were ~~visited~~ and interviews held with the village chiefs of these selected villages. Villages were selected on the criteria that a) maize was the main crop in the village, b) the village was situated inside the boundaries of existing irrigation infrastructure, and c) the village was accessible by road. Fishing villages, rainfed villages, and towns were excluded.

Table 1

List of Selected Villages

<u>Region</u>	<u>District</u>	<u>Village</u>
Lower Shabelle	I. Afgoi	1. Gaalware
		2. Sabid-Canole
		3. Mordinle
		4. Mareerey
		5. Barire
		6. Aw-Dhegle
		7. Darasalam
		8. Mubarak
		9. Jambalul
		10. Baqdad
	II. Merka	11. Ugunji
		12. Sigale
		13. Mishani
		14. Wagaday
		15. Bulo Marerta
		16. Golweyn
		17. Mukay Jaalle
		18. Samey Samey
		19. Majabto
III. Qorioley	20. Gaiarow	
	21. Haduman	
	22. Bulo Sheikh	
	23. Jeerow	
	24. Farxane	
IV. Kurtun Warey	25. Abdi Ali	
	26. Urunurow	
	27. Afgoy Yare	
	28. Bombasa	
Middle Shabelle	I. Balcad	29. Walamoy
		30. Xawadley
		31. Jameco Misra
		32. Baqdad
		33. Raqaylow
	II. Jowhar	34. Dudunle
		35. Mahaday
		36. Burfule
		37. Barroweyne
		38. Kallundi
		39. Kongo

3. DATA COLLECTION AND PROCESSING

3.1 Data Collection

Principal investigator Yassi, Jeyte Wehelie personally interviewed 39 village chiefs in collaboration with the researchers N. H. Dheere, M. I. Asser, and A. O. Abikar. The interview with the village chiefs was structured and formal.

A questionnaire was designed and pretested in the field before the survey was conducted, and it was later revised in relation to both content and wording after the pretesting. The specific questions in the questionnaire covered a range of subjects designed to provide baseline information on village characteristics, estimates of the frequency distribution of the use of various farming practices, the impact of liberalization policies on maize and sesame production, and farmers household food security strategies. (See the appendix for a reproduction of the final draft of the questionnaire which was used in the survey).

At each village, the village chief was given a short briefing on the purpose of the of the study. During the interview schedule, some village chiefs got help in answering certain quantitative questions from village council members and other elders that were present during the interview. However, the village chiefs were able to adequately answer most of the questions.

3.2 Data Processing

Each questionnaire was edited and checked for accuracy in the field. The coding of the responses was performed in the office.

Data were entered into the Project's Compaq Plus computer, using SPSSPC+, the newly introduced and powerful statistical program.

Data analysis was primarily preliminary, and most of the analysis was performed using the descriptive statistics procedures that are available in the program. Regional statistics were obtained with the help of the processing procedure of the program with respect to the regional codes.

Part II. Main Results of the Reconnaissance Survey

4. PRINCIPAL FINDINGS

4.1 Crop Mix

Village chiefs were asked to rank order crops by area cultivated in both the Gu and Der seasons. Their responses are summarized below in Table 2.

Table 2

Gu and Der Cropping Patterns in the Shabelle Regions

A. Gu Crop	Crop Ranking						Regional Frequencies		Total Frequency
	1st	2nd	3rd	4th	5th	6th	L. Sh.	M. Sh.	
Maize.....	39						28	11	39
Sesame.....		1	5				2	4	6
Cowpeas.....		30					19	11	30
Sorghum.....									
Rice.....			1					1	1
Tomatoes....			5	2			2	5	7
Onion.....		2	2	1			5		5
Watermelon..						1	1		1
Tobacco.....		1	3	1	1		6		6
Cotton.....			1	1	1	1	2	2	4
Pumpkin.....									
B. Der									
B. Der Crop	1st	2nd	3rd	4th	5th	6th	L. Sh.	M. Sh.	Frequency
Maize.....	3	18	2				13	10	23
Sesame.....	31	5	3				28	11	39
Cowpeas.....		2	5				2	5	7
Sorghum.....	3	1	1	1			5	1	6
Rice.....	1			1				2	2
Tomatoes....	1	4	5	2			11	1	12
Onion.....			1				1		1
Watermelon..		5	1	1			6	1	7
Tobacco.....									
Cotton.....									
Pumpkin.....			1	1	1		3		3

Maize was reported to be the most important crop during the Gu in all of the villages. During the Der, sesame was reported to be the principal crop in 23 of 28 of the villages in the Lower Shabelle and all 11 villages in the Middle Shabelle.

Crops of secondary and tertiary importance were more varied. Cowpeas were reported to be the second most important crop during the Gu in 19 of 23 cases in the Lower Shabelle and in all 11 of the Middle Shabelle villages. Cowpeas are generally intercropped with maize, and boosts maize yields by fixing nitrogen. Other crops of reported secondary importance during the Gu in the Lower Shabelle are onions(2), tobacco (1), and sesame(10). Crops of tertiary importance during the Gu are mixed in both regions. Tobacco (3) and onions (2) are cited most often in villages of the Lower Shabelle, while sesame (4), tomatoes (4) and rice (1) are reported for the Middle Shabelle. Fourth crops are rarely grown during the Gu in either region.

Although sesame is the most important Der crop, maize is a significant second crop. The range of alternative crops cited as second, third and fourth most important during the Der is broader in the Lower Shabelle than in the Middle Shabelle. Farmers in the Lower Shabelle are more likely to cultivate watermelons, tomatoes and onions(i.e. cash crops) than their counterparts in the Middle Shabelle.

4.2 Maize Yields and Factors Affecting Yield

Maize yields are significantly higher on average and on the best farms in the Lower Shabelle than in the Middle Shabelle. Both average and best yields as shown in Table 3, are nearly double in the Lower Shabelle. These estimates reported by

village chiefs must be regarded as tentative and approximate however. Note the large standard deviations around the mean and the vast range of reported yields.

Table 3

Comparison of Maize Yield in the Two Regions
(Quintals of Shelled Maize)

<u>Region</u>	<u>Best Maize Yield</u>				;	<u>Average Maize Yield</u>			
	<u>Mean</u>	<u>Max</u>	<u>Min</u>	<u>Standard Deviation</u>		<u>Mean</u>	<u>Max</u>	<u>Min</u>	<u>Standard Deviation</u>
L.Shabelle	30	60	10	13.6	;	12	35	5	7.4
M.Shabelle	16	30	4	8.6	;	7	12	3	2.8

It is important to note that these yields are reported as opposed to measured. In the village reconnaissance, chiefs reported shelled maize yield per hectare.¹ Although not all maize is shelled at the time of the harvest, unshelled maize can be converted to shelled maize equivalents by using a 0.5 conversion factor. That is, two sacks of unshelled maize are roughly equivalent to one sack of shelled maize.

The divergence between estimated maize yields in the Lower and Middle Shabelle is due to several factors. First, a higher proportion of land is irrigated in the Lower Shabelle, and the irrigation system is also generally better maintained and more

¹. A hectare is generally equal to 16 Jibaals or 4 Darabs (local land measures). In Qorioley, 1 hectare equals 3 Darabs and 1 Jibaal.

effective. Second, levels of purchased input use are higher in the Lower Shabelle, as suggested by the findings in sections 4.3. Farmers in the Lower Shabelle are also more likely to participate in projects and programs that provide inputs such as fertilizer, insecticides and herbicides on credit, as well as extension services. Finally, private tractor ownership is more widespread in the Lower Shabelle, so that farmers are likely to have better access to timely land preparation. Delayed planting, resulting from having to wait for tractor hire services, most probably has an adverse impact on yields. Other factors which may help to explain regional yield differences are the degree of precision in land leveling, the type of irrigation system used (flood vs. controlled irrigation), soil fertility, and the level of commercialization of agriculture, which would presumably contribute to more efficient water use.

The wide disparity between the best and average yields in both regions can likely be attributed to a similar set of factors, as summarized in Table 4.

Water availability, provided by irrigation and/or by rainfall, is cited most frequently and is overall rated to be the most critical factor effecting yields in both regions.

Table 4

Major Factors Affecting Yield

Yield Factor	Lower Shabelle				:	Middle Shebelle			
	1st	2nd	3rd	4th		1st	2nd	3rd	4th
Water Availability	10	5	1	3	:	4	6		
Management Practices	7	1	1	1	:	1	1		
Improved seeds	5	1	1	2	:				
Fertilizer Use	2	3	6	1	:	1			
Insecticide Use	1	4	5	4	:				
Insect and Disease		4	1		:	1	2	5	
Land Preparation	1	2			:				
Soil Fertility	2		1		:	4			
Plant Population		2			:				
Row planting			1		:				

Cultural management practices are emphasized in the Lower Shabelle, but not in Middle Shabelle.

Use of improved seeds, fertilizer, and insecticides are commonly cited in the Lower Shabelle, though rated less important than water availability and management. The use of purchased inputs received virtually no mention in the Middle Shabelle. Pest and disease are recognized in both regions as constraining factors. Soil fertility is cited as the most important factor affecting yields by 4 of 11 respondents in the Middle Shabelle, but it is recognized as far less important in the Lower Shabelle.

The irrigated areas in the Middle Shabelle, particularly in Jowhar District, seem to face to a greater degree of soil salinity problems than in the Lower Shabelle, which have forced many hectares of irrigated land out of production.

4.3 Participation of Public Input Credit Programs

The levels of purchased input use and the degree of participation in publicly supported projects and programs are significantly higher in the Lower Shabelle than in the Middle Shabelle. This is suggested by the incidence of input use and participation reported in table 5.

Table 5

Sources of Farm Inputs

	Lower Shabelle	Middle Shabelle
UNCDF	11	2
ONAT	3	0
FAO Fertilizer Program	2	0
AFMET	1	0
Other (don't know)	7	1

Total	24	3

In 8 of 11 villages in the Middle Shabelle, purchased inputs

are not used at all. In contrast, only 4 of 28 villages in the Lower Shabelle purchase no inputs such as fertilizer insecticide and pesticide. Input sources for farmers in villages where inputs are purchased are summarized in Table 5.

Table 6

Input Use, Extension, and UNCDF Participation
(Number of Villages)

Input Use	Lower Shabelle		Middle Shabelle	
	Yes	No	Yes	No
Fertilizer	18	10	0	11
Insecticide	23	5	1	10
Improved Seeds	20	8	1	10
Technical Package	18	10	0	11
Row planting	19	9	5	6
FEA Agent	17	10	5	6
UNCDF	11	17	2	9

Clearly, the Lower Shabelle is the favored region in terms of access to inputs supplied by public programs and agencies. In the 7 villages in the Lower Shabelle where the chief responded "other sources", inputs may be acquired from neighboring banana plantations or from farmers in other villages who participate in public programs. It is noteworthy that private traders do not supply inputs to farmers.

4.4 Farm Size and Resource Ownership

Farms were reported to be larger on average in the Lower Shabelle than in the Middle Shabelle, and the largest farms in each village were also larger in the Lower Shabelle (see Table 7).

Table 7

Farm Sizes in the Lower and Middle Shabelle
(in Hectares)

	Mean	S.D	Minimum	Maximum	N
<u>Lower Shabelle</u>					
Average Farm	3.5	1.9	0.3	7	25
Largest farm	95.2	114.5	1	400	25
<u>Middle Shabelle</u>					
Average Farm	2.9	1.1	1.5	5	11
Largest Farm	30.7	25.6	20	50	11

Private ownership of tractors was also more widespread in the Lower Shabelle (4.8 per village) than in the Middle Shabelle (2.6 per village) even though the size of the villages did not differ greatly between regions (383 vs. 343 houses). Finally, a greater proportion of villages in the Lower Shabelle have households owning 1-2 cows in the village (26/28) or cattle herds

grazing away from the village (18/28) than is the Middle Shabelle (6/11, 4/11 respectively).

4.5 Maize Marketed Surplus

Village chiefs in the Lower Shabelle reported that farmers in their villages sold an average 51% of their maize harvest. Sales estimates ranged from 30% to 80%. In contrast, Middle Shabelle village chiefs estimated that farmers sold a lower average 34% of their maize harvest, with estimates ranging from 20% to 50%. The degree of difference between the two regions is not surprising, given the greater commercialization of agriculture in the Lower Shabelle and its better integration with urban markets, particularly Mogadishu, than the Middle Shabelle. The magnitude of reported sales is surprisingly high in the Lower Shabelle, however. More detailed information on grain sales will be obtained in later farm surveys, which will shed more light on farmers' sales volume and strategies.

Farmers in the surveyed villages sell their maize most frequently to ADC (37/39) and at local markets (31/38) and least commonly to itinerant traders (17/39). What is especially striking is that itinerant traders buy maize in only 1 of 11 villages in the Middle Shabelle, in contrast to 16 of 28 in the Lower Shabelle. This reinforces the finding that the agricultural zones of the Middle Shabelle are less well-integrated with urban markets than villages in the Lower Shabelle.

4.6 Impacts of Market Liberalization

Village chiefs reported that farmers increased area under cultivation during the last 3-4 years in 36 to 39 villages, presumably in response to market liberalization. According to aggregate statistics, most of this expanded area was cultivated in maize. Most of this increase was made possible by reduction of land lying fallow (36/39) and the cultivation of new land (27/39). Interestingly, 10 of 28 villages in the Lower Shabelle were unable to put new land under cultivation. This was likely due to the higher population density of the Lower Shabelle. The degree to which villages expanded irrigated area as opposed to rainfed area under cultivation is unknown. This will be examined in the follow-up surveys in 10 villages.

Over this same period agricultural production increased in 37 of 39 villages. Improved technology was adopted by farmers in 22 of 39 villages, although adoption was not widespread in the Middle Shabelle (3/11). This is likely due to the less easy access to inputs and public projects and programs by Middle Shabelle farmers.

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APPENDIX

This interview with village chiefs is intended to provide base line information on the diversity of the different villages, resource bases, access to inputs, markets, and farm technology in the Lower & Middle Shebelle regions.

Item	Specific Question	Response	Code
1. Population	1. What is the approximate population of the village?	# Houses..... # Families... # People.....	
	2. What proportion of the residents are farmers?%	
2. Cropping system	1. Are villages farms irrigated and/or rainfed?	Irrig..... Rnfed..... Both.....	
	2. What are the major crops grown during: a) Gu season? b) Der season?	a) Gu:..... b) Der:.....	
	3. What is the village's: a) Best maize yield? b) Average maize yield?	a).....Qt/Ha. b).....Qt/Ha.	
	4. What factors affect maize yield the most?	1)..... 2)..... 3)..... 4)..... 5)..... 6).....	
	5. Do farmers use the following maize technologies: a) Fertilizer? b) Insecticide? c) Improved seeds? d) Row planting? e) Improved package?	a) Yes... No... b) Yes... No... c) Yes... No... d) Yes... No... e) Yes... No...	
	6. Does the UNCDF provide credit in this village?	Yes... No...	
	7. Is there an FEA assigned in this village?	Yes... No...	
	8. From whom do farmers get farm inputs?	
	9. How many tractors are owned by village residents?	
	10. Are there banana plantations around the village?	Yes... No...	

Item	Specific Question	Response	Code
(Cont.)	11. Do banana plantations give small parcels of land to their laborers?	Yes... No...	
Farm sizes & resource availability.	1. How many hectares is the largest farm in the village?Ha.	
	2. What is the average farm size ?Ha.	
	3. Is farm land rented in the village?	Yes... No...	
	4. Do farmers own the following: a) One or two cows kept at home? b) Large cattle herds grazed outside the village?	a) Yes... No... b) Yes... No...	
Product marketing.	1. What proportion of maize harvest do farmers normally sell?%	
	2. To whom do they sell maize: a) ADC? b) Itinerant private traders? c) Local market?	a) Yes... No... b) Yes... No... d) Yes... No...	
	3. Which major market residents sell most of their products?	
Liberalization impacts.	1. Has any changes occurred over the last 3 or 4 years in the village's: a) Production? b) Technology use?	a) Yes... No... b) Yes... No...	
	2. Did cropped area expand over this period?	Yes... No...	
	3. Was the change of area cropped due to: a) Reduction in the fallow period and fallow land? b) New land under production?	a) Yes... No... b) Yes... No...	