Tanzania Cotton Production and Productivity

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By

Mwangulumba, E.I.
Tanzania Cotton Board
P.O. Box 9161, Dar es salaam,
Tanzania.

and

Buluma M. Kalidushi
Tanzania Cotton Board
P.O. Box 61, Mwanza,
Tanzania

Abstract

Much as Tanzania is envied as one of the giants in cotton production in sub-Saharan Africa little has been said on its lowly yield per area or productivity. For the farmers' poverty emancipation through cotton cultivation the importance of rising productivity can't be overemphasized, as it overrides relapses in world cotton price volatility problems.

A study was undertaken to evaluate the performance in cotton productivity for all farmers involved in multiplication for a then new cotton variety of UK91 in Meatu District, during a 2004/2005 season. Data were analyzed by a computer whereby, quantitative information was obtained by a general linear model procedure whereas Procedure Frequency was used for qualitative analysis (SAS, 1992).

The results obtained indicated considerable mismatch between the area under cotton cultivation and the yield outputs showing negative or lack of correlation thereof ($P \geq 0.05$). This contrasted the correlation seen between other production variables under a study such as the farms' sizes against gross yields. Basically, as the area under cultivation increases, the cotton yields per area proportionately declined whereas the gross yields significantly ($P \leq 0.001$) increases. This productivity inefficiency and low yields was also seen in later studies on same under the Cotton and Textile Development Project which is financed by the Gatsby Charitable Foundation of United Kingdom (2007), and in the recent ICAC report (2012). Low inputs usage and farm-operations untimeliness by the farmers was found to be the main culprits, amongst others (Baffes, 2002). This prompted for the national initiative on the rollout of Cotton Contract Farming System. The system was envisaged as a multipronged solution on the multifaceted problems facing cotton farming in a country, particularly low cotton productivity. There were however, huge differences between farmers on means for acreage, productivity and gross yields with the standard deviations of 3.7, 115 and 1249, respectively. Under Contact Farming arrangements these variances are to narrow-down as farmers are obtaining farm inputs on credit. Simple labour-serving technologies also have been introduced and extension services intensified.

Keywords: Production, productivity, yield

0.1 Background

Cotton is a lifeline of about 40% of the entire population of about 45 million. On average 400,000 hectares are sown to cotton by approximately 350,000 to 500,000 smallholder farmers. The cotton crop is 100% rain-fed yielding an average 300 kilograms of seedcotton per acre. Cotton is grown in 42 districts of 13 regions out of 127 districts and 21 regions, respectively. During the 2005/2006 financial year cotton was the first forex earner among agricultural commodities. Sustainable cotton farming has therefore, the potential to significantly contribute to poverty eradication and socio-economic development in Tanzania.

Cotton is an annual crop that requires a substantial investment in pesticides and fertilizer to achieve profitable yields. The major constraints that face the cotton farmers in production include soil fertility exhaustion, insects' infestation and weeds. The solutions to these problems are fertilizer application, pesticides and weeding. The cost of this inputs is often beyond the purchasing power of the average cotton smallholder, as a result Tanzanian cotton yields on average are less than one third the globe average.

0.2 Objective

This study was undertaken to investigate the cotton productivity for smallholder farmers in Meatu District, which is one of the typical main cotton producing districts in Tanzania. It also aimed at identifying some attributes in agricultural operations that may hinder or favor efficiency in cotton production.

0.3 Methodology

A study was undertaken to evaluate the performance in cotton productivity for all farmers involved in multiplication for a then new cotton variety of UK91 in Meatu District, during a 2004/2005 season. All the tree administrative divisions of Nyalanja, Kimali and Kisesa in the district were involved. The farms were measured, date of sowing recorded, close monitoring throughout the study period was done and the cotton outputs weighed at the end. Questionnaires were also randomly administered in randomly selected villages, for other farm operations. Data were analyzed by a computer whereby, quantitative results were obtained by a general linear model and Procedure Frequency was applied for qualitative information (SAS, 1992).

0.4 Results

Overwhelmingly, typical of the Tanzanian cotton farming system great variations between individual farmers were observed. This revealed different capacities in investment and farm management among farmers as shown in Table 1. Big statistical variances in the ranges and the standard deviation for the parameters under study were observed.

Table 1: Simple statistics

Variable	(n)	Mean	Std. Deviation	Minimum	Maximum
Acres	214	4.8	3.7	0.5	27
Yield per area (Kg/acre)	214	265	115	35.6	683
Gross yield (Kg)	214	1322	1249	60	8,060

Qualitatively, the difference in farm managerial ability of individual farmers was vivid, as shown by the variables in Table 2. Attributes such as timeliness in cotton planting, application of manure and the right spacing were not adhered to. This could amongst others, attributable to a labour-peak period during the planting time where apart from cotton the farmers are also engaged in tending food crops as well, at the onset of the erratic first rains. There is also drudgery in all farm activities due to lack of labour-serving tools and simple farm technologies. Spacing is one of the single most important factors for the proper and right plant population density in the farm but, only about 11% managed a right spacing.

Table 2: Response of farmers in various production operations

Variable				
Cotton sowing month				
November	December	January	February	***Total***
20%	65%	13.75%	1.25%	100%
Application of manure in the cotton farm				
		Not applying	Applying	***Total***
		88.75%	11.25%	100%
Cotton crop spacing				
		Right spacing	Wrong spacing	***Total***
		21.18%	78.2%	100%
Ox-plough ownership				
		Hiring	Owned	***Total***
		42.57%	57.43%	100%
Ox-cart ownership				
		Hiring	Owned	***Total***
		46.53%	53.47%	100%
Ownership of Ngitile area				
		Not owned	Owned	***Total***
		20%	80%	100%
Ambition to purchase additional land				
		No ambition	High ambition	***Total***
		15.84%	84.16%	100%

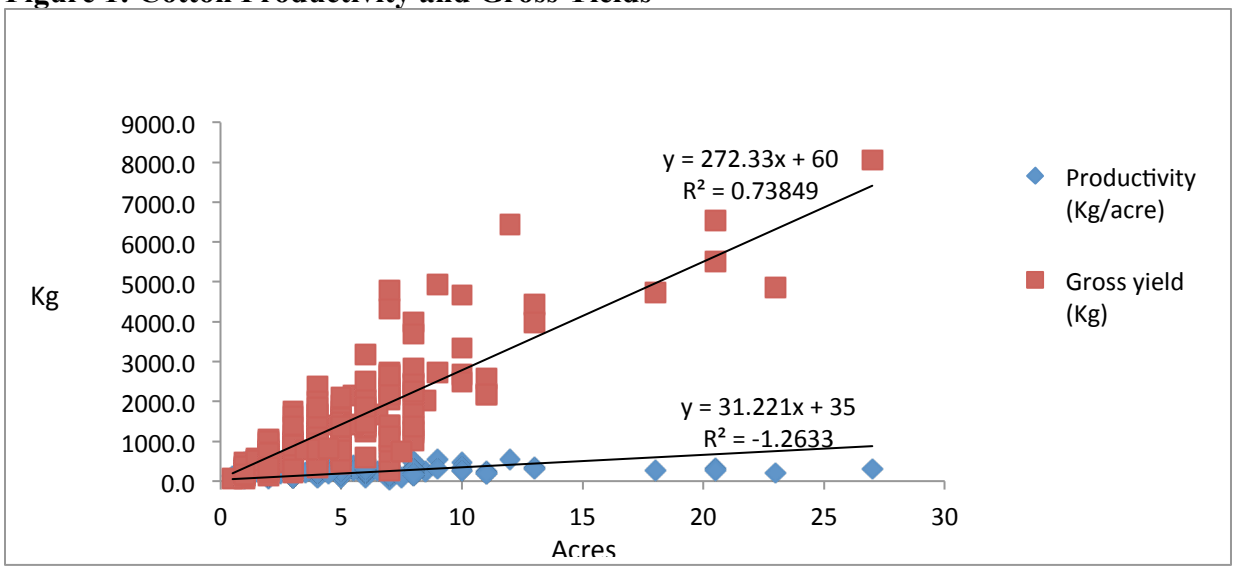
Results in Table 3, shows no correlation between the acreage under cultivation with yield per area whereas, highly significantly ($P \leq 0.001$) differences for the same with gross yields, had been observed. Acreage rise tends to the economy of scale whereby efficiency increases due to reduction in unit cost. In the current study this was not the case as no any clear statistical ($P \geq 0.05$) evidence was observed on increased productivity with acreage.

Table 3: Pearson Correlation Coefficients

	Acres	Yield per acre	Gross yield
Acres	1.000	0.103^{ns}	0.862***
Yield per acre		1.000	0.524***
Gross yield			1.000

A graphical description on the declining cotton productivity with acreage under cultivation is shown in figure 1. The significant (P≤0.001) and positive 0.739 R^2 implied that the area under cotton cultivation can correctly predict cotton gross yields and vice versa for productivity.

Figure 1: Cotton Productivity and Gross Yields



0.5 Discussion

Yield per unit area has a direct impact on farmer's returns from cotton cultivation. The application of adequate fertilizer, sustainable crop protection, the presence of high yielding varieties and appropriate agronomic practices have emerged as the most important factors in improving yields.

In Tanzania yields are erratic and barely sufficient to cover production costs. Poor agricultural extension services leading to non-adoption of recommended crop protection packages, low fertilizer use and faulty seed multiplication program have been responsible for the non-realization of the yield potential of the varieties grown (Fred, et al. 1995).

Cotton cultivation is generally done manually under rain-fed conditions and with minimal use of inputs. Average yields have reached at 750 kg to 800 kg of seed cotton per hectare, which are low, typical to many sub-Saharan African countries.

Based on the study commissioned by the Gatsby Foundation and Tanzania Cotton Board in 2007, Contract Farming initiatives was introduced and endorsed by the cotton sub-sector

stakeholders meeting in 2008 as a vehicle to improve productivity. The main elements in contracts included the input access, market access, management specifications and recommendations which have to be adhered to by the growers and buyers. To integrate input supply and inputs credit for farmers the Cotton Development Trust Fund (CDTF) established during 1999/2000 season by the Board, and was mandated to centrally purchase all the inputs. Central purchasing of cotton inputs pushes down the input prices to cotton growers, as the Fund subsidizes some additional costs.

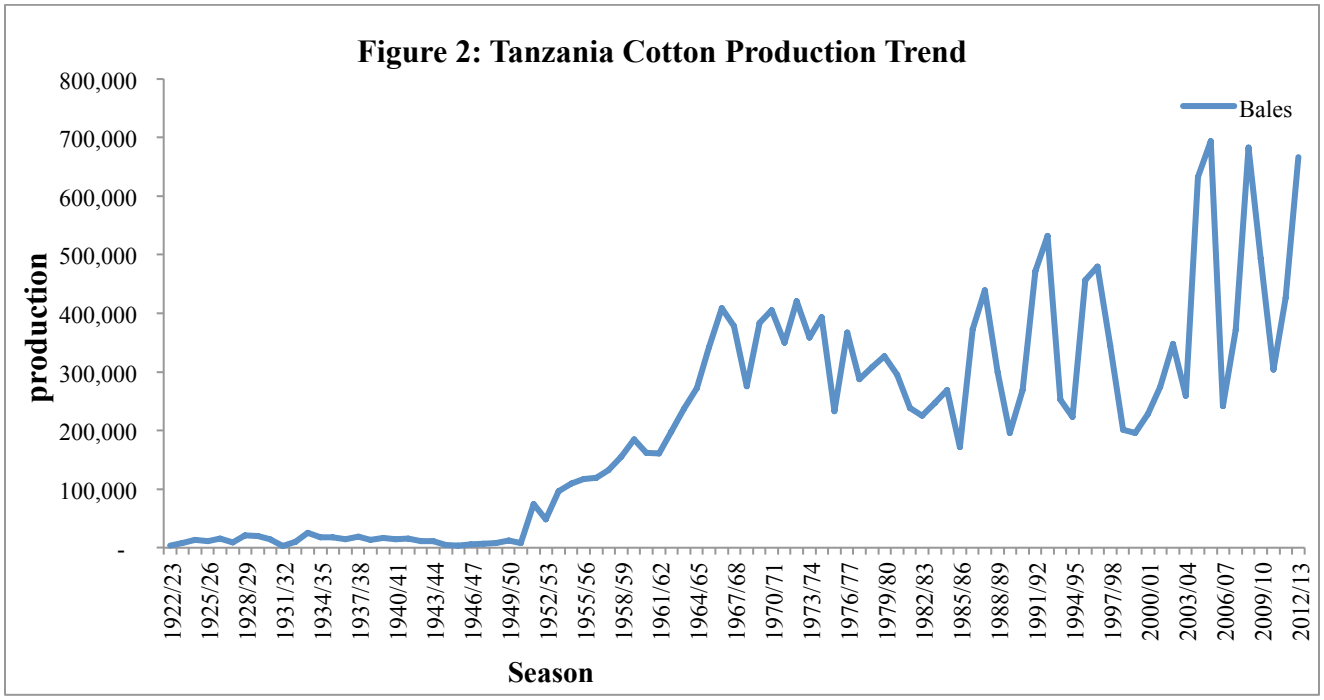
In 2008, TechnoSeve was selected and financed by Tanzania Gatsby Trust to pilot test contract farming in Mara region, for three seasons. The pilot involved organizing farmers in Farmers' Business Groups (FBGs) and linking them with the ginning companies. The pilot was a success and the cotton productivity hopped to levels slightly above double the national average of 300 kg/acre. Contract farming demonstrated that investment in agricultural inputs can increase yields. It has proven itself as a viable vehicle through which to address the key challenges facing the Tanzanian cotton sub-sector, including low yields, lack of investment in inputs, weak extension services and poor cotton quality.

Built on the success and lessons from the three season pilots, it was imperative to roll our Contract farming to all cotton growing areas during the 2011/2012 farming season. With a strong understanding of the challenges influencing success, the Board and other stakeholders are implementing and integrating series of activities and efforts, to that end.

Serious research and development efforts are being devoted towards increasing the yields. The two research institutes where cotton researches are undertaken are Ukiriguru and Ilonga. Specific objectives are to develop high yielding varieties with resistance to the major diseases and pests and also production of breeder and pre-basic seeds. The thrust is delivery of innovative technology through superior quality seeds as carriers for benefit of farmers and other end users. The research is inclusive and collaborated with both public and private stakeholders and partners. The Board has contracted Quton Seed Company a Zimbabwean private firm to multiply and process the cotton seeds for planting. The key success factors for Quton are support, corporation, investment in research through loyalty to breeders, protection of the seed multiplication zones, viable seed price and training of local talents in the area of their operation. With this endeavor in place Tanzania is geared for using only certified cotton seed starting the next farming season of 2013/2014.

During 2011/2012 farming season the whole western cotton growing areas was subdivided into 12 zones, to improve inputs supply and cotton marketing service to farmers. About 9000 Farmers business groups (FBGs) were formed which interred in contracts with 32 ginning companies. Registration and training of FBGs were undertaken by TechnoServe and about 3000 and 600 lead farmers and extension officers respectively, were trained. To improve efficiency and reduce drudgery in farm operations, simple labour-serving technologies have been introduced in the system. 225 Ox-drawn weeders have been distributed to farmers and 600 ox-drawn planters are underway and will be supplied to the best farmers in an area as well as the lead farmers in the FBGs. The Board has liaised with Rural Livelihood Development Company a Swiss based firm to connect a supplier, Nandra Engineering Co. Ltd with the village agro-dealers, for the supply process to be self-sustaining after and during adoption process, through its financial grants.

Much more endeavors have been undertaken in the first season of contract farming with huge success in terms of expected record breaking cotton production. This success has been attained in just a first marketing season of Contract farming inception, as shown in Figure 2.



0.6 Conclusion

The Government has directed the Tanzania Cotton Board and other stakeholders to increase cotton productivity up to 1000 Kg/acre during 2014/2015 farming season. This is also reflected in the Board's corporate strategic plan. Ambitious though, we expect the efforts put in place will make it possible to attain these levels of productivity.

0.7 References

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