FACUAL PROJECT

Improvement of Cotton Ginning in Mato Grosso

(*Melhoria do descaroçamento do algodão no Mato Grosso*)

Expertise of UNICOTTON Cotton Classing Laboratory in Primavera Do Leste (MT, Brazil)

November 3-14, 2005

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CIRAD
November 2005

Expertise of UNICOTTON Cotton Classing Laboratory

In Primavera Do Leste (MT, Brazil)

1 - Mission schedule

Montpellier - Paris – São Paulo – Cuiaba – Primavera Do Leste : November 3rd and 4th.

Work in UNICOTTON: November 4th to 11th, 2005.

Primavera Do Leste - Cuiaba – São Paulo - Paris – Montpellier: November 11 and 12.

2 - Objectives

- Make a diagnosis about the conditions of work of the UNICOTTON cotton classing laboratory.
- Bring a contribution to build the protocol of checking the impact of the new devices installed in Fazenda Nova gin on fibre quality parameters.
- Inform UNICOTTON Members and staff about the international standardisation according to the Commercial Standardized Instrument Testing for Cotton Task Force initiated by the International Cotton Advisory Committee.

3 - Activities carried out in UNICOTTON

3.1 - Diagnosis in the laboratory

The diagnosis started in August 2005 based on pictures taken by Jean-Luc Chanselme and persons from CIRAD during previous missions.

During the visit several activities were performed:

- preparation of a questionnaire, and collection of answers by various members of UniCotton: Paulo Riba, Adelar Dahmer, Valmir Lana mainly.
- check of the air ambient conditions
- check of some results from "HVI" instruments
- organisation of the collection and grouping of results from the first gin diagnosis (in 13 gins), collection made by Bruno Zarro
- first analysis of these results.

3.1.1 - Answers to the questionnaire to present UNICOTTON laboratory

This questionnaire was designed so as to understand the main organizational and technical points necessary to start the diagnosis.

In summary, 570 000 samples were characterized in the UNICOTTON laboratory this crop year, most of them for classing purposes. Characterization is made visually on one side of the sample, and using three devices, type *HVI* ® (2*900Automatic and 1 Spectrum II). In addition, some samples are tested on an AFIS Pro device having all modules except the trash and dust one (Figure 1).

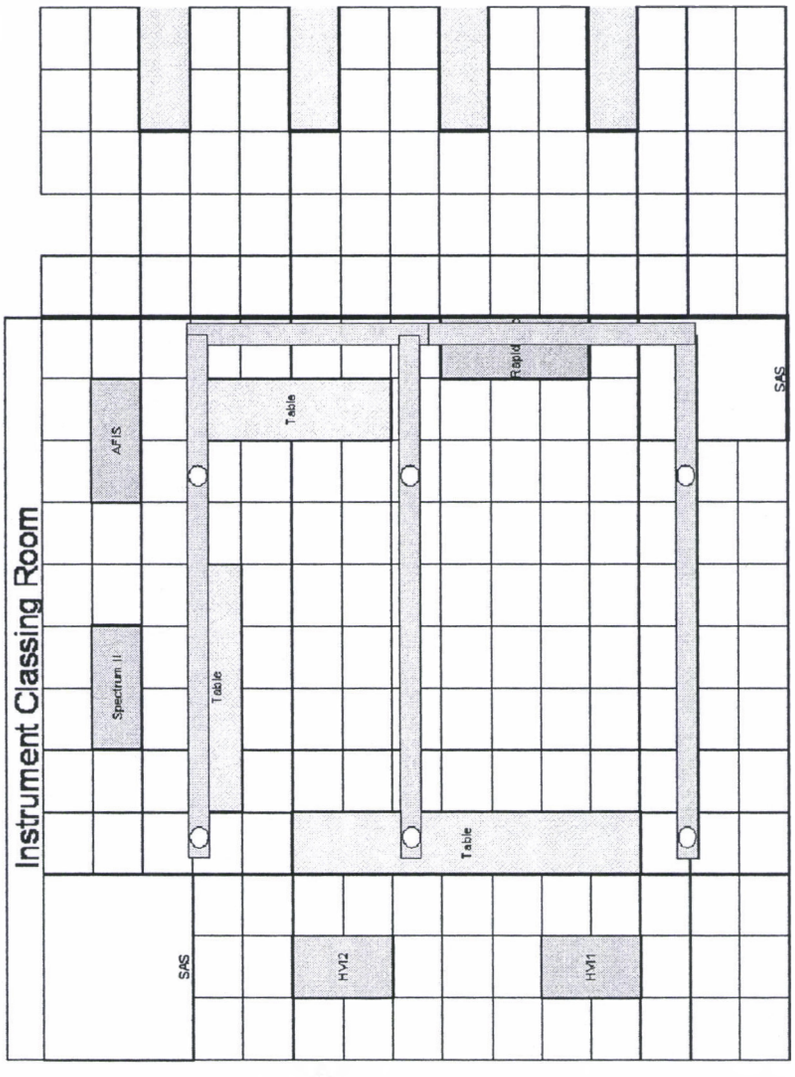


Figure 1: Raw plan of the UNICOTTON laboratory.

The reference point for UNICOTTON is the USDA monthly check test. As seen on results presented by Valmir Lana, results seems in accordance with USDA ones. UNICOTTON also participates in the Bremen round-test.

There is an ISO 9001-2000 certification for UNICOTTON, and procedures are in place in the laboratory in order to achieve measurements within 24 hours to their members and customers.

For each bale, fibres are taken out from its both sides to constitute one sample, sub-divided in 2 parts, one for visual classing and one other for instrument testing. Samples are arranged by the laboratory personnel in the visual classing room. A majority of these samples are conditioned for around 15 minutes in a RapidCon® system before being stored in the instrument classing room for testing. The same RapidCon system is used to set and manage the ambient air conditions in the instrument laboratory (see raw plan in figure 1).

Results from both visual and instrumental classing (by a disk from the HVI to a central computer) are computed and sent to customers mostly via electronic mailing.

3.1.2 - Check of the climate control system

The RapidCon is designed to achieve 2 goals:

- allow a fast moisturization of samples
- allow the conditioning of the laboratory to normal standard conditions (20°C and 65% of relative humidity RH).

These 2 goals are achieved thanks to 2 circuits of air in the RapidCon and specific automations. These 2 automation systems – one for sample conditioning and one for room conditioning – are USUALLY piloted by:

- one sensor of temperature that commands
    - the regulation of the quantity of cold water circulating in the system, to cool the air temperature down and to condense and remove water from the air;
    - the regulation of heater device, to increase the temperature in the system;
    - the tolerance of temperature; as stated in ISO 139 standard, it is +/- 2.°C (this tolerance is allowed at the recording point of the system, meaning that it includes all the errors of sensing, managing, piloting, and all sensors errors and technical tolerances);
- one sensor of relative humidity that commands some system of adding water in the air (in Rapidcon, it is done by spraying very fine droplets of water; but the best solution would be by adding vapour).
    - the tolerance of relative humidity as stated in ISO 139 standard is +/- 4% (this tolerance is allowed at the recording point of the system, meaning that it includes all the errors of sensing, managing, piloting, and all sensors errors and technical tolerances).

A Rotronic device, brought by CIRAD, has been used to record the ambient air conditions for 2 days (48 hours) each minute in the corner of the office of Valmir Lana. Figure 2 to Figure 7 show the categorization of the RH and temperature records, and the corresponding records along the time respectively.

Several comments can be deduced from these figures:

- The tolerances at the measuring device are not in compliance with ISO 139 standard;
- There are bimodal distributions for both temperature and relative humidity records;
- There are variations on different frequencies in these records: 1) short term (less than 10 minutes) variations seems acceptable, 2) mid term variation (1-2 hours) may be important at some point of the day and 3) long term variation (day/night) are very large;
- There is a general trend for decreasing temperature along the time. It should be noticed that the outside temperature was going very low at night due to storm in the evenings.
- The relationship between RH and temperature is not usual, and indicates that there are some troubles in the command of the conditioning system (Figure 6) in comparison to what can be observed in Cirad (Figure 7).

My first analysis of this data can be concluded by:

- There is a strong lack of temperature control of the air that can induce very large variations in humidity, and there is a lack of humidity control in the system.
- It seems that there are specific variations or changes in the behaviour of the RapidCon when samples are in it for conditioning
    - Note: a switch is used to change the working mode of RapidCon from "room conditioning alone" to the "room and samples conditioning". When the switch is activated for "room and sample conditioning", 4 doors are supposed to move thanks to air-cylinders so as to direct a part of the air through the samples (the remaining continuing to condition the room), and the ventilator is running faster (from 21 to 51 Hz).
- There is a lack of thermic isolation of the building that drives the cooling system to be less efficient at some moment.

Based on these records, we were able to discuss with M. Luis Antonio Petkowics from AR.com Company who is responsible of the maintenance of the RapidCon device.

From our discussion, it became clear that:

- some electro-pneumatic valves and air-cylinder are ineffective or un-installed due to a **problem of water in the compressed air**, problem which seems not to be cleared up to now. The consequence is that **electro-pneumatic-valves and air-cylinders show strong corrosion evidences, and therefore cannot function in a proper way**. This is seen by the necessary delay that is required by the system between a command of a air-cylinder and its real move, if it moves... This certainly does not allow a good ambient air conditioning in both sample and room systems.
- The valve that controls the quantity of water circulating in the cooling system was removed from the RapidCon, and therefore, **the capacity of cooling down the temperature and/or removing water from the laboratory air is only and directly dependent upon the Carrier cooling system which is installed outside the building, while it should be controlled by the RapidCon controlling tools themselves.**

In these conditions, it is impossible to say if the encountered troubles we see in the records are only due to the RapidCon, as it is not in its optimum ability to work properly.

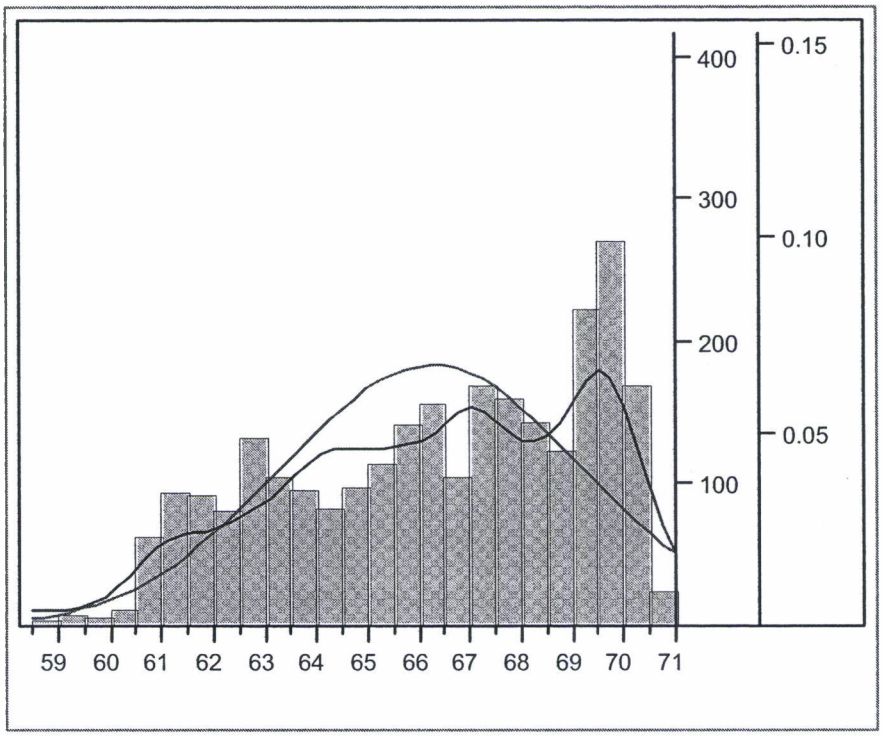


Figure 2: RH% categorization for the 2 days records.

In the bar charts (Figure 2 and Figure 3), the numbers (counts) of recorded relative humidities and temperature are given the vertical axis in correspondence with in the horizontal axis values. For instance, there were around 275 times where the relative humidity was recorded in the range [69.5, 70] during the recording period.

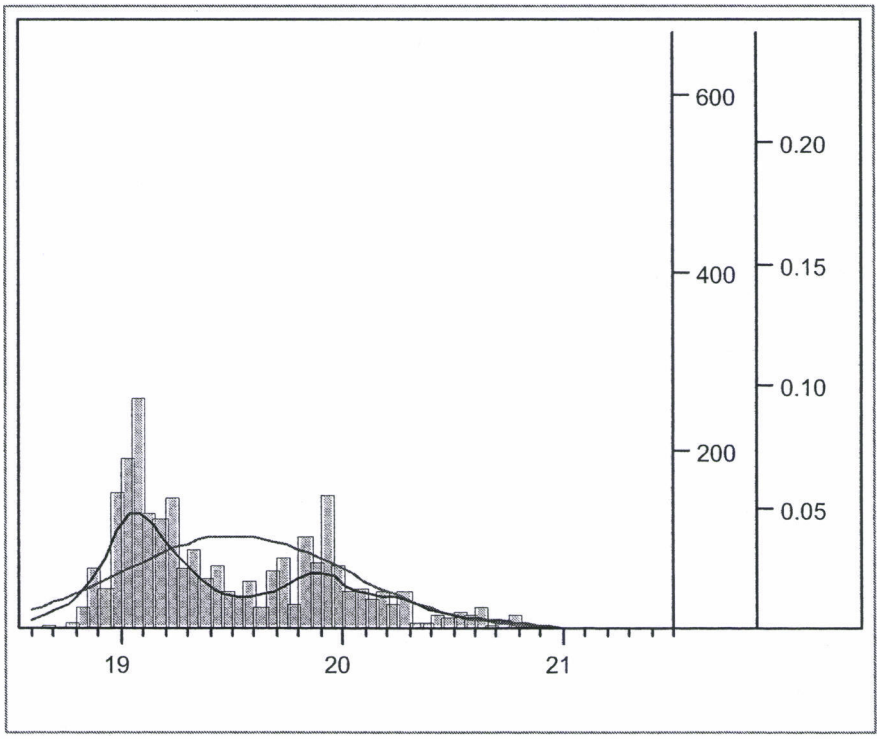


Figure 3: Temperature categorization for the 2 days records.

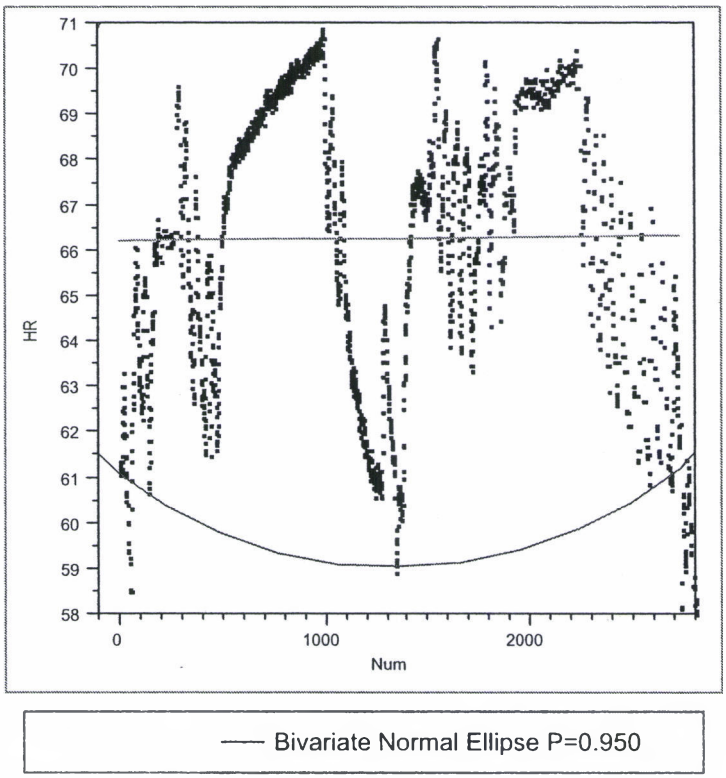


Figure 4: RH% records vs time (Num) during 2 days (1 point every minute).

In this Figure 4, the ellipse is representing the area counting 95 % of the recorded points in relative humidity, and the line is representing the trend of relative humidity as a function of the record number (which represents the time in minutes). We observe that the global trend is flat with an average value of 66%. However there are large variations during the time.

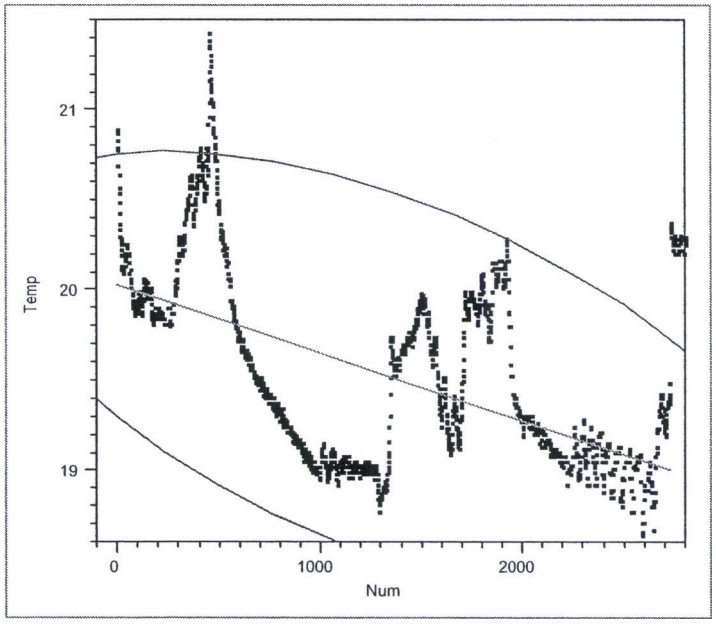


Figure 5: Temperature records vs time (Num) during 2 days (1 point every minute).

In Figure 5, the trend is indicating that the temperature is decreasing along the time as already discussed earlier.

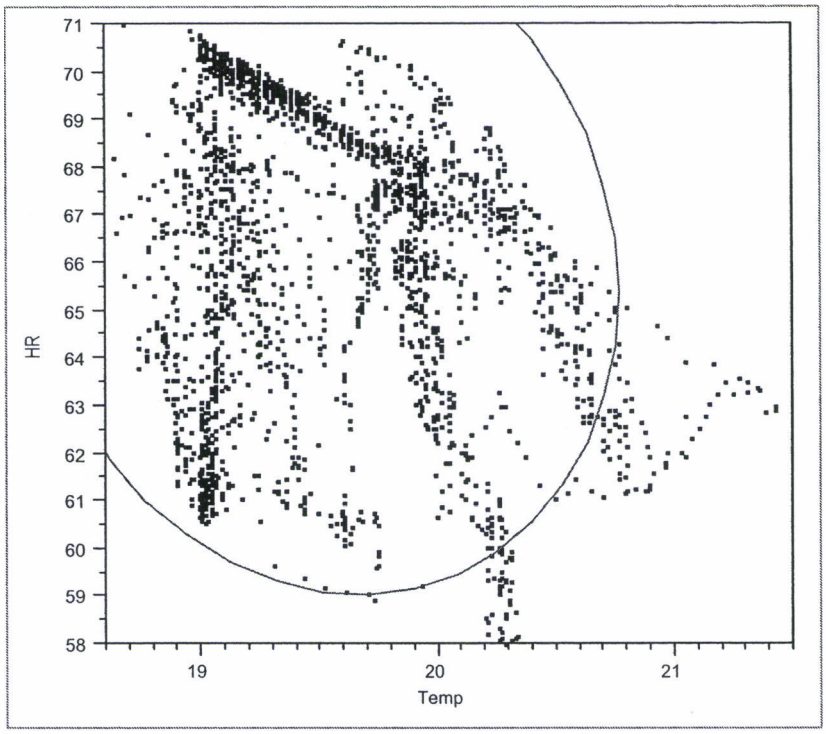


Figure 6: Relationship between RH% vs Temperature in UNICOTTON (1 point every minute).

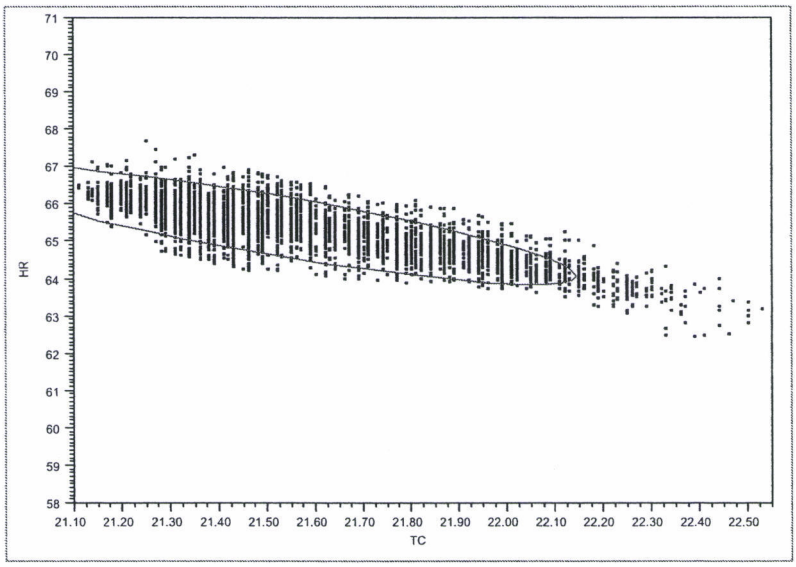


Figure 7: Relationship between RH% vs Temperature in Cirad for one month recording (1 point every minute).

My suggestions are then (from priority one to n):

- make the necessary changes so that the compressed air is warranted dry for sure when coming in the laboratory equipments.
    - Note: there are 2 air compressors in the back of the building. Only one was working when we were visiting UNICOTTON, but it was running at all times

while there was almost no demand in the laboratory (lunch pause). This means that this compressor is not efficient or that there is/are leeks in the system. When a compressor runs 100% of the time, there is not time for an inefficient system to remove water from the compressed air, and that increases some more the water problem in the compressed air in the current situation.

- Replace the corroded valves and air-cylinders in the RapidCon with standard spare-parts.
- Replace the valve regulating the quantity of cold water circulating in the RapidCon.
- Replace the temperature and relative humidity sensors by those acquired by the project in order to have fine recording of the variations in the room.
- Insure a better air filtration for dust in the room to avoid technical problem on the HVIs. It can be seen a lot of dust after some hours of instrument testing that can be partly fixed thanks to a better filtration system.
- As stated earlier, the building is not enough protected against insulation. To counter this, insulating walls and ceiling have to be built around the laboratory as well as automatic closing doors system should be installed on all doors going to the laboratory (2 doors of air-lock chambers 1 and same for air-lock chamber 2).

ONLY AT THAT MOMENT, after the repaired RapidCon stabilises for at least one day, it will be possible to see if it is efficient enough to manage the sample conditioning AND the room conditioning. It is important to note that the investments for repairs will not be lost as the system will be used at the final step (see just hereafter).

My advice however would be to install 2 completely independent systems:

- one for the room
    - Note: a particular attention should be focused on the way of implementing this system. It should include a command/control/monitoring
        - Of temperature in very tight tolerances (+/- 0.2 °C) to achieve the final +/- 2 % RH in the room at the independent recording point (meaning an independent device that only records the ambient conditions, not the system that regulate the ambient conditions).
        - Of relative humidity of +/- 1% RH to achieve the final +/- 4% in the room at the independent recording point.
        - This will only be possible by activating cold-water circuit AND air heating device AND addition of **vapour** (not water spray or droplets) in a proportional manners (not on/off systems).
        - The room should get a given percentage of new air coming from the outside to renew its "freshness".
        - The pressure in the laboratory should be higher than outside to insure the good conditions in the laboratory and that no dust/trash would enter the laboratory.
        - Other independent recording instruments included in the project should be installed to record air characteristics in several locations in the laboratory to check that the regulation procedures of the

conditioning system are efficient.

- and the RapidCon for sample conditioning if it shows its efficiency to do so.

If this solution is retained, then the RapidCon should be moved in the visual classing room not to disturb the room conditioning system, and its exhaust air should be directed to somewhere no new problem is created in the laboratory.

In these conditions, UNICOTTON would have a laboratory in good ambient air conditions and with respect to its stated delays in its ISO 9000 rules (24 hours for giving results to its customers).

As stated above, recording the conditions in the labs and moisture in the samples for several weeks will only bring the proof that the systems are efficient and stable.

3.1.3 - Ambient conditions in various locations in the laboratory

During one day, the Rotronic recording device was moved from place to place in the laboratory to record the conditions at 4 spots during at least 1 hour each labelled as follows:

- HVI 1 is the 900 Automatic in front of the office of Valmir Lana;
- HVI 2 is the next 900Automatic;
- Air Vent 1 is in the corner close to HVI 1 in front of the office of Valmir Lana;
- Air Vent 6 is the one close to AFIS.

As we only have one recorder installed, the variations we observe in the following figures (Figure 8 to Figure 11) may come from the sources of problems already discussed or/and in addition to a bad repartition of air in the room. However, as the Rotronic device was moved from one place to the next in around 5 to 10 minutes, we may think that the variations are also due to a lack in homogeneity for air distribution in the room.

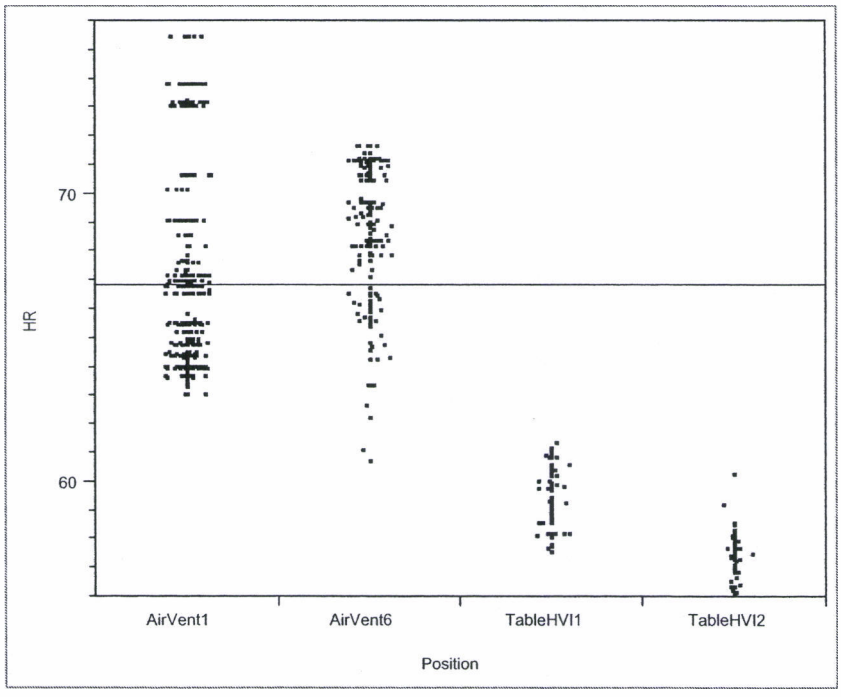


Figure 8: RH in 4 locations in the laboratory (1 point every minute).

Mean of relative humidities were 67% in Air Vent1, 70% in Air Vent 6, 59% on Table HVI1 and 57% on Table HVI 2, for a global range of 13% at that time.

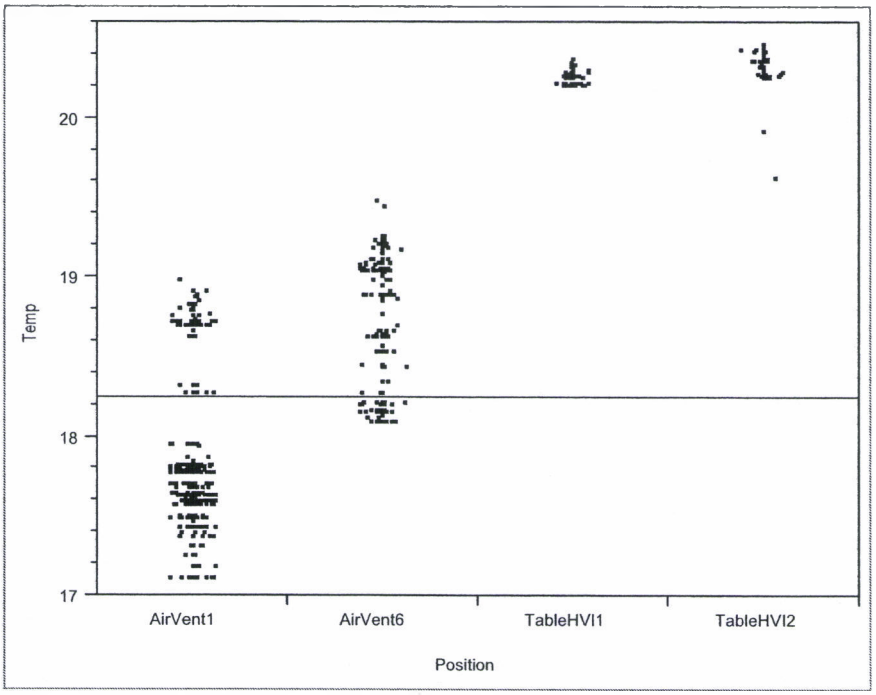


Figure 9: Temperature in 4 locations in the laboratory (1 point every minute).

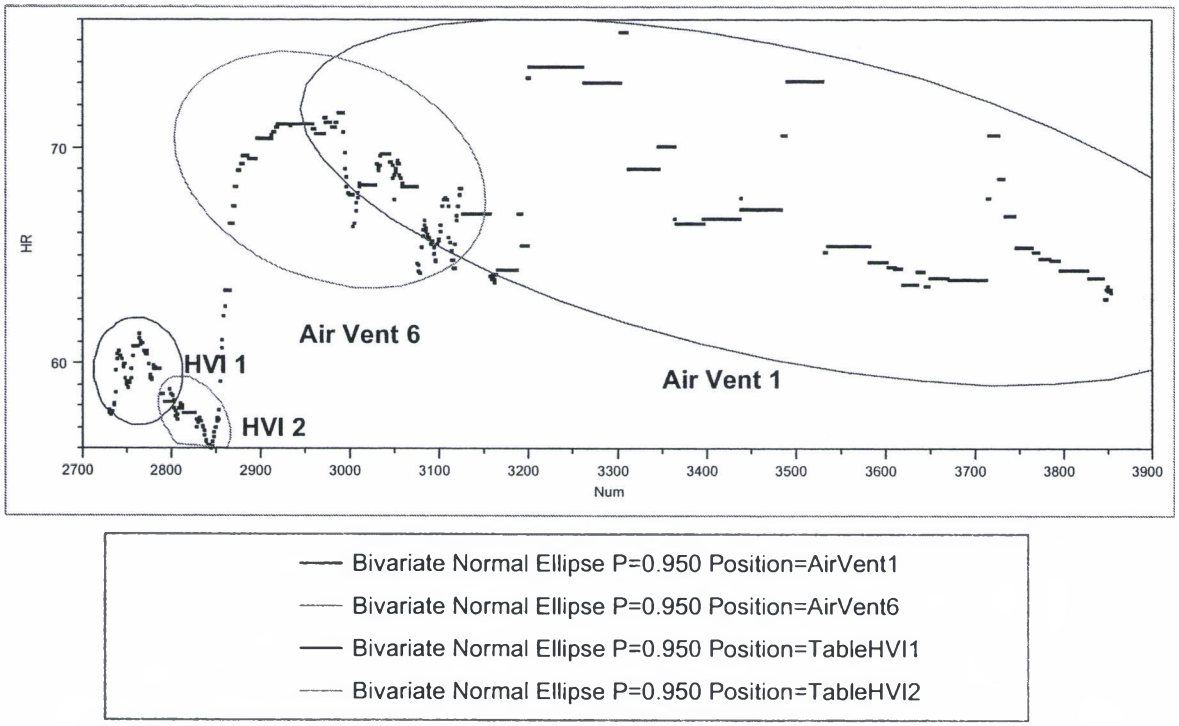


Figure 10: HR vs time (Num) in 4 locations in the laboratory (1 point every minute).

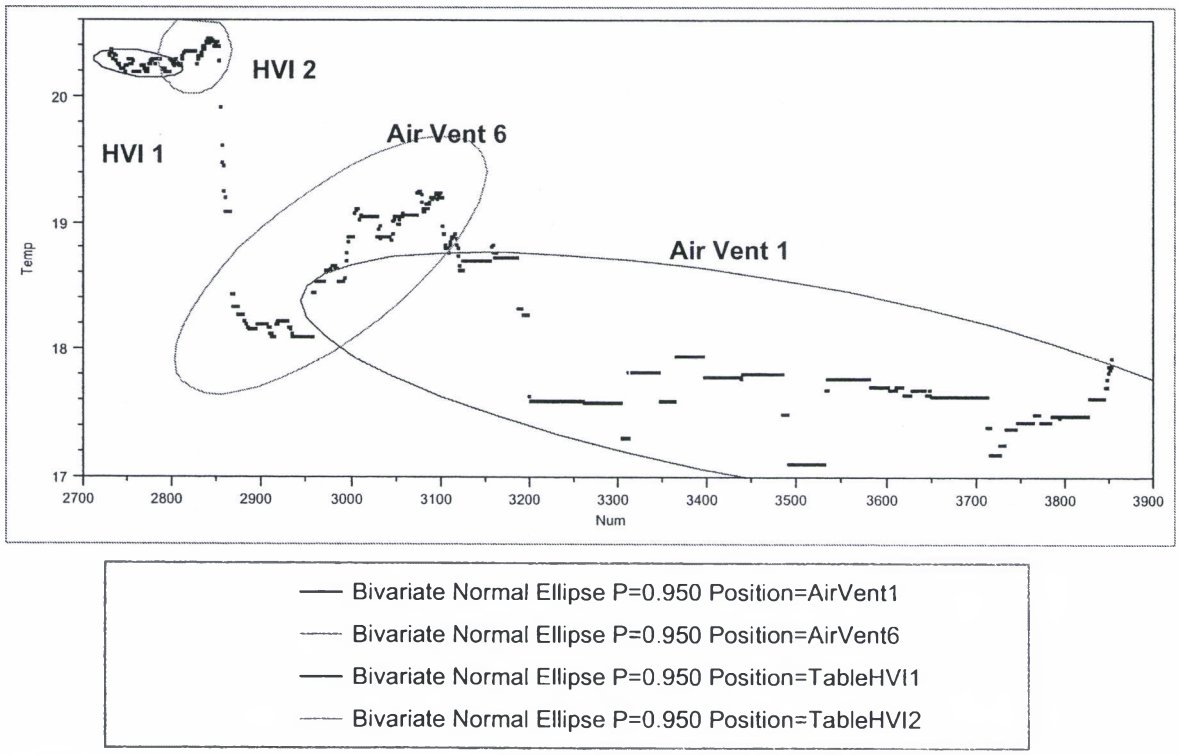


Figure 11: Temperature vs time (Num) in 4 locations in the laboratory (1 point every minute).

The same trends, discussions and limitations as in the previous paragraph can be repeated here. In addition, we observe the air conditions are not homogeneous in the laboratory.

One reason may be the absence of air-vent systems able to manage / regulate the speed and the quantity of air going through the pipes in the actual system. As an example, the air velocity was changing from air-vent to the other in a range of 2.8 m/s (air-vent 1) to 4.2 m/s (air vent at the door of the office of Valmir Lana). It can be worse when RapidCon is switched to "sample and room conditioning": the air velocity was changing from 3.3 m/s to 5.7 m/s respectively.

Recommendations:

- Insure that the first repairs are effective.
- Add 6 air-vents allowing a setting of air stream characteristics to the current system to dispatch / distribute more evenly the air in the laboratory.

3.1.4 - Consequences on the results

It should be known that the current system, with its +/- 6% variation in relative humidity for the best during the day, can lead to wrong strength results: 3-5% RH change leads to 1g/tex difference according to Sasser (1990) and other authors.

In UNICOTTON, these variations are observed mainly during every single day and can lead to claims in quality measurement (a same cotton measured in the morning and in the evening can be read at 26 and 28 g/tex on the same day…).

In addition of not being stable during the day, the system does not allow a perfect and even distribution of air in the laboratory.

Thus, in the current situation, a same single cotton tested in the morning on HVI 1 at 29.5 g/tex can be read at 26 g/tex (or *vice et versa*) **if tested on Spectrum during the evening for instance (1 g/tex for 'during the day' change and 2 to 3 g/tex for location position in the lab), this error is only due to room and sample conditioning.**

3.1.5 - Consequence for the ginning experiment in Fazenda Nova

For the ongoing ginning experiment, samples will be analyzed to check the efficiency of the new ginning sequence in Fazenda Nova. In order to compare the 2 lines of ginning without being disturbed too much by the laboratory conditions, several repetitions of measurements on the same sample (**3 repetitions of 4 measurements each for every sample**) will have to take place in a randomized protocol, so as to average the various conditions of testing. If possible, manage the data such a way that the final data table will collect any individual measurements on the samples.

Measurements have to be made on the **Spectrum** device as it has a moisture sensor which scan every sample and record the results. It also has a temperature and relative humidity meter that store the data along with the measured fibres characteristics. This will then allow a statistical analysis of the ginning experiment results without loosing too much in power for this analysis.

As long as the conditioning system is not set according to the described way, it is preferable to continue to **calibrate the HVIs every 2 hours** or so as this is the rule up to now in UNICOTTON.

To insure that the results are valid, I recommend including the **testing of reference materials as normal samples**. For instance, Micronaire standard and HVI calibration Cottons should be analysed as normal samples to be classed every 2 hours for instance, and the according data saved in a specific file. In case of problem in the data interpretation, this file will serve to explain some unexpected variations, ad even to detect the moment of the problem. It could allow the retesting of all samples since that moment to insure the results for the customers.

3.1.6 - Other considerations that are valid for every day testing and the ginning experiment

When the conditioning system will be efficient and will work normally, it will not be necessary to "calibrate" the HVIs every 2 hours as it is done now. Only a "calibration check" will have to be made then.

- Note 1: A "calibration" is a procedure for systematic adjustment of the settings of the HVI to insure that the HVI will find the target results given on reference materials such as Universal High Volume Instrument Calibration Cottons (UHVICC).
- Note 2: A "calibration check" is a procedure for verifying that the adjustments of the settings of the HVI are able to insure that the HVI will find the target results given on reference materials such as Universal High Volume Instrument Calibration Cottons (UHVICC). This mode changes the settings of the HVI only if it is required.
- In the current working and climate conditions in UNICOTTON, it may be required to run a "calibration" as often as necessary to insure that the machine is almost reading the same results for a same single cotton at various hours during the day (meaning in changing atmospheres).
- However, when the repairs and investments will be made in a properly working air conditioning system, it will only be necessary to run "calibration checks" as the conditions of testing will be more stable. In other words, it is not necessary to change systematically the settings of the machine. In practice, if these "calibration checks" are ok ("pass"), then the testing of samples can directly begin with the certitude that the machine is properly set. If the "calibration check" fails, then the normal calibration procedure starts, it changes the settings of the machine because it is necessary, and then the testing of samples can begin in confidence.

UNICOTTON is used to analyse samples for research purposes (test for breeding programmes, round tests ...). According to the ginning experiment, no specific sample preparation will be required as many samples will be taken, and the normal research protocol will be performed on samples (4 micronaire + 4 length/strength + 4color/trash measurements per sample).

3.1.7 - Preparation of the data collection for the ginning experiment / expertise for 13 gins

I was able to show to Jean-Luc Chanselme and Bruno Zarro a way of collecting the data from various measuring instrument files and to group them in an Excel file for statistical analysis.

Excel allows the opening of TXT files as produced by HVIs or AFIS, and the repartition of the information in to various columns.

Here is a schematic (Figure 12) on how we proceeded in this case.

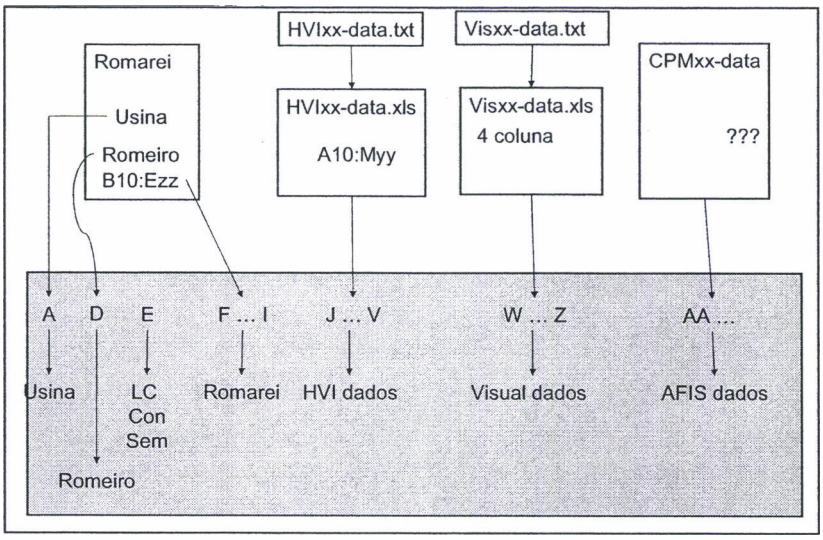


Figure 12: Schematic of the construction of an Excel file with instrument TXT files.

This data was acquired on the basis of the following sampling (Tableau 1).

Tableau 1: Liste des échantillonnages généralement réalisés dans l'expérimentation de 13 usines.

Pour chaque module et pour chaque ligne d'égrenage	Caractérisations		
	CMI Nb échantillons / Nb mesures par éch	Visual Nb échantillons	AFIS Nb échantillons / Nb mesures par éch
Avant lint-cleaner	1 ech 10 Mic/L/T/C/T, module testing		1 ech 3 mesures de 3000 fibres
Après lint-cleaner	1 ech 10 Mic/L/T/C/T, module testing		1 ech 3 mesures de 3000 fibres
Balles avec lint-cleaner	1 ech 6 Mic/L/T/C/T, module testing	1 ech 1 évaluation du grade	
Balles sans lint-cleaner	1 ech 6 Mic/L/T/C/T, module testing	1 ech 1 évaluation du grade	

3.2 About the protocol for the ginning experiment in Fazenda Nova (in French for Jean-Luc Chanselme and Bruno Bachelier in order to prepare their experiment)

3.2.1. Rappel de ma compréhension de l'objectif à atteindre

Une expérimentation est montée pour évaluer l'efficacité de l'amélioration du système d'égrenage, notamment sur le grade du coton fibre (pour passer de 41-4 à 31-3). L'usine de Fazenda Nova a été choisie pour cette étude. Elle dispose de deux lignes d'égrenage (ou *conjuntos*). Dans le cadre du projet, un système de pré-nettoyage PN (hot box, tour de séchage, nettoyeur incliné et stick machine) a été installé. Un *conjunto* (CJ1) est resté en l'état (seule l'humidification fibre a été coupée pour se placer dans une situation fréquente au Mato Grosso) et l'autre (CJ2) a été modernisé (un nettoyeur incliné et un *lint-cleaner* de plus grande capacité ont remplacé les anciens, ajout d'une humidification coton-graine). Plusieurs modules de coton-graine, classés dans le même type, ont été stockés pour cette étude. Un module permet de produire 18 à 20 balles.

Une première étape, réalisée sur 6 modules de type 41-4, a consisté à égrener (de façon randomisée) 2/3 d'un module avec PN+CJ1+CJ2 et 1/3 avec CJ1 seul (sans PN). Des échantillons ont été prélevés à différents endroits, en particulier avant et après le *lint-cleaner* de chacune des deux lignes d'égrenage. Certains échantillons sont analysés sur CMI, d'autres par classement visuel+CMI. Parmi ces échantillons, certains sont analysés sur AFIS.

3.2.2 - Objectifs techniques pour la caractérisation

A partir du protocole établi par Bruno Bachelier et Eric Gozé, je me permets d'apporter les commentaires complémentaires suivants.

Echantillonnage

La question est combien faut il prendre d'échantillons et où dans le système pour permettre les comparaisons prévues par Bruno Bachelier et Eric Gozé.

Je dois regarder les résultats déjà acquis dans la pré-étude sur une quinzaine d'usines pour estimer la facilité de mise en évidence de différences par ce protocole.

Pour les mesures de longueur, d'uniformité de ténacité de micronaire et de couleur, qui sont des grandeurs continues, il semble que le dispositif actuel permet de mettre en évidence des différences même avec peu d'échantillons, même pour la couleur qui est difficile.

Cependant, il s'agit de mesurer également mesurer l'impact de l'égrenage sur les résultats du Trashmeter, où des comptages d'éléments sont à la base de la mesure, et on sait la grande variabilité de ce genre de mesures.

En fonction de ce qui sera décidé comme plan d'expérimentation, on peut proposer que l'échantillonnage se passe de la manière suivante (Tableau 2) :

Tableau 2: Conseil d'échantillonnage pour les expérimentations de Fazenda Nova.

Pour chaque module et pour chaque ligne d'égrenage	Spectrum II Nb échantillons / Nb mesures par éch	Visual Nb échantillons	AFIS Nb échantillons / Nb mesures par éch
Avant lint-cleaner	1 ech /balle, avec prélèvement unique (pas de petites pincées) 2 Mic 4 L/T/C/T, module testing 3 répétions		1 ech /balle, avec prélèvement unique (pas de petites pincées) 3 mesures de 3000 fibres
Après lint-cleaner	1 ech /balle, avec prélèvement unique (pas de petites pincées) 2 Mic 4 L/T/C/T, module testing 3 répétions		1 ech /balle, avec prélèvement unique (pas de petites pincées) 3 mesures de 3000 fibres
Balles avec lint-cleaner	1 ech[1] /balle 2 Mic 4 L/T/C/T, module testing 3 répétions	1 ech[2]/balle 1 évaluation du grade	
Balles sans lint-cleaner	1 ech[3] /balle 2 Mic 4 L/T/C/T, module testing 3 répétions	1 ech 1 évaluation du grade	

3.2.3 - Codage sur 14 caractères pour les codes barres

Un exemple de codage par code barre sur fichier Excel (Figure 13) a été proposé pour préparer les étiquettes à accoler sur les échantillons collectés pendant l'expérimentation égrenage.

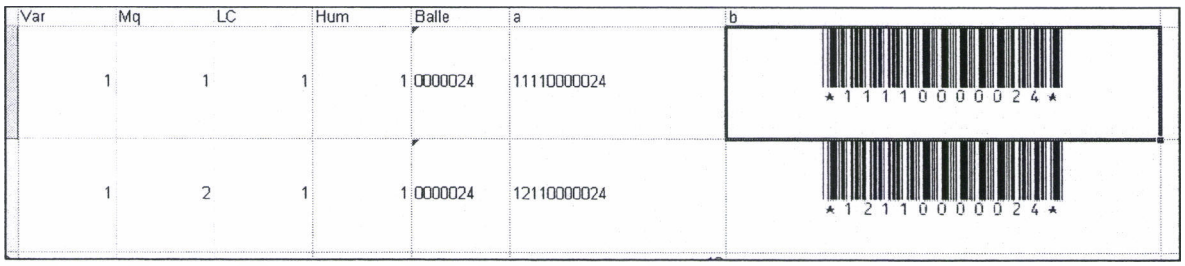


Figure 13: Exemple de code barre sous Excel.

[1] 1 échantillon = collection de fibres prélevées des deux côtés de la balle.
[2] 1 échantillon = collection de fibres prélevées des deux côtés de la balle.
[3] 1 échantillon = collection de fibres prélevées des deux côtés de la balle.

3.3 Information about CSITC

The CSITC (Commercial Standardized Instrument Testing for Cotton) Task Force was created in 2003 by the International Cotton Advisory Committee (ICAC) to reply to a request from the trade. The observation was made at that time that only / already 30% of the cotton was classed based on instrument testing results, and this situation was inducing some misunderstanding in the trade according to cotton quality and prices.

The CSITC Task force made some proposals that are presented in Annex 1. In summary, the goal of the recommendations is to favour the use of instrument in a normalized way, using standards procedures in order to ensure that all results would be alike on the same cotton worldwide. In order to ensure that the laboratories work properly, a system of "certification" would be created along with a specific international round trial able to check both precision and accuracy.

In the Annex 1, I also attach some ideas of organization that are not discussed already. These ideas are made possible by our involvement in the construction of a Common Fund for Commodities project in cooperation with ICAC, Faser Institute Bremen (Germany), and partners in Africa. Indeed, this project will be in charge to apply CSITC recommendations in the specific conditions for Africa.

In the discussion at the end of the presentation, it was also mentioned that many countries are going toward an instrumental classification during the last years: Brazil, China, Uzbekistan, Australia, Africa. However it has to be insured that everybody goes in the same directions in terms of testing, procedures, calibrations, conditions of testing (climate control ...), personal training ...

This presentation was then designed to bring new information about worldwide classing, in order to lead seminar participants to discuss about future actions. These discussions will lead to prepare a new FACUAL project for the next years.

Importance of retest and round tests in Mato Grosso: As seen above, the "certification" system planed by CSITC is organize around a new round trail to be organized on a periodic basis (quarterly for instance). The same type of round-test, with a higher frequency, can be organized in Mato Grosso so as to insure a common image of cotton quality and cotton characterization quality for this state. However, these round tests are only proving that laboratories are able (or not) to perform well at some particular moments in the year, and it does not insure the customers that the laboratories are performing well on a daily basis.

To insure this last point, meaning that a laboratory is efficient every day, it is necessary to include a new procedure: every day of testing, this procedure is consisting in selecting random samples already measured that day on all available machines (minimum 1% to 10 % when necessary), and retest them as a group of samples by another operator, another machine which will considered as the "master" instrument. As soon as the retests are performed, a careful look to the data will indicate the level of reproducibility in the measurement in that given laboratory. This procedure may also consider selecting random samples from all laboratories in Mato Grosso, samples to be sent and to be retested by one laboratory considered as the "master" lab every day. Technical advises and recommendations will be sent back for homogenizing the Mato Grosso levels of reading. This level will not be different from the World one level, as the "master" lab will have to participate to the same kind of procedure at the worldwide level.

The conclusion of this report shows the possibility for a funded proposal for the next year project according to building-up such a network of laboratories in Mato Grosso.

4 - Conclusion and proposal for future actions

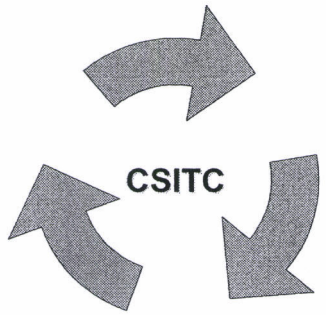
(prepared in cooperation with Jean-Luc Chanselme and Bruno Bachelier)

Situation	Origins	Priority	Proposed solutions
Ambient air characteristics are heterogeneous in the time and in the volume in the laboratory	No efficient temperature regulation. RapidCon in not good conditions caused by presence of water in the compressed air (presence of oxydation on air-cylinders, and the regulation valve for cold water in RapidCon as well as in electro valves), avoiding a proper control of air and sample conditioning	1	Adapt the protocol of testing in the framework of the ginning experiment to limit the incidence of conditioning problems on fibre characterization results (3 repetitions of 4 measures during the time per sample, calibration every 2 hours, test of reference material as samples). Testing of ginning experiment with Spectrum, to measure Moisture Contents in the samples, and measure the actual air characteristics in the room at the moment of the test for any individual measurement. Efficiently remove water from the compressed air (improve the efficiency of the water/air separation). Replacement of the rusted RapidCon parts. Improve the insulation of the laboratory (walls and ceiling). After repairs, control the efficient functioning of the RapidCon for the room and for the samples.
		2	Envisage and study of an independent conditioning system from the RapidCon (taking into account the characteristics of Carrier system). Install the new conditioning system (water distribution, temperature and relative humidity regulations, so as it becomes independent from the existing system Install 6 efficient air-vents (able to evenly distribute the air in the room at comparable speed) onto the existing pipes. Move and re-install the RapidCon to the visual classing laboratory (attention to where will go the exhaust air from the RapidCon) to keep the facility of rapid sample conditioning
No existing network of laboratories in Mato Grosso	Laboratories are linked to indepedent bodies (UNICOTTON, COOPERFIBRA , Fundação Mato Grosso, Wakefield/WIS, Petrovina Sementes, SGS, etc.)	3	Information and expertise of the individual laboratories Organize a Round test and retest o samples in MT Creation of procedures, preparation and expedition fo samples, data analysis and technical recommendations, training of one person Development or utilisation of a software for data analysis Study the feasibility of ISO 17025 in the MT laboratories
No instrumental grading of the seed-cotton before ginning	No existing rapid instrument	4	Develop / use imaging system such as CATI/Trashcam to characterize seed-cotton in relation with low-speed seed-cotton "fractionator"

Annexe 1
Slides presented in front of the UNICOTTON Board Members

Princípios originais desenvolvidos por CSITC (novembro 2003)

1



Commercial Standardization of Instrument Testing of Cotton

2 **Padronização comercial da clasificação do algodão com instrumentos**

Proposta para as ações futuras a respeito da padronização comercial de teste do algodão com instrumentos (CSITC)

Painel de expertos - International Cotton Advisory Committee

3

ALVOS e OBJETIVOS

Medição do algodão com métodos e procedimentos padronização ao nivel mundial

Pré-requisitos:

- Confiabilidade
- Econômico
- Prático
- Para a comercialização
- Arbitragem

4

ALVOS e OBJETIVOS

Medição do algodão com métodos e procedimentos padronização ao nivel mundial

Ações

1. **Definição das especificações para o negócio do algodão**
2. **Definição das regras internacionais**
3. **Execução das regras**
4. **Certificação dos laboratórios**
5. **Padrões da calibração**
6. **Especificando limites de controle comerciais para o negócio**
7. **Procedimentos de arbitragem**

5

1. Definição das especificações para o negócio do algodão

Recomendação do painel de expertos do CSTIC– Estágio Inicial

- Micronaire
- Resistência
- Comprimento (UHML)
- Uniformidade do comprimento (UI)
- Cor (Rd e +b)

AÇÃO:
Recomendação : Amostras 10% a 100%, média do fardão, *etc.*

6

2. Definição das regras internacionais do teste

AÇÃO :

- Métodos de teste controlados e padronização a ser baseados sobre:
  - ASTM D5867 Standard Test Method
  - USDA Guideline for HVI Testing
  - ITMF HVI User Guide
  - Other International HVI Working Groups
- Proposta para regras internacionais de teste
- Acordo em regras
- Aprovação das regras de teste

7

3. Execução das regras

Pré-requisito: Aceitação pelos produtores, vendedores do algodão, fiação e industria textil

- Inclusão das regras em Regras do Negócio do Algodão
- Procedimentos de organização para o sistema de certificação nas regras do Negócio do Algodão
- Associações do algodão a ser consultadas:
  - American Cotton Shippers Association,
  - Belgian Cotton Association, Gent, Belgium
  - Bremer Baumwollbörse, Bremen, Germany
  - East India Cotton Association, Mumbai, India
  - Zdynia Cotton Association, Gdynia, Poland
  - International (former Liverpool) Cotton Association, Liverpool, UK

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4. Certificação dos laboratórios

AÇÃO

- Execução de um sistema certificado de classificação do algodão
  - Centros de formação internacionais o nacionais certificados, controlando parte ou todos os instrumentos na região
    - Realizar inspeções regionais
    - Realizar inspeções centrais aleatórias
  - Criar centros nacionais ou regionais para:
    - treinar para testar
    - treinar na calibração
    - fornecer um serviço de manutenção

CSITC

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4. Certificação dos laboratórios

AÇÃO

- Execução de um sistema certificado de classificação do algodão
  - Centros de formação internacionais certificados, controlando todos os instrumentos
    - Realizar inspeções regionais
    - Realizar inspeções centrais aleatórias
  - Criar centros nacionais ou regionais para:
    - treinar para testar
    - treinar na calibração
    - fornecer um serviço de manutenção

Sob discussão

CSITC

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4. Certificação dos laboratórios

AÇÃO (CONTINUADO)

- Determinação dos procedimentos da certificação
- Certificação de acordo com os limites de controle
- Entrega ou retirada dos certificados
- Diversas estruturas envolvidas com a certificação do sistema e dos procedimentos
  - Faserinstitut Bremen e.V., Bremen, Germany
  - ITMF Committee on Cotton Testing Methods – HVI WG
  - CIRAD, Montpellier, France
  - USDA – ARS, SRRC, New Orleans, USA
  - Wakefield Inspections
  - SGS

CSITC

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4. Certificação dos laboratórios

AÇÃO (CONTINUADO)

- Determinação dos procedimentos da certificação
- Certificação de acordo com os limites de controle
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  - USDA – ARS, SRRC, New Orleans, USA
  - Wakefield Inspections
  - SGS

Sob discussão

CSITC

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5. Padrões da calibração

AÇÃO

RESPONSÁVEL : USDA

- Definição dos padrões válidos da calibração
- Controle da seleção dos padrões
- Período definido de validade para jogos de padrões definidos
- Preparação dos padrões da calibração:
- Fornecimento de padrões da calibração a todos os laboratórios certificados

CSITC

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6. Especificando limites de controle comerciais para o negócio

AÇÃO

- Acordo sobre as razões das variações em resultados de teste:
  - Variações nos resultados dos fardinhos individuais (causadas pelo próprio algodão)
  - Variações nos resultados dos fardinhos de um lote (causado pelo próprio algodão)
  - Variações causadas pelo método de teste (repetibilidade)
  - Desvios entre laboratórios (repetitividade)
  - Variação dependendo do número das medidas por a amostra.

CSITC

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6. Especificando limites de controle comerciais para o negócio

AÇÃO

- Acordo sobre as razões das variações em resultados de teste:
  - Variações nos resultados dos fardinhos individuais (causadas pelo próprio algodão)
  - Variações nos resultados dos fardinhos de um lote (causado pelo próprio algodão)
  - Variações causadas pelo método de teste (repetibilidade)
  - Desvios entre laboratórios (repetitividade)
  - Variação dependendo do número das medidas por a amostra.

Sob discussão

CSITC

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6. Especificando limites de controle comerciais para o negócio

AÇÃO

Acordo

- Que existe variação entre instrumentos e condicionar das amostras, que requerem alguma tolerância de limites de controle para o negócio do algodão.
- O índice de umidade no algodão varia com alteração nas temperaturas.
  - Aumente na resistência do algodão com aumento da sua umidade
  - Outras características são menos afetadas com as variações aceitáveis nos limites de controle comercial
- Desenvolvimento de um instrumento autônomo, calibrando-se sozinho, com um controle do clima interno, sem nenhuma intervenção do operador

CSITC

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6. Especificando limites de controle comerciais para o negócio

AÇÃO

Acordo

- Que existe variação entre inst... e condicionar das amostras, que requer... ...erância de limites de controle n... ...o algodão.
- O índice de u... ...dão varia com alteração nas temp...
  - Aume... ...ência do algodão com aumento da sua umidad...
  - Outras características são menos afetadas com as variações aceitáveis nos limites de controle comercial
- Desenvolvimento de um instrumento autônomo, calibrando-se sozinho, com um controle do clima interno, sem nenhuma intervenção do operador

Sob discussão

CSITC

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6. Especificando limites de controle comerciais para o negocio

AÇÃO

- Estabelecer a escala e as tolerâncias para estas 6 características básicas
- Introduzir o software para corrigir os resultados baseado em variações na climatização pela medida de temperatura / umidade ou do índice de umidade.
- Quantificar as variações diferentes baseadas sobre:
  - Bremen and USDA Round Tests results
  - Na literatura
  - Round Tests específicos por outras organizações

CSITC

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6. Especificando limites de controle comerciais para o negocio

AÇÃO

- Estabelecer a escala e as tolerân... ...ara estas 6 características básicas
- Introduzir o softwa... ...os resultados baseado em variaçõ... ...ção pela medida de tempera... ...ue ou do índice de umidade.
- Quantifica... ...as variações diferentes baseadas sobre:
  - Bremen and USDA Round Tests results
  - Na literatura
  - Round Tests específicos por outras organizações

Sob discussão

CSITC

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7. Procedimentos de arbitragem

AÇÃO

- Tratar variações entre instrumentos, fora das tolerâncias concordadas entre o comprador e o vendedor na mesma maneira que com a classificação visual
- Amostra a ser coletada e emitida ao centro aprovado para a arbitragem identificado no contato, por exemplo Liverpool, Bremen ou Gdynia.
- Os resultados publicaram a maneira idêntica que existe para a classificação visual, diferenças estabelecidas do valor a aplicar-se, custo por conta do perdedor.

CSITC

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7. Procedimentos de arbitragem

AÇÃO

- Tratar variações entre instrumento... ...a das tolerâncias concordadas entre o compra... ...edor na mesma maneira que com a cl... ...al
- Amostra a ser ... ...ada ao centro aprovado para a ar... ...icado no contato, por exemplo Liverpoo... ...ou Gdynia.
- Os resultados publicaram a maneira idêntica que existe para a classificação visual, diferenças estabelecidas do valor a aplicar-se, custo por conta do perdedor.

Sob discussão

CSITC

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CONCLUSÃO

AÇÃO

- Motivação do apoio político à utilização do CSITC no negócio do algodão
- Apoio por produtores, vendedores e indústria têxtil
- Acordo nas ações futuras
- A participação dos laboratórios envolvidos
- Incentivo àqueles participantes para empreender sua parte
- Provisão dos fundos onde requerido pelos responsáveis.
- Aproximar o CFC e governos nacionais para o apoio financeiro.

CSITC

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Outros comentários / propostas gerais

Por Dr. Jean-Paul Gourlot

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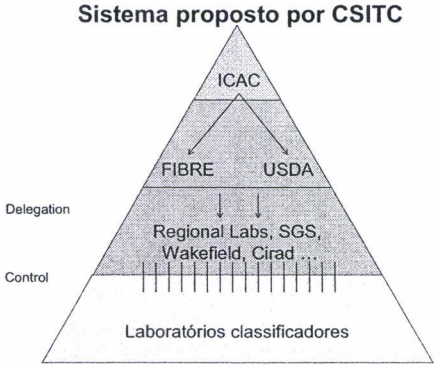
Sistema proposto por CSITC



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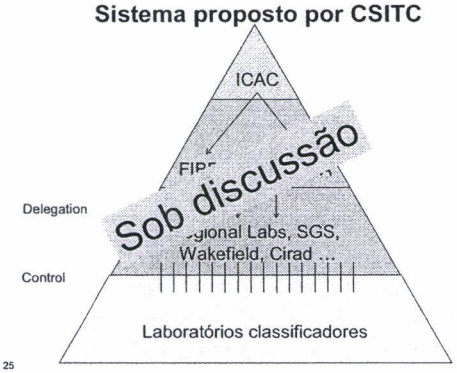
Sistema proposto por CSITC



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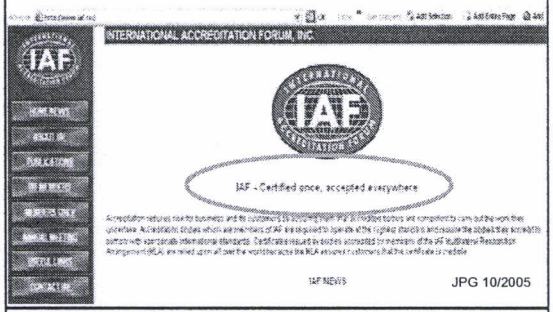
International Accreditation Forum



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Tópicos principais do ISO 17025

- O domínio
- Referências
- Termos e definições
  - Organização
  - Sistema de qualidade
  - Documentação necessário
  - A revisão, exames, acordos, reivindições...
  - Ações de correção, manejo dos documentos

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Tópicos principais do ISO 17025 (...)

- Prescrições técnicas
  - Pessoal
  - Circunstâncias climáticas
  - Métodos
  - Equipamentos
  - Rastreabilidade
  - Amostragem, calibração e testes
  - Relatórios dos dados

O centro do sistema a preocupar-se EM PRIOREDADE

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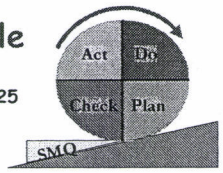
Exemple



Plan : Certification ISO 17025 (QQOQCP)

Do : Procedure description

: Training

: Answer the demands of the standard

Check : Check the progress (conformity, efficiency?)

Act : Corrective actions

: definition of the next steps

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Sobre o sistema do ISO

- Se nós desejamos provar a disponibilidade dos resultados no prazo, ISO 9001 é preferida
- Se nós desejamos provar resultados para o marketing baseado em características da fibra, a estrutura do ISO 17025 é preferida

Este parece ser mais sobre nosso objetivo principal...

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Como um sumário gráfico

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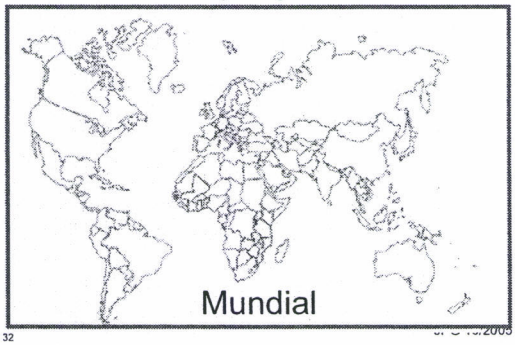
Nivel da aplicação : CSITC



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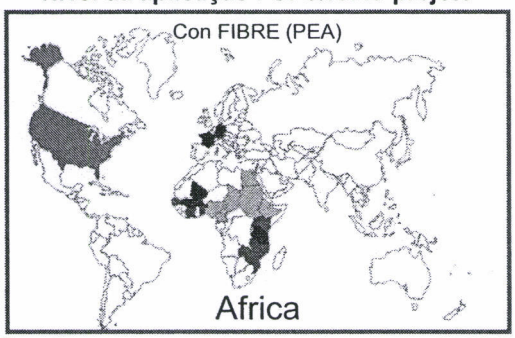
Nivel da aplicação : CFC/ICAC projeto



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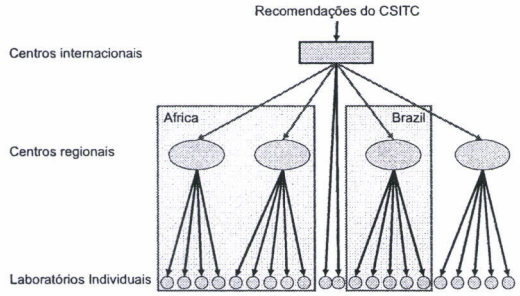
Treinamento/apoio/perícia/Round Test Regional"



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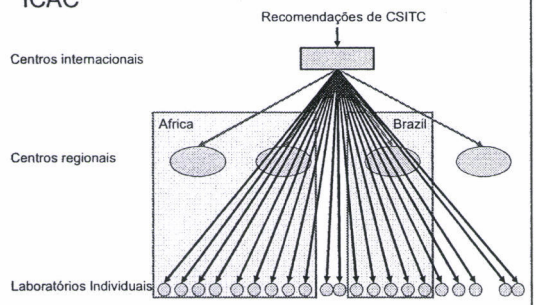
"Round Test internacional e certificação por ICAC"



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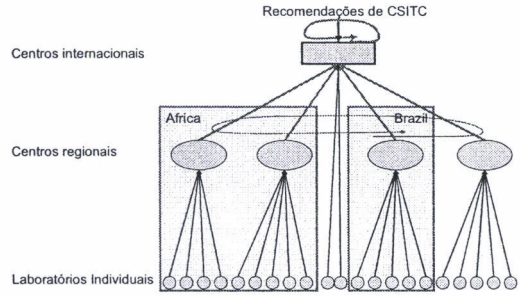
Contra-prova



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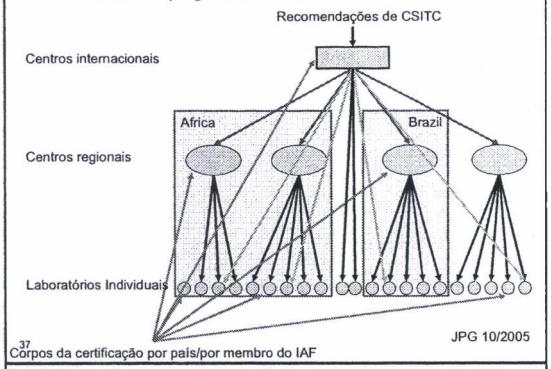
Auditos (algodão e referencia do ISO)



37 Corpos da certificação por país/por membro do IAF JPG 10/2005

Official information

http://www.icac.org/csitc/english.html

Obrigado por sua atenção

Toda pergunta sera muito bem vinda

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