

Economical Viability of the Proposed Solutions



An economic appraisal of testing and marketing Sudanese cotton according to levels of stickiness

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Abstract: Sudan Cotton Company (SCC) in collaboration with other international agencies, interested in researches on cotton stickiness launched an interdisciplinary project to test and evaluate methods for establishing the degree of stickiness in Sudanese cotton (b) develop a threshold to enable economical processing of sticky cotton and evaluate financial viability of the project. On bases of the results of testing and classification of exported cotton according to different thresholds it was found that a high percentage of Barakat cotton was free from stickiness and the other types are lightly affected. The discounted current prices are revised to cater for free and lightly affected cotton. On bases of these the project is found financially viable and the testing for stickiness is recommended to continue but on commercial bases using more sophisticated testing equipments and testing charges to be levied on the agricultural corporations.

Introduction

Cotton (*Gossypium barbadense* L.) and (*G. hirsutum* L.) is a fibre crop which includes many cultivars differentiated by the length of their fibres, length of maturation period characteristics of plant leaves and canopy in addition to other biological and morphological characteristics. It is produced all over the world under different modes of irrigation depending on the type of soil, weather conditions, amount, duration and intensity of rainfall, and availability of irrigation water. Four types of cotton cultivars are produced. These are extra long staple cotton represented by Giza and Barakat, long staple cotton represented by Pima, medium staple cotton represented by Acala and short staple cotton represented by upland cotton. Most of the world cotton is produced in Asia. Four Asian countries account for more than 50% of the world production in 1998 and 1999. China (Mainland) is the largest world producing country followed by USA., India, Pakistan and Uzbekistan. These five countries account for more than 75% of the world production.

Consumption of cotton is affected by synthetic fibres consumption. In recent years cotton consumption has declined from 66% to 58% as a result of expansion in purchases of synthetics resulting from higher incomes in developing countries (CFC). Nevertheless textile industries in developing countries were expected to expand. The developed countries on the other hand have become recently more conscience to natural goods and are expected to become a source of raw material to the developing countries.

Consumption of cotton fibre is seriously limited by cotton stickiness. However cotton stickiness is not new to producing and consuming countries. Many causes were reported contributing to this problem. Among these causes are insect excretions, plant exudates, environmental conditions and varietal

differences, in addition to an endless list of factors. Stickiness caused by whitefly (*Bemisia tabaci*) and Aphids (*Aphis gossypii*) is the most serious one. Chemical analysis revealed that both insects excretions are very rich in monosaccharites compared to that from plant exudates. It poses serious problems at spinning and results in considerable financial losses. Because of these high losses, spinners purchase sticky cotton at discount prices. For a producing country like Sudan the losses incurred from selling at discount rates may be considerable especially the country depends mainly on cotton export proceeds for its foreign currency. This problem faces almost 20% of the world producing countries. Because identification of levels of cotton stickiness is not possible at the field and ginning factories, it is therefore very important to establish cotton stickiness classification system in order to allow discounts to be attributed in a more rational manner. An early identification of the problem will not only save cotton producers from discounts but also warn spinners to be ready to make necessary adjustments in machinery and spinning conditions to avoid unnecessary delays, breakages and ultimate financial losses. But many of these countries lack research capacities and financial means to solve key problems.

History of stickiness in Sudan

Sudan grows four types of cotton ranging from extra long to short staple cotton. Of these the medium staple cotton (Acala) is mostly affected. This is related to the nature of the crop. Acala plant is hairy, short, bushy and forms a close plant canopy which encourages white flies to hide in the lower parts of the plant thus avoiding insecticides from reaching them. Moreover, the maturation period of the plant coincides with the peak of the white fly infestation. Hence, the open cotton bolls are subject to more contamination with honeydew the more they remain on the plant in the field.

Khalifa in his review on cotton stickiness stated that the white fly infestation does not only cause cotton stickiness but also leads to an inferior fibre characteristics such as low maturity ratio, reduction in fibre length, micronaire value, fibre weight per cm, and yarn strength.

The National Research Committee on cotton stickiness in Sudan had launched a number of coordinated research programmes which aimed at establishing reliable methods for grading cotton stickiness, investigating the effect of different cultural practices on the life cycle of the white fly and breeding cotton cultivars resistant or tolerant to white fly infestation. These programmes were accompanied with routine cotton tests for stickiness using minicard testing machines. The results of the total production showed that 50% of the extra long staple cotton (Barakat) was free of cotton stickiness and 25% of it was considered light. These results are not surprising because the maturation of Barakat commences after the infestation peak of the white fly thus avoiding being contaminated.

Sudan cotton is offered for sales in different quantities (lots) and is purchased by different dealers originating from different parts of the world. Stickiness of Sudan cotton although not mentioned but is well taken care of. Each of these purchasers or consumers already have developed their own technique to deal with Sudan cotton. In doing so, they have calculated the costs and benefits and based on these they normally offer their bids. It is believed that in absence of an official classification system, the entire production reputed to be contaminated may have to be discounted whereas, in fact, it only contains a small fraction of truly contaminated cotton. This is very true with Barakat. It is therefore, believed that large amounts of foreign currency is lost because of this.

Action taken by Sudan

Sudan Cotton Company Ltd being the cotton sole marketing agency in collaboration with Agricultural Research Corporation (ARC), (Sudan) Common Fund for Commodities (CFC), International Cotton Advisory Committee (ICAC) International Textile de France (ITF), and Centre de Cooperation Internationale en Recherche Agronomique pour le Development (CIRAD), launched a multidisciplinary stickiness testing research project to investigate the following:

- To test and evaluate methods for establishing the degree of stickiness in Sudanese cotton produced in affected areas.
- To develop a threshold to enable economical processing of sticky cotton.
- To evaluate the financial viability of the project.

Materials and Discussion

The implementation of the project was carried by ARC, ITF and the author for analyzing the financial viability.

ARC collected samples of cotton produced in season 1997/98 and 1998/99 from the Gezira scheme, Rahad and New Halfa Agricultural Corporations. The samples were stratified according to location of production, type of cotton and type of ginning (roller/saw). The testing was carried out using stickiness cotton thermodetector which is developed by CIRAD and recommended by the International Textile Manufacturer Federation (ITMF).

The results of the testing is arranged in Tables 1 to 3 for each type of cotton according to a given stickiness threshold. The stickiness thresholds are developed by ITF using the same cotton samples used by ARC in Sudan, but using more sophisticated equipment such as high speed stickiness detector (H₂SD). The range of stickiness thresholds developed by ITF was lowered by ARC to avoid litigation charges. The threshold levels used in this study are as follows:

- free cotton up to five sticky points.
- light cotton between six and fifteen.
- moderate cotton above fifteen to thirty, and
- high above thirty.

ITF has set maximum limits of 10, 20 and 30 for the above three thresholds respectively.

According to the above sticky threshold levels Sudan cotton for 1997/98 and 1998/99 is classified as follows:

Barakat roller gin

The Gezira scheme is the only scheme producing Barakat and all the produce is roller ginned. Table (1) gives the levels of stickiness and percentage of sticky points of tested samples in each level for the two crops according to location of gin.

The table indicates that more than 80% of Barakat cotton has less than 16 points which according to Tamime et al is considered for some spinning machine as non-sticky or free. The location of the ginning factories indicates that North and North West Agricultural Groups have less sticky cotton (Bageir) than the Centre Agricultural Group (Hassaheisa) and the Southern Agricultural Groups (Maringan). The Centre and Managil Agricultural Groups are relatively more infested. However the comparison between seasons indicates that 1997/98 is better than 1998/99.

Acala roller gin

The Gezira scheme is the only scheme which uses roller gins for Acala cotton. About 87% and 68% of the Gezira production of this crop was roller ginned in 1997/98 and 1998/99 respectively. The remaining quantities were saw ginned. Table (2) gives the percentage of Acala cotton according to the level of stickiness and location of ginning (roller) for seasons 1997/98 and 1998/99.

Table (2) indicates that Acala cotton is more contaminated with stickiness than Barakat, which calls for more measures to be taken at the field. The percentage of free and light cotton in both seasons was

less than 40%. Comparison between seasons indicates that the levels of stickiness in 1997/98 were much higher than 1998/99.

Acala cotton saw gin

Acala cotton produced in Rahad and New Halfa is totally saw ginned in addition to the proportion left from Gezira. Of the total saw ginned, Gezira Acala accounts for 26% in 1997/98 and 40% in 1998/99. It is worth noting that 1998/99 production in Rahad was only 58.5% of that produced in 1997/98. Similarly the production of New Halfa in 1998/99 was also 67% of that produced in 1997/98.

Table (3) gives the percentages of Acala cotton (saw) according to the levels of stickiness thresholds and location of scheme for 1997/98 and 1998/99.

In 1997/98 the cotton infestation was very heavy in all schemes. Moderate and high levels accounted for 88% in Gezira, 92% in Rahad and 73% in New Halfa. However the situation became less intense in 1998/99 season. The moderate and high levels dropped to 64% for Gezira, 16% for New Halfa and remained at their high level in Rahad (91%). For the Sudan as a whole some producers with free and light sticky levels received less than they ought to receive because the cotton of other producers in other corporations was highly contaminated. Of the three cotton producing corporations the Rahad should give more attention and the present production practices need to be seriously revised. Early picking should be encouraged as well as effective measures on the side of crop protection should be taken.

Financial analysis

To calculate the financial benefits the average prices currently received for each variety are upgraded by 10% for free cotton, 5% for light, zero % for moderate and furtherly discounted by 5% for high. The upgrading is only arbitrary. It can be more or less than the above levels. However its impact will be felt when the resulting returns are compared with the existing returns (with and without).

Also the production of 1997/98 and 1998/99 is classified according to type of cotton and levels of thresholds obtained from testing. Table 4 gives the distribution of cotton according to above criteria.

The prices received under the existing situation (without project) for the different types of cotton in 1998/99 per bale were \$ 322.3 for Barakat, \$ 240 for Acala roller and \$ 224.1 for Acala saw with a weighted average of \$ 263.4/bale.

The corresponding upgraded prices per bale for each type of cotton according to each threshold level are as follows:

Threshold	Barakat	Acala (R)	Acala (S)
Free	\$ 354.5	\$ 264	\$ 246.5
Light	338.4	252	235.3
Moderate	322.3	240.0	224.1
High	306.2	228	212.9

Applying these prices to amounts in bales in 1998/99 of each type of cotton, the following results are obtained in thousand US \$.

Without project:

Barakat	\$ 38496.8
Acala R	\$ 25303.2
Acala S	\$ 26009.5

Total returns \$ 89809.5 and an average price of 263.4.

With Project:

	Barakat	Acala R	Acala S
Free	\$ 8045.0	1948.3	3147.1
Light	25060.2	9033.2	9012.0
Moderate	6544.3	11892.5	7542,7
High	731.5	2884.7	6671.6

Total returns \$ 92513.1 and an average price of 271.3.

The overall upgrading is only 3%.

The net benefits for each type are 1882.2 for Barakat, 455.5 for Acala (R) and 363.9 for Acala (S).

Total net benefits equal \$ 2701.6 of which Barakat gained 69.67%, Acala roller 16.86% and Acala saw 13.47%.

The gain on bases of bale for each type was \$ 15.76 for Barakat, \$ 4.32 for Acala roller and % 3.13 for Acala saw.

The cost of testing was estimated at \$ 231.6 thousand leaving a net financial benefit of \$ 2470 thousand for the producers.

From the above analysis it is clear that marketing cotton on bases of levels of stickiness is financially awarding. The total capital cost needed for the purchase of testing equipment and materials is given at \$ 194.35 thousand. The rate of return to capital is estimated at $2470 / 194.35 = 1271\%$

The benefit cost ratio is estimated at $2470 / 231.6 = 1066\%$

Conclusion

The project is financially viable and SCC should commence testing and marketing at least Barakat type on bases of levels of stickiness. Agricultural Corporation growing Acala are encouraged to secure enough finance for picking operations and especially Acala type should be picked between waterings in order to obtain cotton free of stickiness. If ARC charges one dollar/bale for testing, ARC is expected to gain about 110 thousand dollars. The financial analysis for ARC indicate that the rate of net return to capital would be 56.6% and the benefit cost ratio would be 147%.

Recommendations

- Agricultural Corporations should be encouraged to test their produced cotton for stickiness annually and market it accordingly.
- The testing of cotton should be expanded using more sophisticated equipment such as H2SD and operated on commercial bases.
- Agricultural Corporations currently facing high levels of stickiness are advised to take immediate measures to reduce such levels.
- SCC is encouraged to convene a workshop to discuss and demonstrate the advantages of marketing cotton on bases of levels of stickiness.

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Table 1: Percentage of Barakat cotton according to levels of stickiness threshold and ginnery for seasons 1997/98 and 1998/99. Source: ARC.

Location of ginnery	Levels of stickiness								Total bales	
	Free		Light		Moderate		High			
	1997	1998	1997	1998	1997	1998	1997	1998	1997-	1998-
	-	-	-	-	-	-	-	-	1998	1999
	1998	1999	1998	1999	1998	1999	1998	1999		
Maringan	45	21	45	65	10	13	0	1	8193	15348
Hasshaeisa	31	14	52	60	17	23	0	3	59450	56847
Bageir	49	32	44	63	6	05	1	0	24111	21754
Total Gezira	37	19	49	62	13	17	1	2	92744	93754

Table 2: Percentage of Acala cotton according to level of stickiness threshold and location of ginning roller for season 1997/98 and 1998/99. Source: ARC..

Location of ginning	Levels of stickiness								Total bales	
	Free		Light		Moderate		High			
	1997	1998	1997	1998	1997	1998	1997	1998	1997-	1998-
	-	-	-	-	-	-	-	-	1998	1999
	1998	1999	1998	1999	1998	1999	1998	1999		
Maringan	3	9	9	39	31	41	57	11	104205	49501
Hassaheisa	2	2	23	25	44	58	31	15	79005	25296
Total	2.6	7	15	32	36.6	47	45.8	12	183210	74797

Table 3: Percentage of Acala cotton according to levels of stickiness thresholds and location of scheme for season 1997/98 and 1998/99.

Location of ginnery	Levels of stickiness									
	Free		Light		Moderate		High		Total bales	
	1997	1998	1997	1998-1999	1997	1998	1997	1998	1997-1998	1998-1999
Gezira	2	2	10	34	40	50	48	14	26886	35918
Rahad	1	9	7	0	19	13	73	78	33546	19649
N.Halfa	1	30	26	54	49	15	24	1	42762	28624
Total	2	11	19	33	46	29	33	27	103176	84191

Table (4). Distribution of exported cotton bales according to level of stickiness.

Level of stickiness	Barakat		Acala (R)		Acala (S)	
	1997/98	1998/99	1997/98	1998/99	1997/98	1998/99
Without project	60000	119444	183000	105430	102000	116060
With project:						
Free	22200	22694	4758	7380	2040	12767
Light	29400	74055	27450	35846	19380	38300
Moderate	7800	20305	66978	49552	46920	33658
Heavy	600	2389	83814	12652	33660	31337

Some remarks and ideas to better understand the links between stickiness and prices

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Abstract: At present, the "sticky cotton" reputation is the criteria taken in account by buyers. But only a scientific analysis could allow to classify the bales, then to identify and to certify the non-sticky ones. The discount applied today to sticky bales depends on the level of supply of cotton on the market and on the level of modernity of the spinning mill using them. But over fifty sticky points, a cotton cannot be processed pure and is no more bought. In the Sudanese conditions, the financial evaluation of a classification has to be based on economical data, not yet all available.

Cotton reputation

The discount on the cotton sales price is linked to the reputation of cotton stickiness, this reputation not being established on a scientific analysis of the percentage of sticky cotton in the delivered lots, but is founded on the customer's perception of the stickiness characteristic of the cotton origin. It is difficult to remove an acquired reputation; thus, cotton from Cameroon which acquired the reputation of a sticky production and undergoing some discounts, was unable to get rid of this reputation in spite of the success they got in fighting against stickiness. Nowadays, mean discounts of 5% are still in use compared to cotton from Mali though their stickiness levels are not different.

Cotton classification on its stickiness level could solve the problem, if a renowned certified body certifies that bales are homogeneous, otherwise traders will not take the risk of this certification by their own. Mixing lots from different origins, as it is done in Sudan, is not the proper way. It would be better to identify free zones and make certified by ICAC that this is coming from a non-sticky certified production zone, otherwise customers's reticences will be maintained and the non-sticky cotton from Sudan will continue to be subject of discounts.

Discount level as a function of the cotton quotation

The discount level is more or less important depending on the excess of supply over the demand or the contrary. The discount level is lower when the supply is in deficit, it is higher when the supply is in excess. Consequently, knowing that, when the supply is in excess then the quotation is lower, and conversely when the supply is in deficit then the quotation are high, the effect of the discount is cumulative. Thus, the discount level was 0.50 FF/kg when the cotton price was 7 FF / kg and was only 0.30 FF/ kg when the cotton price was 10 FF / kg. In the first case, the discount level was 7% whereas it is 3% in the second case.

Discount level as a function of the customer's origin

The price discount on sticky cotton is linked to the fact that cotton fouls up production machines, which induces yarn breakdown and machine stops. The cost of these immobilizations is not the same in modern mills with high productivity and a high labour level compared to lower productivity mills and low labour level. The discount level to be applied by the customer using high productivity mills will be higher than the lower productivity mills.

The use of sticky cotton in the industry

Sticky cotton having more than 50 sticky points cannot be used because it prevents the production of machines. There is no more discount in this case, this becomes a refusal of purchase. In France, it even seems that cotton having more than 20 sticky points is not accepted.

In the countries with modern machinery and high labour, when the supply is in excess, the industry refuses cotton having more than 2 sticky points, it does not buy discounted cotton. When the supply is in deficit, it could buy sticky cotton, to mix it with non-sticky cotton, but it cannot pass its own given stoppage level, and one can assess that it cannot mix more than 5% of that sticky cotton. It would prefer to pay a premium for non-sticky cotton than use a discounted sticky cotton for mixing, that induces a storage of this sticky cotton to be gradually mixed and induces extra-handling. There is no market for Sudanese sticky cotton in France in any case.

In countries using low productivity equipment, the machines often run with sticky cottons with given levels. If the Sudanese production is separated into sticky and non-sticky batches, the stickiness level of the sticky part will automatically increase. If this level is too high, would the customer continue to purchase it ?

Comment on M. A. Ahmed's financial analysis of the Sudanese cotton

This evaluation does not take into account some variability aspects in some factors:

- The stickiness level per crop: Keeping the cost hypothesis made by M. A. Ahmed to be applied on 1997 crop, the raw profit of the operation drops from 2,764 million dollars down to 0,501 million dollars, and the net benefit from 2,470 million dollars down to 0,270 million dollars.
- The discount level for sticky cotton following the quotation levels, if the discount level in low quotation period remains around 10 and 5% for non-sticky and low sticky cotton, but goes to -5 and -10% for moderate to highly sticky cottons, the gross benefit of the operation becomes a loss of 2,346 million dollars.

To know what would have been the consequences of a classification process for the Sudanese cottons, the following information is required:

- a complete list of purchasing countries,
- the amount in weight that has been acquired by every purchaser,
- the discount level that was applied to the Sudanese cotton (at the exact quotation mentioned in the contract compared to the ICAC quotation the same day) by every purchaser for the past years 1995,1996,1997,1998,1999,
- the price that every purchaser would have paid its cotton at each stickiness level.

