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## SMALLHOLDER CASH-CROPPING, FOOD-CROPPING AND FOOD SECURITY IN MOZAMBIQUE'S COTTON BELT

By

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**BACKGROUND:** As Mozambique recovers from war and undergoes economic reform, given its favorable agroecological endowment and its highly rural population, improved agricultural performance is essential to three government policy objectives: 1) smallholder income growth; 2) improved rural food security; and 3) reducing the balance of payment deficit. In the context of near complete input and credit market failure in rural areas, policymakers are faced with the challenge of how to achieve these micro- and macroeconomic goals. In the north, the government formed joint venture companies (JVCs) with three multinational agroindustrial firms to rehabilitate cotton infrastructure in 1990 with the hope that this would simultaneously contribute toward achieving these three goals. In return for monopsony cotton-buying rights in their respective areas of influence, the JVCs agreed to provide participating smallholders with reliable input supplies and extension services for cotton and food crops and to purchase seed cotton from farmers at official price levels. The firms also agreed to invest in the rehabilitation of cotton ginneries and rural road networks in their areas of influence.

**OBJECTIVES AND METHODS:** The desire to understand the effects of smallholder:JVC cash-cropping was the motivation of a socioeconomic study conducted in Nampula and Cabo Delgado Provinces by the Ministry of Agriculture and Fisheries/Michigan State University Food Security

Project (MAP/MSU FSP) from 1994 to 1996. More than 500 rural households from across the North's cotton belt were surveyed at four month intervals during this period. A stratified random sample was drawn in the area of influence of each JVC, as well as a sample of farmers in an adjacent non-JVC area designed to include households involved in the range of cotton technology systems in the zone (high-input block, high-input dispersed, low-input block and low-input dispersed).

### FINDINGS:

■ **In both principal study zones (Montepuez and Monapo/Meconta), cotton producers grew greater quantities of maize than households with no cotton production.** Econometric modeling suggested that smallholder cash-cropping participation had a positive effect on smallholder food production. Further, households who grew cotton under a high-input package (using fertilizer, herbicides and insecticides) but who grew low-input maize had significantly **greater maize yields** per hectare than their neighbors in low-input cotton schemes or those that did not grow cotton (see Table 1).

■ **Low-input cotton production (where insecticide represents the only modern agricultural input used) raised smallholder per capita income by between 25 and 36 percent (or \$15 to \$22 per capita) in the zones of significant JVC investment,** based on econometric analyses of the determinants of

per capita income (see Table 1). Cotton's effect on an indicator of smallholder food security - hungry season cereal reserves - was positive and significant among low-input growers in Montepuez, and positive but statistically insignificant among households in other cotton production categories in Montepuez and Monapo/ Meconta. In other parts of Nampula Province, with very minor private sector investment in input distribution and extension services, low-input cotton had a negative effect on income and little effect on hungry season cereal reserves. The finding that, holding constant other factors, low-input cotton contributes positively to smallholder income in areas of significant JVC investment, though less so to food availability, is a key result. This suggests the importance of a significant JVC investment in a given zone for smallholder cotton to deliver these benefits in the current policy environment.

- The benefits to smallholders, the country and private sector firms supporting smallholder cotton increase dramatically where smallholders grow cotton with fertilizer and herbicide. **The same econometric estimation technique showed that high-input cotton increased per capita income by between 97 and 138 percent relative to non-cotton growers.** Intensification was also shown to be positively associated with greater smallholder food production and hungry season cereal reserves.

- **Within the two principal study zones and across cotton production categories, cotton and maize yields varied significantly.** Yield equations identified early seeding, sufficient weeding labor, and adequate insecticide applications (for cotton) as key factors related to productivity (see Table 1).

- **For smallholder:JVC relationships to be sustainable, the JVCs must be financially profitable enterprises.** In both principal study zones, analysis combining data obtained from JVCs and smallholders showed that both low-input and high-input cotton were profitable to the JVCs. Assuming current yield and world market conditions, the JVCs earn from \$56 to \$127 per hectare on average.

- **Cotton domestic resource cost ratios ranged from 0.42 to 0.65, indicating a comparative advan-**

**tage for the cotton belt in both low-input and high-input packages.** Sensitivity analysis showed that these estimates were robust to variation in world cotton prices experienced over the past ten years.

- **The cotton belt is currently an inefficient producer of maize for markets outside the region such as Maputo.** Even assuming improved yields and lower per unit production costs, the high costs of coastal shipping, inefficient port operations and a poor domestic highway network result in the north **currently** having a comparative disadvantage in maize. **However, the fact that the north's rainfall patterns are not correlated with those in the rest of the Southern Africa region and the potential, with appropriate investments, to develop its strategic position vis-a-vis ports and rail lines suggests that it could become an important supplier of maize (and other food crops) to the region, especially Malawi.**

#### **POLICY RECOMMENDATIONS:**

- Smallholder cotton can have important micro- and macroeconomic benefits if it is promoted with a sufficient level of inputs, extension and marketing infrastructure. **Intensification** of cotton has even greater benefits for each actor in the system. **The government of Mozambique (GOM) should promote smallholder cotton production in the cotton belt through strategies that effectively balance smallholder and private sector interests in pursuing vertical coordination of the subsector.**

- Improving smallholder capacity to represent their own interests vis-a-vis private sector firms in the cotton subsector can be an important mechanism to improve the effect of cash-cropping on smallholder welfare. In a zone similar to Mozambique's cotton belt in Mali, farmer associations have represented an important way for farmers to achieve greater power and gain access to fertilizers and other key inputs.

**Table 1. Selected Household Level Results by Study Zone and Cotton Production Category**

Indicators	Montepuez				Monapo/Meconta		
	Cotton Production Category <sup>1</sup>				Cotton Production Category <sup>1</sup>		
	High-Input Block	High-Input Dispersed	Low-Input Dispersed	No Cotton	Low-Input Block	Low-Input Dispersed	No Cotton
Total maize production (kgs)	2159	2295	592	424	391	338	277
Maize yield (kg/ha)							
Upper tercile	3185	1610	1188	1190	918	657	593
Lower tercile	871	328	238	194	218	181	162
Cotton yields (kg/ha)							
Upper tercile	1796	1661	1010	--	1080	917	--
Lower tercile	1045	649	200	--	337	155	--
Returns to labor (\$/day)							
Maize	1.82	1.82	0.92	0.71	0.64	0.39	0.36
Cotton	2.41	1.91	0.78	--	0.93	0.62	--
Net household income (\$)	669	650	255	192	371	238	151
Net per capita income (\$)	131	129	63	42	67	56	42
Hungry season cereal reserves ('000s calories per capita)	150	121	101	63	220	106	90

<sup>1</sup> Definition of Cotton Production Categories: A household in a "high-input" category is defined as one that used fertilizer, herbicide and insecticide on their cotton plot(s) during 1994/95; "low-input" is defined as a household that applied no fertilizer or herbicide on their cotton plot during the same period. Insecticide is the chief "modern" input used by these farmers. The distinction between "block" and "dispersed" relates to the ownership and location of a household's cotton plot. Where cotton production by the smallholder takes place on a larger contiguous area (some of which may be held by a JVC) and divided into smaller parcels, this is defined as "block." Where cotton production by a smallholder takes place on their own fields, this is defined as "dispersed."

Source: 1994/96 MAP/MSU FSP Smallholder Survey

Farmer associations have the potential to represent smallholder concerns effectively *vis-a-vis* large firms operating in the cotton subsector in Mozambique as well. Besides having benefitted smallholder incomes, smallholder cotton has played a key role in promoting food security in Mali. Consider the analysis offered by Dione:

"...the success of the *Compagnie Malienne de Developpement des Textiles (CMDT)* in promoting foodgrain production was achieved through a strategy centered on a vertically coordinated set of activities (research, extension, input and credit distribution, and output processing and marketing) for the long-term growth of cotton production and income. This income served as an engine to support gradually the development of food crop production and non-crop activities...(The promotion of cotton represents) a strategic approach to rural development and significantly diverges from the approach followed by most rural development agencies and the traditional food crop - cash crop dichotomy, which is almost irrelevant in the CMDT case where there was growth in cereals production mainly **because of the growth in farmers' income from cotton production**" (emphasis added) (Dione 1989).

■ **The process by which the GOM determines minimum producer prices for cotton should be reviewed.** Yearly changes in the GOM cotton price have not reflected changes in world market conditions. For example, the official price jumped from \$0.16 to \$0.34 per kg from 1994/95 to 1995/96 while FOB Northern Mozambique prices for cotton fiber dropped from \$1,715 to \$1,438. Such erratic price policies make long range investment planning by the JVCs and other private sector firms difficult and create unsustainable price expectations and uncertainty for smallholders.

■ The Mozambique Cotton Institute lacks the institutional capacity and resources to represent smallholder interests effectively. However, governmental oversight to encourage JVC behavior to benefit smallholders throughout their areas of influence is important. **The GOM should seek new and innovative mechanisms to bring this about, such as having Institute representation in the decision-making structure of the**

**JVCs, given that the government is in fact a partner in these schemes.**

■ If the GOM wishes to encourage JVC involvement in smallholder food crop intensification, establishing a minimum producer price at recently observed levels may be counterproductive. **The GOM should seek policies designed to increase rural incomes through productivity enhancing technology packages rather than through an unsustainable minimum price policy.** JVCs have an important stake in improving rural food security and innovative mechanisms should be sought to encourage their participation.

■ Development of cotton varieties with enhanced ginning outturn ratios is the subject of research attention by the national agricultural research system. **The government and donors should place renewed focus on this effort.**

#### References:

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