



# INTERNATIONAL COTTON ADVISORY COMMITTEE

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## Memorandum No. 758

**To:** Delegates to the Standing Committee, Coordinating Agencies, Members of the Private Sector Advisory Panel and Industry Observers

**From:** Executive Director

**Subject:** Report of the Expert Panel on CSITC

**Date:** April 19, 2004

A critical issue facing the world cotton industry is the lack of universal standardization of the operation of instrument-based systems to evaluate the spinning characteristics of cotton. The use of instrument-based methods to evaluate the technical characteristics of cotton began in the United States in the 1970s, and there has been gradual worldwide diffusion of the technology in the decades since. The Secretariat estimates that 29% of world cotton production was evaluated with instrument classing systems in 2002/03.

Objective measurements of the technical characteristics of cotton, if accurate, provide quantitative information to spinners enabling them to optimize the use of cotton, thus helping to boost demand. Objective measurements of cotton characteristics also benefit producers by enabling more sophisticated marketing and enhanced prices. The reports from the Committee on Cotton Production Research presented at each of the last two plenary meetings in Cairo in 2002 and Gdansk in 2003 concluded that instrument-based quality evaluation systems are superior to the traditional hand classing systems and are of benefit to both producers and consumers.

During the 61<sup>st</sup> Plenary Meeting in Cairo in 2002, representatives of producers and consumers agreed that the cotton industry needs to move forward in the adoption of instrument based quality evaluation systems, and during the 62<sup>nd</sup> Plenary Meeting in Gdansk in September representatives of merchants and spinners agreed that an international agreement on the use of instrument based quality evaluation systems is needed to standardize quality test results. In the Statement of the 62<sup>nd</sup> Plenary Meeting, the Committee instructed the Secretariat to form an Expert Panel on Instrument Testing of Cotton.

Accordingly, an Expert Panel on Commercial Standardization of Instrument Testing of Cotton (CSITC) was formed under the auspices of the ICAC in December 2003 with Andrew Macdonald as Chair and Zbigniew Rostwitalski as Rapporteur.

The Expert Panel met in Bremen on March 22, 2004 with 15 members present. The panel's report is in the form of a presentation by Mr. Macdonald to the 27<sup>th</sup> International Cotton Conference Bremen on March 25. A copy of Mr. Macdonald's report follows.

### Next Steps

Comments to the report are encouraged. Comments should be sent to the Secretariat for distribution to all Expert Panel members during April and May 2004. Members of the Expert Panel will consider the comments received and review the contents of the report during June, and a revised report may be issued. The Expert Panel will present its report to the Plenary Meeting in Mumbai during the 63<sup>rd</sup> Plenary Meeting.



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March 25, 2004

## **Presentation of the Expert Panel on Commercial Standardization of Instrument Testing of Cotton (CSITC)\***

### **Andrew Macdonald, Chairman (CSTIC) and President Liverpool Cotton Association**

It is my privilege to present to you some thoughts from the Expert Panel on Commercial Standardization of Instrument Testing of Cotton, CSITC, which has been organised by the International Cotton Advisory Committee (ICAC) on the initiative of the Liverpool Cotton Association, with support from the International Textile Manufacturers Federation (ITMF). The panel is made up of representatives from across the cotton chain, including producers, merchants, researchers and spinners.

The objective of the Expert Panel is to improve the commercial acceptance of instrument testing, for the purposes of trading cotton. The Expert Panel is working within the framework of commercial practicality to introduce:

1. Standardized controlled testing procedures,
2. Standardized calibration methods, and
3. Standardized assurance checks.

In the context of these objectives, I must stress the word COMMERCIAL. Instrument results provide no real end value unless they correlate with processing performance. This means that the buyer, in this case the textile industry, should be able to use Standardized Instrument Testing of Cotton (SITC) results for their lay downs. This would indeed be an ideal solution, and one we shall all strive for.

However, today instrument testing is as vulnerable to variations as traditional manual classing. Therefore, as a first step to reach the perfect solution, we recommend utilising the description and evaluation of cotton based on instrument testing language and equipment. To achieve these objectives, the panel proposes to avoid scientific jargon and stick only to commercial considerations.

The Expert Panel is aware that each textile company will have its own instrument line, and we are not suggesting that companies should dispose of their testing equipment just because the seller has equipment also. However, it is encouraging to note that in the United States, where testing by the USDA is well controlled, in some cases SITC data is accepted at face value, and introduced into the textile process accordingly.

The ITMF International Committee on Cotton Testing Methods has provided, and will continue to provide, extremely valuable guidance to the cotton industry. Now the time has come to apply the ITMF expertise and know-how to the commercial marketing, and the contractual exchange, of cotton lint. To this end, the U.S. Department of Agriculture (USDA) continues to offer its experience and assistance to the international commercial cotton trade in order to establish standardized classification.

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\* Presentation to the 27<sup>th</sup> International Cotton Conference Bremen, March 24-27, 2004

And today represents a window of opportunity. There is now a consensus across all segments of the cotton industry, including spinners, merchants and producers, on the need to improve and expand the standardization of instrument testing of cotton throughout the world, so that the results can be used with confidence, as a basis for trading, as well as in the production and ginning of cotton.

## **History, Benefits and Problems with SITC**

A few words on the history of cotton classing in relation to instrument-based testing are in order at this time, along with a discussion of the benefits and problems with instrument testing; the subject is vast, and the complications even larger.

- 1) Today, traditional hand classing fails to provide growers and spinners with the technical information about fibre characteristics that is required to optimise the growth and use of cotton.
- 2) Standardization of Instrument Testing of Cotton (SITC) was introduced in the U.S. in the 1970s and implemented for 100% of the United States crop in 1991. SITC in the U.S. has met with considerable success and has undergone many changes since it was first implemented. Considerable progress was made during the 1980's to develop the instruments, instrument calibration standards, and testing procedures into a national system capable of full-scale classification. Although no new measurements have been added to the USDA classification system since the early 1990s, the accuracy and reliability of the established measurements have drastically improved with better instruments, calibration materials, testing procedures and sample conditioning.
- 3) There has been a gradual worldwide diffusion of SITC technology over the years, and few cotton spinning units today would operate without such a tool. It is estimated that 90% of the industry uses SITC instruments in one form or another.
- 4) Producers in more countries are expanding the use of instrument testing. For example, the Government of Brazil requires that cotton be evaluated on the basis of the Universal Standards and Brazil will eventually class all cotton with instrument-based systems. China, is taking on an ambitious plan to reform its classing and grading system for cotton, and has asked the USDA for assistance in establishing a reliable cotton classing system. This will be an incentive to expand the system to more countries.
- 5) However the nation-wide implementation of a set of internationally recognized correct quality testing procedures, calibration standards and quality assurance checks, based on directions provided by the ITMF International Committee on Cotton Testing Methods and the USDA handbook, has only worked on a limited basis in countries other than the United States.
- 6) Cotton grown in Australia, Israel and South Africa is evaluated with procedures similar to the USA, and other countries have partial systems. However, it is estimated that only 29% of world cotton production was instrument evaluated at origin in 2002/03. With China (Mainland) adopting a classing system similar to the U.S. on a trial basis in April 2005, and a fully implemented system in 2006, we can anticipate that this percentage will greatly increase.
- 7) Not all countries are equipped with instrument measuring devices, and many countries do not have easy access to instruments due to cost, service, and maintenance. However, today the trade/merchant has access to such equipment, be it their own, or through information obtainable from inspection companies worldwide.
- 8) The high cost of manual classing, together with pressure from some spinners, is provoking this challenge to achieve a fully integrated worldwide system of SITC.

## Benefits of SITC

- 1) Efficiency thought out the supply chain.
- 2) Reduced risk to all the parties involved in cotton transactions.
- 3) Cotton farmers could be properly rewarded for their cotton, despite the misconception to the contrary in some countries.
- 4) An objective measurement enables more sophisticated marketing, including electronic trading, clearly the future.
- 5) Cotton ginners with accurate feedback would be encouraged to fine-tune processing for their own, and their client's, the grower's, benefit.
- 6) Merchants would be able to better target markets with specific requirements, and their risk of being caught with 'misrepresented' shipments from suppliers would be greatly reduced.
- 7) The final buyers would avoid the risk of receiving cotton outside of specification.
- 8) The textile industry would have improved quality and a wider variety of applications.
- 9) The consumer would have a more consistent end product quality, a defence against synthetic fibres.
- 10) The 'sanctity of contracts' would be assisted by accurate and repeatable fibre measurement when integrated into any arbitration system.
- 11) Instrument testing would provide quantitative information to spinners enabling them to make basic decisions, before the cotton arrives at the plant, thereby reducing inventory. The re-classing/testing on buyers instruments would be simplified.
- 12) Clearly the ideal long-term objective is for the spinner to use the instrument information directly from his supplier once all the instruments talk the same language.

## Problems Associated with SITC

The Expert Panel analysed the problems that cause variances in results and make implementation of a worldwide system difficult. The Panel enumerated the following problems in trying to expand the use of SITC:

- 1) A lack of trained and experienced operators.
- 2) Testing instruments are not installed, maintained, and calibrated properly.
- 3) Variation occurs naturally within bales of cotton, and consequently variation in test results within known parameters is inevitable. In many countries, quality variation is due to cotton bolls opening irregularly, and being machine picked. Mature and immature bolls are often mixed together, giving variation in results depending on the tuft selected.
- 4) Tests are performed in laboratories without uniform humidity and temperature. Deviations in moisture affect fibre strength the most, followed by length and micronaire.
- 5) SITC systems are expensive and involve the operation of complex instruments requiring regular maintenance.

- 6) Not all countries have easy and rapid access to universal calibration standards (delivery and import duties create difficulties for non-US companies).
- 7) A lack of consistency between manufactures of instruments.
- 8) Sellers claim customers are unwilling to pay for the true quality of cotton under SITC. "What do I get out of this," is a common question.

### **Recommendations from the Expert Panel**

Having considered the history, benefits and problems associated with SITC, the Expert Panel on CSITC recommends the following:

- 1) Training is at least partially the responsibility of instrument suppliers. Just as with maintenance, each supplier, working in cooperation with governments and industry associations, should provide regional training centres for SITC operators.
- 2) Calibration samples must be easily available to all users. Again, instrument suppliers and regional centres should ensure this, including assisting with the importation of the samples if so required.
- 3) The USDA offers to make available the standards for drawing samples that should be communicated to all users.
- 4) Cotton is hygroscopic, and so instrument results need to be corrected with the use of algorithms within the software of each instrument based on the humidity of the samples being tested, as well as the atmosphere in which they are tested. The concept would be to measure the moisture content of the sample directly. Work should be encouraged in the development and evaluation of a moisture measurement suitable for correction purposes. Instrument manufacturers are now beginning to make available on-line moisture sensors that should be evaluated in the near future.
- 5) Make available to each testing centre the correct specification for construction of a SITC laboratory.
- 6) Government incentives for R&D, as well as risk capital from new investors, to develop new and more economical instruments.
- 7) Establish Round Tests in each country or region. In large countries, one or more reference centres could be identified that would be responsible for conducting round tests within their country and would ensure that their laboratory is reconciled with international standards through participation in round tests with Bremen. These reference centres could also be responsible for training and calibration in their area.
- 8) The USDA would offer its expertise that has been developed in establishing a reliable cotton classing system to other countries and will conduct training programs for achieving standardization. Training would include calibration, quality assurance procedures, instrument maintenance and proper moisture conditioning practices.
- 9) By establishing correct testing procedures and results within a worldwide system of certified laboratories, sellers will be assured of a fair price for their cotton.

### **Standardization**

Standardization of Instrument Testing of Cotton is essential. However cotton fibres are not homogeneous, so a compromise must be reached between the current state of the art of textile machinery, and SITC.

The Expert Panel recommends that:

- 1) Consideration to be given to the concept of commercial tolerances for the principle parameters. Micronaire is an example, where a variance of 0.3 CL is normal. These tolerances are to be recommended based on the variances which are presented by the Bremen round trials.

Initially, the cotton industry should concentrate on the characteristics that can be measured relatively easily and with little variation, and should stick with these basic measurements when attempting stage one of an international agreement. Therefore for commercial purposes, the Expert Panel recommends that the world concentrate on the measurement of:

- i) RD & +b
- ii) Length
- iii) Strength
- iv) Micronaire
- v) Length Uniformity

As testing procedures and the development of commercial instruments advance, additional measurements may be added to a worldwide SITC system in future stages:

- i) Trash
- ii) Neps
- iii) Stickiness
- iv) Maturity
- v) Fineness
- vi) other

On line classing of neps, maturity, stickiness and trash-content would greatly increase cotton's value.

- 2) Adopt metric measurement for staple length.
- 3) Procedures and guidelines recommended by ITMF for SITC should be adopted.
- 4) Sellers should replace manual descriptions of cotton with instrument test information. Buyers will confirm quality measurements with their own instruments and in cases of disagreement, arbitration will be available, just as is the case with manual classing. In time, buyers will learn which sellers are more accurate in their measurements.

#### Universal Standards

Some countries have objected to the introduction of instrument testing on the grounds that the Universal Standards are based on American cotton and cannot be compared with, say, West African, Greek, or Paraguayan cotton. The variation that exists between the Universal Standards and the results of SITC on non-U.S. cotton creates an enormous lack of confidence.

The Expert Panel recommends:

- 1) That the RD & +b readings from SITC should be utilised instead of colour grade. Colour grade is in fact a mathematical calculation, and each country could establish domestic colour grades if necessary, provided their grading system was consistent from season to season and variety to variety.
- 2) It is not the objective of the cotton industry to compare origins on colour. The objective is to encourage increased use of instrument-based quality evaluation systems so that commercial values of a particular growth can be based on instrument testing instead of hand classing. As an example, the current Strict Middling American Central Belt will have the same intrinsic spinning

value relative to a Strict Middling in any other country, regardless of whether the samples are classed by instrument or by hand, even though there might be slight variation in colour, consistent with the tradition of that origin.

- 3) Regarding colour and SITC measurements, the Expert Panel emphasizes that when a spinner buys cotton from West Africa, for example, the price is set by the VALUE of the cotton to the spinner. This value is established by considering the origin first, then reliability of delivery from that origin, then transit time, then the characteristics of that origin, whether it is traditionally rough or smooth for blending purposes, and then finally SITC measures are considered including colour, staple, micronaire, etc.

#### **Proposed 4 Levels of Implementation of SITC**

The Expert Panel proposes four levels of implementation of a worldwide SITC system as an objective:

- 1) A stand-alone instrument which is self calibrating, with internal climate control and requiring no operator intervention, except to put the sample in the instrument and press a button: Such an instrument may take many years to develop, and many more to introduce/replace the existing models.
- 2) A module adaptation for current instruments which measures accurately the sample humidity, as well as the humidity and temperature surrounding the sample area. Such information is to be built into the software and the results adjusted accordingly. This level should be quicker to introduce, since it would not involve a completely new investment, However, while this level avoids the problems of climate control and sample preparation, it would not eliminate operator error or lack of experience. Nevertheless, this level would be a step forward from current practice.
- 3) Introduce in each country or region a reference organization that could oversee all other instrument lines in that country by making constant checks, i.e. following closely the current USDA system with accuracy and repeatability as the objective. Although this level is theoretically relatively easy to introduce, the problem will be for all users to follow the procedures laid down, since the majority of laboratories would require very considerable investment due to lack of, or insufficient, climate control.
- 4) The principle reason for the reluctance of merchants to participate in national, regional and worldwide SITC systems is the variation between instruments. Merchants must assume market risks, and the overall quality risk of a given origin when purchasing cotton for forward delivery. To assume also the risk of the variation between instruments is clearly unacceptable. The first risk can be hedged, the second, parameters are applied to most of the described characteristics, for example micronaire 3.8 to 4.2 CL 0.3.

Therefore, the Expert Panel recommends that the world cotton industry:

Adopt similar COMMERCIAL tolerances for the five basic SITC measurements based on tolerances that are normally expected between instruments. The coefficients of variation (CV's) from the Bremen Round Trials have been examined, and the Expert Panel could recommend tolerances for trading only, based on this data. As the CV's tighten over time, with the introduction of improved international procedures, commercial tolerances will narrow.

Those laboratories that participate in the Bremen Round Trials, and whose results are within the established tolerances, could be certified. Merchants would agree in their contracts to non-binding verification with a certified Bremen laboratory. However the results would not be final, and either side could arbitrate under international contracts, in Liverpool, as is common practice for manual quality arbitrations today.

The Bremen Round Trial results are derived from laboratories all over the world testing absolutely similar cotton supplied to them by Bremen, tested on their instruments and the

results sent to Bremen for collation. These results show therefore a possible and reasonable variance between differently-located instruments rather than the traditional tight tolerances applied to individual instruments during calibration. As an example, in the round tests of Bremen for the third quarter 2003, the bulk of the tests varied between 3.8 and 4.1 micronaire, 33 - 35 staple length, 84 - 86.5 uniformity, strength 35 - 39 g/tx, which would seem to suggest reasonable commercial contract tolerances between individual instruments.

## **Final comments**

Progress in research is a bottleneck to industry advancement, and a lack of finance is keeping this neck tightly closed. The Expert Panel hopes that investors can be encouraged by its recommendations about the excellent future of instrument classing of cotton in the world to invest in this activity, so as to guarantee a continuity of what has been achieved so far.

At the first meeting of the Expert Panel on March 22, 2004 in Bremen, the Expert Panel did not invite manufactures of instruments to participate in order to keep discussion non-commercial. At our next meeting at the ICAC plenary in Mumbai, India during November 29 through December 3, 2004, the Expert Panel will open the floor to all interested parties who apply to participate, so that it can take advantage of their expertise and experience in order to move forward in this most exciting project.

Andrew Macdonald  
Chairman