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**A Socio-Economic Survey in the Province of
Nampula: Cotton in the Smallholder Economy**

**By
MOA/MSU/UA Research Team**

**Working Paper N°. 5E
January, 1991**

NATIONAL DIRECTORATE OF AGRICULTURAL ECONOMICS

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ACKNOWLEDGEMENTS

The National Directorate of Agricultural Economics is undertaking collaborative research in the food security area with Michigan State University (the Department of Agricultural Economics) and with the University of Arizona (the Department of Agricultural Economics and the Bureau of Applied Anthropology Research).

We wish to acknowledge the financial and substantive support of the Ministry of Agriculture of Mozambique and the United States Agency for International Development (USAID) in Maputo to complete food security research in Mozambique. Research support from the Africa Bureau and the Bureau of Research and Development of AID/Washington have also made it possible for Michigan State University researchers to participate in this research, and to help conduct field activities in Mozambique.

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A SOCIO-ECONOMIC SURVEY IN THE PROVINCE OF NAMPULA: COTTON IN THE SMALLHOLDER ECONOMY

I. INTRODUCTION

Cotton in Mozambique has a complex and checkered history. Before Independence arrived in 1975, cotton was a major symbol of colonial dominance over the smallholder sector (defined in Mozambique as the "sector familiar") either through forced labor in the fields of the Portuguese producers, or coerced cultivation on smallholders' plots. The large cotton companies traditionally played a predominant role in the dissemination of the crop, acting as genuine monopolies that exercised local power far beyond simple economic influence. Now in a post-Independence era, when Mozambique seeks to redefine its economic path and move toward sustained agricultural development, the role of cotton continues to generate intense debate.

II. COTTON IN MOZAMBIQUE: THE ISSUES

The current debate over cotton policy focuses on three principal issues. The first issue involves the country's macro-economic situation and the question of using cotton as one of the main sources of foreign exchange credits. During the severe economic crisis that characterized the past decade in Mozambique, national attention increasingly turned to cotton as a cure--albeit a partial one--for the grave problems in the trade balance. With its potential for export earnings, the promotion of cotton still maintains high priority at the national level.

The second issue highlights the appropriate place of cotton in a national strategy for agricultural development. There is general agreement that the future of Mozambican agriculture, and its capability to feed the country, rests clearly with the smallholder sector, whose development is considered a necessary condition of national progress. On the other hand, it is not clear whether cotton will help stimulate technical change and improve the welfare of smallholders, who constitute 90 percent of all Mozambican farmers. It is conceivable that the expansion of cotton cultivation in the smallholder sector could achieve desired macro-economic objectives without providing any substantial benefits to the smallholder households. This, in fact, was precisely the sad reality of colonial history.

Major doubts surrounding this issue center around the question of the potential substitution of food crops for cotton. If large numbers of smallholders expand cotton production at the expense of reducing the area dedicated to maize and manioc, the food supply--local as well as national--could suffer precarious declines. If income from cotton sales fails to compensate for the labor shifted to cotton, the food security of farm household could be endangered. On the other hand, it is possible that the cultivation of cotton could increase the buying power of the smallholder household and stimulate capital accumulation for agricultural investment. Other households might also be encouraged and assisted to specialize in producing food crops. Some African nations have had a positive experience with cotton production, particularly with the technological shifts, where farmers have adapted improved technologies associated with cotton growing to the production of food crops. Furthermore, cotton income has assisted smallholder in capitalizing their farming system, thereby allowing increased output of both cotton and food crops. In the midst of all of these uncertainties, the effects of cotton production on smallholders in Mozambique lacks systematic information on which to ground

conclusions and formulate alternative policies.

A third major issue focuses on the role of cotton companies in promoting and organizing cotton production in the smallholder sector. The present national policy maintains the local monopoly position of the cotton companies--both public and mixed--and has established a licensing system that gives private individuals exclusive buying rights in specific geographical locations. The relationship between the cotton companies (or private buyers) and rural producers is not well-known, nor whether the monopolistic control creates a markedly uneven and disadvantaged bargaining position for the farm. Nonetheless, the companies constitute the only dynamic and capitalized agents in the region and, as such, well placed to provide services and stimulate development in the smallholder sector.

All of these issues lack a definite answer and strategy for action due in part to the dearth of systematic information. Particularly in the Province of Nampula, where cotton has had a long history and its potential for expansion is considered great, a detailed study of smallholder cotton production could contribute significantly toward improved agricultural policy decisions. In that spirit this report is an initial attempt to examine these issues based on empirical insights gained directly from smallholder households.

III. A SOCIO-ECONOMIC SURVEY OF THE SMALLHOLDER SECTOR IN NAMPULA

During the months of June, July and August 1991, an agricultural survey of the smallholder sector was carried out in three districts of Nampula. In total, 343 farming families were interviewed (the majority in the local language of Macua) by 15 local interviewers trained specifically for the task (see NDAE Working Paper No. 3 for a detailed discussion of the study methodology). The data obtained from completed questionnaires and from informal interviews are in the process of being analyzed by a team of Mozambican and foreign researchers under the Food Security Project financed by the Ministry of Agriculture and USAID. The results reported here are of a preliminary nature, and will be systematically disseminated during the coming months.

The questionnaire that served as the principal data-gathering instrument focussed on various aspects of smallholder households, including demographic characteristics, patterns of household labor utilization, access to land and cropping patterns, household integration into output and consumer goods markets, dietary habits and consumption, and, of immediate interest, the importance of cotton to household welfare and the relationship between smallholders and the cotton companies operating in the region. Of the three districts, two had villages with a significant number of cotton producers--Monapo and Ribaúe. In Monapo, the sample was stratified to include villages with a longer history of cotton production as well as villages with less cotton experience with. The survey sample included the areas controlled by SAMO (Mecutine, Muelege, Mutarauatane), SODAM (Mpatha and Netia) and the Empresa de Algodão in Ribaúe (Tanheia and Mape). Among the 228 households selected in these two districts, there were 89 families that grew cotton during the 1990-91 agricultural campaign.

This research was designed to explicitly address the three issues presented above, but with particular attention to the last two--the contribution of cotton to agricultural development and

the role of the cotton companies. The preliminary results allow us to examine rural household production strategies, and at the same time to estimate the well-being of cotton producers as compared with that of other farmers.

IV. THE PRELIMINARY RESULTS

During the analysis of the data, three criteria were applied to disaggregate the sample of cotton producers and to establish bases for comparison. At one level, the analysis focussed on the differences among villages. To identify different kinds of cotton producers, the sample was also classified according to the scale of production based on the results of the last production campaign. These categories included farmers without cotton (non-producers), farmers who produced less than 100 kilos of cotton, those who produced more than 100 and less than 200 kilos, those who produced more than 200 and less than 500 kilos, and, finally, those producing more than 500 kilos. For a final comparison, we adopted the functional definition employed by the local cotton companies to categorize their registered cotton producers. This classification is based on land and includes non-producers, those who grow 0.5 ha or less of cotton (**cultivadores**), and those who have more than 0.5 ha in cotton (**agricultores**). Through these different comparisons, it is possible to document the heterogeneity in the rural population and to broaden our evaluation of the impacts of cotton on the smallholder sector.

Variations in Production and Sales at the Village Level:

Table 1 presents the distribution of producers by district and village. Monapo clearly emerges as an important cotton-producing district, with 57% of the sample producing cotton. At the village level, Netia (under the influence of SODAM) and Mecutine (SAMO) figure as the principal centers of production. Only three cotton farmers were identified in Mutarauatane, and while they relatively large producers, the small sample size for this village (14) suggests cautious interpretations. In almost all of the cases, the farmer customarily cultivates a single field in cotton and rarely intercropped, as is commonly observed in fields of food crops. For this district, the average area grown in cotton is approximately 0.66 ha, although the most frequently encountered field size is a one-half hectare. On average, the area of cotton production represents about 40% of the total cultivated area.

In Ribaúe, scarcely 21% of the population cultivated cotton during the last season, and only the villages of Tanheia and Mapé evidenced a significant number of producers. Since Ribaúe generally enjoys abundant land, the cotton fields are larger, but the percentage of land dedicated to cotton is relatively smaller (less than 25%). Thus, when compared with Monapo, the producers in Ribaúe cultivate a larger area in cotton, but at the same time a smaller proportion of the available land. As a general rule, the producers of Angoche do not cultivate cotton because they do not have access to appropriate land. The two Angoche farmers in the sample who cultivated cotton during the last season had no production due to unfavorable climate.

Table 1. Characteristics of Cotton Production in 15 Villages in Nampula.

District/Village a/ (sample size)	Cotton Producers		Área in Cotton		Production 90-91 (kg)	Productivity (kg/ha)
	(N)	(%)	(ha)	(%) b/		
MONAPO (109)	621	56.9	0.66	38.8	380	640
Netia (22)	14	63.1	0.75	42.2	415	605
Muelege (25)	10	40.0	0.70	25.2	334	420
Mpatha (26)	13	50.0	0.52	41.2	136	320
Mecutine (22)	22	100.0	0.52	41.0	514	998
Mutarauatane (14)	3	21.4	1.75	41.7	443	303
Ribaúe (119)	25	21.0	0.76	22.7	71	94
Moçambique Novo (23)	1	4.3	0.50	15.4	0	0
Mucu (25)	0	0	0	--	0	0
Natere (26)	3	11.5	1.0	26.0	76	76
Tanheia (21)	13	61.9	0.85	23.9	77	81
Mape (24)	8	33.3	0.56	20.5	70	137
ANGOCHE (115)	2	1.7	0.38	68.2	0	0
Napruma (24)	1	4.2	0.50	88.9	0	0
Namapuiza (20)	0	0	0	--	--	--
Namitória (22)	0	0	0	--	--	--
Macogone (25)	1	4.0	0.25	47.6	0	0
Monari (24)	0	0	0	--	--	--

a/ The statistics presented in this table are unweighted averages.

b/ Percentage of the total cultivated area dedicated to cotton.

Source: Socio-Economic Survey of the Smallholder Sector in Nampula Province

In order to identify the constraints to cotton production, the survey inquired into farmer motives for not cultivating cotton in zones considered appropriate for the crop. In the district of Monapo, a majority of the non-producers blamed the shortage of labor as the principal reason for not producing cotton, while more than 30% responded that they did not have sufficient or adequate land. In the district of Ribaúe, 34% of the non-producers stated that they had no interest in producing cotton; 30% discussed the scarcity of labor; and 25% indicated a lack of sufficient or appropriate land.

The information in Table 1 reveals significant differences among villages and districts for both average production levels and yields. Assuming a conversion factor of 35 kilos per sack of cotton, the villages of Netia, Mecutine, and Mutarauatane attain production levels exceeding 400 kilos per household. Average production is lower in Muelege, and significantly so in Mpatha, a more isolated village. Average yields (in kilos per hectare) vary between 303 kgs/ha (for Mutarauatane) and 998 kgs/ha (for Mecutine). For the entire sample of Monapo, average yields reach 640 kgs/ha, a much higher estimate than the figures usually cited as representative of the smallholder sector (for example, SAMO gives estimates between 350 and 500 kgs/ha). By comparison, the production and productivity estimates for Ribaúe are much lower. Although the cultivated area is larger, production levels are below 20% of those recorded for the Monapo villages. Likewise, the yields for Ribaúe cotton farmers are extremely low.

Thus, at a general level, the survey results identify an overall pattern in the distribution of cotton production. In Angoche, the edapho-climatic conditions largely preclude cotton as a viable cropping alternative. In Ribaúe, the production problems with cotton appear to arise more from the presence of institutional constraints, perhaps related to the history of cotton in that district or to the operations of the cotton company responsible for that district. The survey responses reveal an unambiguous resistance to cotton production, and as an indication, more than 84% of those who produced cotton in Ribaúe during the last campaign do not intend to grow it during the next agricultural campaign. On the other hand, all the cotton farmers in Monapo plan to continue. It is possible that the more dynamic stance of the companies in Monapo has provided a more attractive set of incentives to smallholder households.

Table 2 summarizes selected characteristics of cotton marketing, discriminated by village and district. Since the price of cotton is fixed for the entire marketing campaign, there is no incentive for farmers to store the harvest in the expectation that prices will improve. Consequently, all cotton is sold shortly after the harvest. Table 2 shows that the average returns from cotton sales amounted to an average of 112 contos¹ for an average household in Monapo, compared to 31 contos in Ribaúe. In Mecutine, the farmers received an average cotton income of 153 contos, a value that represents 84% of total agricultural sales for these households. By contrast, in Mpatha, a more isolated village in Monapo, the average value of cotton sales was only 44 contos, or a 67% share of agricultural sales. In Ribaúe, the importance of cotton sales is much reduced. For the principal cotton-producing villages, Tanheia and Mape,

¹ One **conto** is equal to 1,000 **meticais**, the Mozambican currency.

Table 2. Characteristics of Market Sales of Cotton and Food Crops, by Village.

District/Village a/	Value of Cotton Sales (mt)	Cotton Sales/Total Agricultural Sales (%)	Declared Unit Prices (mt)	Sales of Food Crops (% of families)	Sales of Food Crops (mt)
MONAPO	112852	70.7	306	59.7	21599
Netia	105727	78.3	290	57.1	16094
Muelege	107966	44.9	307	100.0	66900
Mpatha	44019	67.3	315	46.2	10515
Mecutine	152840	84.0	305	50.0	12448
Mutarauatane	162667	42.9	310	66.7	11417
Ribaúe	31491	23.6	312	96.0	90569
Moçambique Novo	--	--		100.0	57975
Mucu	--	--	--	--	--
Natere	25800	41.9	329	66.7	86667
Tanheia	43800	27.1	315	100.0	82326
Mape	22175	15.4	299	100.0	109500

a/ The values in table are non-weighted averages by household.

Source: Socio-Economic Survey of the Smallholder Sector in Nampula Province

cotton income represented only 27% and 15%, respectively, of the total value of agricultural sales. It is possible to conclude that in the Monapo villages, even in the more isolated areas, cotton income is a major source of agricultural revenue; whereas in Ribaúe, cotton provides a relatively minor contribution to household incomes.

During the 1991 marketing campaign, the price of high quality cotton (in seed) was stipulated at 320 meticaís per kilo. Table 2 provides estimates of the average prices declared to have been received by producers, which suggest that farmers on average feel that the average price did not correspond to official levels (8 to 14 meticaís per kg.lower), probably due to variations in quality. Presumably, a certain proportion of the cotton did not receive a first-class classification and was sold at a lower price.

It is sometimes argued that cotton producers do not supply the market with food crops. Nonetheless, survey results in Table 2. demonstrate that 60% of the cotton producers in Monapo and 96% of those in Ribaúe sold maize, beans, sorghum or manioc during the past year. These sales provided an average annual household income of 22 contos in Monapo and 91 contos in Ribaúe. Thus, in comparing food crop and cotton sales, the positions of the two districts are reversed. In Ribaúe, cotton producers depend primarily on the income from food crop sales. On the other hand, cotton producers in Monapo do market other products, but in smaller quantities.

Variations in the Scale of Production and Sales

Preliminary analysis identifies substantial variation in cotton production within given villages, suggesting high level of heterogeneity among cotton producers. To accommodate this variation, the sample was grouped into categories based on the scale of production during the last campaign. Table 3 summarizes this distribution of the farmers. As expected, the cotton growers in Ribaúe produced either very little (less than 100 kilos) or no cotton. The Monapo cotton growers, on the other hand, were concentrated in the categories of producers with more than 100 kilos. In Mecutine and Netia, production averages surpassed 200 kilos. These results support the conclusion that a class of rather specialized cotton growers can be identified in Monapo, which is not so in the case of Ribaúe.

Table 4 utilizes the same scale of production classification to present selected characteristics on land use, production, and yields. Overall, cotton farmers appear to have access to somewhat more land than do the non-producers. In the case of Monapo, the large scale producers have more land in cotton; however, the differences in scale cannot be attributed solely to the cultivated area. Cotton yields appear to increase significantly with the scale of production. Thus, while larger producers do have more land, levels of production are also conditioned by factors that affect productivity, such as technology and agricultural practices.

The disaggregation of the sample by scale of production provides a more detailed perspective on the competition between cotton and food crops over productive resources. As mentioned above, one side of the debate holds that in a context of land or labor scarcity, cotton production expands at the expense of food production (principally maize, beans and manioc). Following this reasoning, households that specialize in cotton production do so at the risk of their own food security. Opponents to this view defend cotton production as an important source of income to buy food.

Table 3. Distribution of the Sample by Scale of Cotton Production.

District/Village	No Cotton Production		Production (0 - 100 kgs)		Production (100 - 200 kgs)		Production (200 - 500 kgs)		Production (> 500 kgs)	
	(N) a/	(%) b/	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)
MONAPO	48	43.1	9	7.3	11	10.1	22	20.2	20	18.3
Netia	8	36.4	1	4.5	1	4.5	6	27.3	6	27.3
Muelege	15	60.0	2	8.0	2	8.0	4	16.0	2	8.0
Mpatha	13	50.0	4	15.4	5	19.2	4	15.4	0	0.0
Mecutine	0	0.0	2	9.1	2	9.1	8	36.4	11	50.0
Mutarauatane	11	78.6	0	0.0	1	7.1	0	0	1	7.1
Ribaúe	94	79.0	18	15.1	4	3.4	3	2.5	0	0.0
Moçambique Novo	22	95.7	1	4.3	0	0.0	0	0.0	0	0.0
Mucu	25	100.0	0	0.0	0	0.0	0	0.0	0	0.0
Natere	23	88.5	1	3.8	2	7.7	0	0.0	0	0.0
Tanheia	8	38.1	9	42.9	2	9.5	2	9.5	0	0.0
Mapé	16	66.7	7	29.2	0	0.0	1	4.2	0	0.0

a/ Number of households by category of production.

b/ Percentage of households by category of production.

Source: Socio-Economic Survey of the Smallholder Sector in the Nampula Province

Table 4. Characteristics of Cotton Producers by Scale of Production.

Levels of Cotton Production a/	Producers by Class		Total Cultivated Area (ha)	Área in Cotton (ha)	Cotton Production (kgs)	Cotton Yields (kgs/ha)	Production of Food Crops (kgs)	Production of Food Crops Per Capita (kgs)
	(N)	(%)						
MONAPO (total)	109	100.0	1.6	0.4	216.0	640.2	1129.9	338
Non-Producers	47	43.1	1.3	0.0	0	0	1075.4	419
Less than 100 kgs	9	8.3	2.0	0.7	50.2	110.2	941.7	256
100 - 200 kgs	11	10.1	1.6	0.5	138.4	323.0	1140.5	267
200 - 500 kgs	22	20.2	1.8	0.6	319.7	699.2	1174.2	221
More than 500 kgs	20	18.3	2.2	0.9	727.1	988.5	1288.0	351
Ribaúe	119	100.0	2.4	0.2	15.0	94.9	1327.5	298
Non-Producers	94	79.0	2.2	0.0	0	0	1156.2	272
Less than 100 kgs	18	15.1	3.4	0.7	21.7	36.5	1821.0	368
100 - 200 kgs	4	3.4	4.1	1.0	131.3	131.3	1908.3	336
200 - 500 kgs	3	2.5	3.5	0.8	291.7	396.7	2958.3	628
More than 500 kgs	0	0.0	0.0	0.0	0	0	0	0

a/ The values in the table are non-weighted averages.

Source: Socio-Economic Survey of the Smallholder Sector in Nampula Province

Results in Table 4 suggests that, in general, as scale of cotton production increases, farmers continue to grow food for household consumption. There are, however, clear differences between Monapo and Ribaúe. In Ribaúe, the larger cotton growers are clearly the larger food crop producers, and there is little evidence to support the competition argument. In Monapo the largest cotton growers produce more food crops than the other categories of growers; however, when food production is measured in *per capita* terms, non-producers have a greater quantity of food available relative to all cotton growers. As a consequence, inasmuch as the cotton producers in Monapo maintain some land in food crops, there exist subtle indications of competition for smallholder labor. These interpretations receive some support from the responses of cotton producers to questions of preference between market crops and food crops. Approximately 67% of the cotton producers in Monapo declared that cotton does not serve as a substitute for food crops. On the other hand, nearly 33% of the farmers consciously produced cotton to obtain the income to purchase basic consumer items including food. In Ribaúe, none of the producers expressed a preference for cotton a source of income for purchasing food.

The economic importance of cotton for the smallholder sector is presented in Table 5. As in the case of production, there are great differences between the districts. In Monapo, those who cultivate cotton depend substantially on the proceeds from its sale. For these farmers, the value of cotton sales represents between 52% and 84% of the total value of their household cash income (agricultural sales,) and varies from 29 contos for small scale producers to 208 contos for the large scale producers. A majority of the cotton cultivators also market some food crops, although at a very reduced level. In Ribaúe, by contrast, cotton sales comprise about one half the total farm cash income for the larger scale producers, who are also strong participants in food crop markets. In sum, sales patterns suggest that the cotton producers in Monapo specialize to a greater extent in that crop than do producers in Ribaúe, where product marketing appears more diverse.

Technological Transfers Between Cotton and Food Crops

One commonly-cited advantage related to the influence of the cotton companies is the potential for access to improved technologies. The more dynamic organizations can provide a variety of services, from seeds and machine services to employment on company farms. In other African countries, experience has shown that the technologies associated with cotton growing can be successfully transferred to other crops. Table 6 reports preliminary analysis of this hypothesis by comparing maize and manioc yields among producers classified by scale of cotton production, including a category of farmers without cotton. Note that for this preliminary analysis the yield estimates for these food crops do not account for the effects of intercropping, thus reported values do not include the quantities of the associated crops (usually beans), assumed here to be constant across all categories.

Based on the yield results in Table 6, the analysis offers only minor, if any, support for the argument that the most efficient cotton growers manage to transfer some of their benefits from cotton technology and other benefits over into the production of food crops. The case of possible strong positive interaction and worthy of further analysis is the high maize yields reported for the largest category of cotton growers (although the sample size of 12 observations is small).

Table 5. Characteristics of Market Activity by Scale of Cotton Production.

Levels of Cotton Production a/	Producers by Class		Total Value of Agricultural Sales (mt)	Cotton Sales		Food Crops Sales		
	(N)	(%)		(mt)	(% of HH cash income)	(% of N)	(mt)	(% of HH cash income)
MONAPO	109	100.0	148570	112852	70.7	57.0	41439	21.8
Non-Producers	47	43.1	106994	0	0.0	55.3	49556	36.1
Less than 100 kgs	8	7.3	30587	28660	60.4	37.5	12166	11.8
100 - 200 kgs	11	10.1	208445	44682	51.5	72.7	28237	15.8
200 - 500 kgs	23	21.1	164235	98427	73.1	56.5	44773	14.5
More than 500 kgs	20	18.3	306178	208143	84.0	60.0	36364	7.0
Ribaúe	119	100.0	74350	7989	6.6	60.5	62355	60.7
Non-Producers	94	79.0	45757	0	0.0	51.1	44088	68.8
Less than 100 kgs	18	15.1	174509	10033	12.1	94.4	97612	78.9
100 - 200 kgs	4	3.4	160587	51350	47.1	100.0	71988	37.4
200 - 500 kgs	3	2.5	254303	112303	50.1	100.0	142000	49.9
More than 500 kgs	0	0.0	0	0	0.0	0	0	0.0

a/ The values are non-weighted averages.

Source: Socio-Economic Survey of the Smallholder Sector in Nampula Province

Table 6. Estimates of Use of Factors of Production and Comparison of Productivity by Different Levels of Cotton Production.

Levels of Cotton Production a/	Cotton Productivity (kgs/ha)	Maize Productivity (kgs/ha)	Manioc Productivity (kgs/ha)	Expenditures on Inputs/Cotton		Expenditures on Inputs/Food Crops		Available Labor (N of adults)
				(%) /b	(mt) c/	(%)	(mt)	
MONAPO (total)	640.3	664.0	1201.0	53.2	3678	20.2	1731	1.9
Non-Producers	0	633.0	1236.7	0	0	25.5	1865	1.7
Less than 100 kgs	110.2	400.0	906.8	66.7	2750	11.1	2750	2.1
100 - 200 kgs	323.0	508.8	1278.7	90.9	1930	18.2	225	2.0
200 - 500 kgs	699.2	579.9	1218.5	100.0	3796	22.7	1510	2.0
More than 500 kgs	988.5	980.3	1191.1	100.0	4700	10.0	2450	2.3
Ribaúe	94.9	580.7	1138.5	5.9	2429	22.7	2157	2.4
Non-Producers	0	537.2	1199.2	0	0	23.4	1899	2.4
Less than 100 kgs	36.5	744.1	859.1	11.1	3000	22.2	3988	2.4
100 - 200 kgs	131.3	600.0	825.0	916.7	2500	25.0	500	2.8
200 - 500 kgs	396.7	567.0	1177.8	100.0	2000	0	0	2.3
More than 500 kgs	--	--	--	--	--	--	--	--

a/ The values in the table are non-weighted averages.

b/ Percentage of households.

c/ The average for the farmers with expenditures.

Source: Socio-Economic Survey of the Smallholder Sector in Nampula Province

One of the indicators of improved technology is the utilization of purchased inputs. In the case of cotton, the timely application of pesticides is a critical determinant of yields, and it is not by coincidence that in Monapo, the large scale producers with the highest productivity also make major investments in purchased inputs.

A comparison of the average expenses on acquired inputs for food crops, however, does not reveal significant differences between cotton producers and the others. Among the large scale cotton producers, for example, barely 10% acquired inputs for food crops. In the district of Ribaúe, the level of input use is very low for cotton, but actually increases for food crops. Only two cotton growers (one each in Monapo and Ribaúe) applied chemical fertilizers in cotton during the last campaign, and no fertilizers were acquired to produce food crops (although one farmer did cite the positive benefits from the residual effect on subsequent crops of fertilizer use in cotton). Consequently, this preliminary analysis provides little direct or indirect evidence of technology complementarity or spillover in the use of acquired inputs between cotton and food crops.

The production factor that seems to provide more analytical insights into variations in cotton production is the availability labor. Among all cropping alternatives, cotton is the most demanding in terms of labor due to the necessity of repeated weedings, pesticide applications, labor-intensive harvests. Table 6 suggests that the farmers without cotton have fewer adults at their disposal in the household. Hence, the implication is that availability of labor is the more important determinant of the household ability to clear and care for a cotton field.

A final analytical focus, presented in Table 7, compares the well-being of the families who cultivate cotton with those who do not. The previous classification of producers are modified to correspond to the operational categories adopted by the cotton companies. Thus, non-producers are compared with those growers who cultivate 0.5 ha or less (labeled cultivadores) and those who cultivate more than 0.5 ha (agricultores). The criteria used to assess household well-being include access to productive resources (area cultivated per capita and area in cotton per capita), levels of food production per capita, and the cash revenue flows from principal sources (agricultural sales, sales of animals, and off-farm employment).

In Monapo, the well-being of the cultivadores and non-producers does not contrast significantly. The cultivadores have less land and their food production is markedly inferior, although, in compensation, their agricultural sales are higher reflecting the importance of cotton. The producers without cotton have more cash income from off-farm employment opportunities (including cottage craft production). On the other hand, the agricultores constitute the group with the most secure standard of living. The value of agricultural sales for this group is nearly double that of the other categories. The agricultores are also at an advantage, relative to cultivadores, in terms of off-farm income--partially explained by easier access to company employment.

In Ribaúe, the producers without cotton are the most disadvantaged group. They produce less food per capita, sell fewer agricultural products, including animals, and depend much more on outside cash income. On the other hand, there do not appear to be great differences between

Table 7. Estimates of Farm Household Well-Being by the Functional Classification of the Cotton Companies.

Functional Classification of the Smallholder Sector a/	Cultivated Area/per capita (ha)	Área in Cotton/per capita (ha)	Food Production (kgs/per capita)	Sources of Household Cash Income d/							
				Agricultural Sales		Animal Sales		Off-Farm Employment		Total Cash Income d/	
				(%) b/	(mt) c/	(%) b/	(mt) c/	(%) b/	(mt) c/	(%) b/	(mt) c/
MONAPO (109)	.47	.09	338	95.4	155713	20.2	38045	51.4	128039	97.2	228315
Cultivadores (44)	.36	.12	240	100.0	151147	25.0	14682	52.3	82420	100.0	197900
Agricultores (18)	.65	.26	367	100.0	271956	22.2	107625	61.1	115690	100.0	336572
Non-Producers (47)	.50	0	419	89.4	110678	14.9	35000	46.8	181907	93.6	202169
Ribaúe (119)	.56	.03	298	70.6	104592	23.5	38914	31.1	128462	89.1	138004
Cultivadores (13)	.91	.14	380	100.0	221721	46.2	43920	23.1	9500	100.0	244183
Agricultores (12)	.66	.17	409	100.0	134137	41.7	41920	16.7	29750	100.0	156563
Non-Productors (94)	.50	0	272	62.8	72775	18.1	36265	34.0	145784	86.2	118213
TOTAL (343)	.45	.04	295	87.5	156010	22.4	30764	45.2	171165	94.8	211711
Cultivadores (59)	.48	.13	268	100.0	164065	28.8	25000	44.1	120189	100.0	203881
Agricultores (30)	.65	.22	384	100.0	216829	30.0	71122	43.3	208784	100.0	282568
Non-Producers (254)	.41	0	291	83.1	145111	20.1	25564	45.7	175023	92.9	204661

a/ Values in the table are non-weighted averages.

b/ Percentage of households in the sample.

c/ Averages for those households who received revenue.

d/ This is only cash income, not an estimate of total household income (which needs to include the value of production consumed on the farm).

Source: Socio-Economic Survey of the Smallholder Sector in Nampula Province

cultivadores and agricultores in this district. In considering the sample as a whole, the results suggest that the cotton producers enjoy a better life, particularly in Monapo. Nonetheless, the analyses also indicate strong variations among cotton producers, with advantages for the large scale producers in the district of Monapo.

Smallholder Relationships with the Cotton Companies

The cotton companies operating in the survey area vary greatly in terms of the variety of services which they offer to cotton producers. For lack of alternatives, all of the producers (in the sample) receive cotton seeds from the companies, and those who control pests during the vegetative cycle also obtain pesticides and application equipment from the companies. Those more closely assisted enjoy access to custom machinery rentals (albeit a very small number), technical assistance from company field extensionists, and for the most fortunate, employment on company farms or factories.

In the villages under the control of SODAM, more than a third of the sample declared that the company field extensionists provided some technical assistance in food crops. As for the SAMO villages, the extensionists focussed solely on cotton. The producers said that the main advantage of association with the company was access to inputs and a guaranteed market. On the other hand, more than half of the producers also criticized the performance of the companies, particularly with respect to delays in the delivery and distribution of the inputs. The timing of the arrival of inputs is critical to effective pest control and matter of great concern to growers.

GENERAL CONCLUSIONS

This preliminary analysis of the survey data has provided some important insights into the issues raised in the introductory sections of this report. The following conclusions emerge from interpretations of the tabular data, the diagnostic questions in the questionnaire, and the information obtained from the informal and group interviews.

1. On the macro-economic issues and the role of cotton, the survey confirms that the smallholder sector constitutes a substantial, but as yet largely unfulfilled, potential for increased production of cotton as well as food crops. The analyses suggest that attractive prices, an improved system of input supply, greater access to viable technology and related technical information may provide the most effective incentives to expanded production.
2. In general, no systematic strategies to abandon food crops for cotton cultivation were observed. Farmers seek to develop mixed production strategies that guarantee food for consumption as well as the necessary income to purchase basic consumer goods. Nonetheless, in Monapo it is possible to discriminate a slight tendency toward specialization in cotton, and to a certain extent, cotton has substituted other food crops produced for the market. The rate of substitution could increase as farmers gain confidence in markets for products and consumer goods.
3. Cotton is generally cultivated under labor-intensive technologies with some reliance on acquired inputs, particularly, seeds and pesticide. The improved technologies applied to cotton, however, appear to have not been shifted significantly to food crops. A

possible exception may be found in the larger scale cotton growers in Monapo. This issue merits more detailed analysis.

4. As a class, cotton growers in Monapo have a slightly higher standard of living in terms of total cash revenues provided by both agricultural and non-agricultural sources. Nevertheless, there are significant variations among producers. Small-scale producers do not enjoy cash income advantages relative to the class of non-producers. Moreover, when food production is considered on a per capita basis, the position of large-scale producers appears less attractive.
5. In Ribaúe, the cotton producers demonstrate a level of well-being superior to others, but not due to the benefits of growing cotton. To the contrary, cotton production in this district is clearly in decline.
6. The relationship of the cotton companies to smallholder households represents perhaps the most critical issue for agricultural policy-makers. The research results suggest that geographical proximity to company land and factories provides several benefits in terms of better access to services. And growers with such access demonstrate higher levels of both production and productivity. On the other hand, the companies face severe limitations in serving all their clientele, and the questionnaires reveal a high degree of concern on the part of farmers. Although the companies have promoted cash income-earning alternatives in their respective areas of influence, they appear to have neither adequate infrastructure nor the organization to service all potential growers. Moreover, the companies currently enjoy monopoly power in the market place, and as profit-seeking firms their economic interests may not always coincide with those of smallholder farmers. For this reason, the State retains a crucial role in negotiating the terms under which the smallholder sector is integrated into the cotton market. A comprehensive and detailed study is urgently needed of the company-smallholder relationship, the physical capacity of the cotton processing sector, the necessary investments to promote an expansion of cotton production among smallholders, and alternative input supply networks.

In sum, this analysis directly addressed the major issues regarding cotton production in Nampula as an opportunity to initiate dialogue among those who will chart the policy course. But the larger, more critical, question is what will be the future of the smallholder sector, a large segment of rural society that has for many years been marginalized and ignored? This survey, even in this preliminary stage, has reaffirmed lack of support for smallholders, despite their numbers and economic potential. It is hoped that this examination of the role of cotton will help shift national attention to the most urgent problem -- how to transform the vast number of smallholder households into dynamic farmers, full participants in the development trajectory of the nation.

NDEA Working Papers

1. Informing The Process of Agricultural Market Reform in Mozambique: A Progress Report.
2. A Pilot Agricultural Market Information and Analysis System in Mozambique: Concepts and Methods.
3. Inquérito ao Sector Familiar da Província de Nampula: Observações Metodológicas
- 3E. A Socio-Economic Survey of the Smallholder Sector in The Province of Nampula: Research Methods (**translated from Portuguese**)
4. Inquérito ao Sector Familiar da Província de Nampula: Comercialização Agrícola
- 4E. A Socio-Economic Survey in The Province of Nampula: Agricultural Marketing in the Smallholder Sector (**translated from Portuguese**)
5. Inquérito ao Sector Familiar da Província de Nampula: O Algodão na Economia Camponesa
- 5E. A Socio-Economic Survey in The Province of Nampula: Cotton in the Smallholder Economy (**translated from Portuguese**)
6. A Socio-Economic Survey In The Province of Nampula: Determinants of Smallholder Household Income and Food Availability (In Preparation)
7. A Socio-Economic Survey In The Province of Nampula: Smallholder Land Access and Utilization (In Preparation)