

Contamination, Trash and Moisture Control in Ginning & Pressing Factories

Paper by Dr. M. K. Sharma, President, Bajaj Steel Industries Limited, Nagpur, India.

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Preface

The contamination, trash and moisture contents of the cotton and their effects have always been a matter of great concern for the cotton users. Despite centuries of research and volumes of written work the effective control on contamination trash and moisture could not be exercised. Several questions still remains to be answered, some of which are:

1. When all the factors contributing to addition of contamination are identified and lots of efforts are being taken to reduce the same why the contamination in the cotton is on increase?
2. Will it be viable in long term for spinning mills to make huge investments for removal of contamination at various levels such as at blow room by contamination sorters, vision shield or manual sorting, at carding and comber by cotton contamination analyzer, at draw frames and lappers by BMS vision Sliver Watch System, at winding by using electronic contamination clearing channels or UV lights etc.?
3. Whether it is really handpicking and related practices responsible for increased contamination and trash in the cotton?
4. Whether the addition of extra moisture in seed cotton is beneficial and why the practice of addition of moisture even above 15% is increasing day by day?
5. Whether the spinning mills should pay higher for cotton having lower contamination, trash and moisture contents or they should handle the same in their premises only? etc.

It is even become increasingly necessary to analyze why such increase in contamination in cotton is taking place and whether the present scenario of contamination, trash and moisture in cotton will be sustainable in long run?

Contamination:

As per International Trade Centre, "broadly extraneous contamination in cotton bales can be classified in to two groups: Fibrous and Non-fibrous contaminants.

Fibrous contaminant consists of:

- a) Human hair
- b) Animal hair
- c) Yarn pieces
- d) Cloth pieces
- e) Polypropylene fibres or strings
- f) Jute, ramie, hemp
- g) Plastic strings
- h) Long bark and weeds
- i) Bird feathers

All these contaminants disintegrate into tiny pieces in the process of ginning and carding. They have almost the same buoyancy as the cotton, so it is difficult to separate them from cotton. As they are fibrous, they are easily twisted into the yarn body. Thus, fibrous contaminants are the worst component of extraneous contaminants. No chemical process can remove polypropylene and hair contaminants from yarn and fabrics. It is expensive to extract these contaminants from woven cloth, and they cannot be easily removed from knitted fabrics or garments as there is danger of causing holes.

Non-fibrous contaminants include:

- a) Paper, mint wrappers
- b) Cables
- c) Cartons
- d) Wood
- e) Stones
- f) Metallic wires
- g) Nuts and bolts, nails
- h) Parts from ginning machines
- i) Rubber
- j) Leather
- k) Tin
- l) Insects

These are somewhat easier to remove in the spinning process. However, they can cause damage to machine parts.

The quantity or weight of extraneous contaminants ranges from 2 to 100 grams per ton depending on the origin. Fibrous contaminants form about 65%–90% of total extraneous contaminants.

The quantity of contamination per ton of raw cotton seems very small in terms of weight. However, contamination is counted in cloth by frequency, not by the weight of the contaminants. One gram of fibrous contamination in a ton means 0.001% by weight, but this may equate to about 15,000 individual fibres (assuming an average length of 2 cm and denier of 10.0 for these fibrous contaminants)! The lighter the fibrous contamination, the greater the number, and hence higher the defects in the fabric".

Apart from above oil, grease is also serious contaminants.

As per the press release of Summary of Survey Results 2013 by International Textile Manufacturers' Federation (ITMF) the level of cottons moderately or seriously contaminated as perceived by the spinning mills from around the world rose from 23% to 26% as compared to last survey in 2011.

The most contaminated cotton descriptions considered for the survey originated in India, Zambia, Pakistan, Tajikistan, Uzbekistan and China in contrast very clean raw cottons were produced in USA, Spain, Australia, Brazil, Togo and Benin.

From the description of Fibrous and Non-fibrous contaminants mentioned above it may be seen that accept human hair and one or two other type, none other directly related to handling by the human. Further, the contaminants are surveyed at cotton lint level only hence it is not known as to what were the contamination levels in the seed cotton at the time of arrival in the ginning factory for handpicked or machine picked seed cotton. The countries which are termed as having clean cotton are mix of handpicked and machine picked cottons however only one similarity has been observed that most of the countries having lower contamination are using pre and post cleaning and modern ginning machinery while in the higher contamination countries the proper cleaning machinery in the cotton ginning & pressing factories are not used.

We may even observe that in the countries where seed cotton is machine picked due to contaminants being getting mixed in the modules, the initial trash and contamination are much higher as compared to handpicked cotton however in those cases the final contamination level is lower when ginned in proper setup of cleaning machines while the handpicked clean cotton is observed having higher trash and contamination due to poor cleaning setup.

We must also change our mind set that cotton being natural fibre is bound to have some contamination as contaminants are not being grown with cotton in the tree these are added during picking and storage etc. and removal / control of the same is certainly possible if the proper cleaning methods are followed.

It is always best to control the contamination at its origin and all the efforts should be made to educate the large number of people involved in picking, handling and storage of seed cotton and control the contamination levels at origin, but it is not appropriate to just wait for development of understanding at these levels as it is very difficult to control such large number of people therefore, necessary actions should be taken to remove the trash and contamination at cotton ginning and pressing factories which is certainly a control point and easiest and cost effective as contaminants are easily removable prior to their fibrillation in the ginning process. As a matter of fact it is most cost effective and lowest time taking if these contaminants are removed at the level of pre-cleaning by simple methods of removing of trapped contaminants from spiked pre-cleaners. The spiked pre-cleaners may be stopped for a minute after every interval of one hour or so and the contaminants trapped on the spike are manually removed. The further contaminants will again get trapped and such frequent removal may enable removal of majority of contaminants at this level itself, finally resulting in much lower contamination levels in the cotton bales however majority of the ginning factories are **not** willing to do this at this stage for the various reasons, some of which are as below:

- i. At the time of purchase of cotton spinning mills do not make contamination as a parameter for purchase of cotton and only length, micronaire, moisture content and trash content are mainly considered, even RD value and short fibre contents are also not discussed at this stage therefore ginner is least bothered for level of contamination and RD value etc.
- ii. Though initial trash in countries where cotton is handpicked is lower than 2% in majority of varieties and initial moisture is lower than 6% as against normally permitted higher level of trash and moisture by the spinning mills such as 4-5% trash contents and 8-9% moisture contents considered by Indian spinning mills for acceptance of cotton, the traders and ginners are tempted to add moisture and resultant trash to add the weight to get the highest margin up to the acceptable levels of trash and moisture by the mills. In this process of addition of trash and moisture the contaminants are also considered as weight and no efforts are made by most of the ginners to remove them as being considered as creating shortage in the weight of cotton.
- iii. Purchasers of cotton appointed by spinning mills think that the contamination shall be removed in the processes of spinning such as blow room, carding, winding, etc. hence they do not give due weightage to this aspect despite a fact that the cleaning of contaminants is the most costliest process in the spinning mills and none of the machines used for removing the contaminants can remove all the contaminants.
- iv. Since the spinning mills do not consider the contamination as a parameter for purchase of cotton and accepted levels of trash, and moisture are on higher level the ginner do not take up this with the traders or farmers strongly hence they also adopt a casual approach to contamination issue, finally resulting in higher contamination.
- v. In the USA the United States Agricultural Department (USDA) takes sample of each bale of cotton and publishes quality data based on which cotton is traded. This regulatory control enforces the best ginning practices and results in lower contamination cotton. In absence of such regulatory setup in several other countries, ginners do not give due importance to proper cleaning.

There are several other factors which discourages control or removal of trash or contamination at ginning factory level, mainly in the ginning and pressing factories where handpicked cotton is ginned and gentle or less number of cleaning machineries are installed as against higher number of cleaning machineries in the ginning and pressing factories where machine picked cotton is ginned. In the process of cleaning trash and some contaminants get removed hence the machine picked cotton is found with lower trash and contamination, however if proper cleaning is used for the hand picked cotton in ginning and pressing

factories the same will certainly have the lower contamination and lower trash with the advantage of better fibre parameters but this is only possible when the ginner gets encouragement to remove the trash and contaminants and not to add excess water.

Though it is well known to the spinners that contamination even if it is a single foreign fibre can lead to down grading of yarn, fabric or garments or even the total rejection of an entire batch and can cause irreparable harm to relationship between growers, ginner, merchants, textile mills and consumer, the sufficient considerations are not given at the time of purchasing of cotton to this parameter.

A study conducted in Pakistan estimates that contamination of cotton is responsible for an annual loss of US\$1.4 billion to US\$3 billion in export earnings and the study conducted at Indonesia shows that the cost of manual cleaning for sorting contamination alone is estimated at 3.1 to 4.4 US cents per kg. of lint depending upon the level of contamination.

In view of importance of the contamination removal suggestions for the spinning mills and cotton trade in general will be made in later part of this paper.

Trash:

Trash commonly comprises of leaves, bark, grass, sticks, particles of sand and dust, these items are normally removable by cleaning methods at seed cotton and lint by using different cleaning equipments such as inclined cleaners, horizontal cleaners, stick removal machine, impact cleaners and lint cleaners etc. The number and type of cleaning machines will depend upon the quantity of trash present in the seed cotton however it is a pre-condition that the trash can be effectively removed only when the moisture contents in the cotton are within the recommended parameters of below 8% and the ginning factories are using the cleaners to remove the trash. In the normal practice when the trash contents are within the permissible percentage by the spinning mills ginner do not tend to use the cleaning machines as they lose money due to weight loss and in absence of proportionate premium for lower trash contents in cotton they are not willing to do so. Moreover, when the moisture contents are higher and ginner do not use dryers hence it becomes difficult to remove the trash from the cotton. The non removal of trash at origin at the most of the ginning factories is a loss at later stages due to unnecessary transportation cost and higher cost of removal at spinning mills.

Moisture:

The recommended moisture contents in the cotton for proper cleaning, better fibre parameters and ease of ginning in the ginning factories is 7-8%. The addition of moisture up to extent of 11% in the seed cotton may give better fibre parameters and ease of ginning but certainly is not good for removal of trash and contamination hence at ginning level the moisture content should be added only up to 8% before cleaning if the incoming moisture contents are lower, however a large number of ginner in different countries prefer to have higher moisture content to add the weight, which finally results in higher trash and contamination as the cleaning effect is not proper. In view of this there is a need to either control this practice by commercial methods or by regulatory methods.

Combined Effect of Higher Moisture Content, Trash and Contamination:

The cotton is under constant threat from artificial fibres and presence of contamination is one of its main weaknesses. If this is not controlled at the origin or at the most at cotton ginning and pressing factories, it will have a very serious impact on the whole cotton industry in the long run as it will be costlier for spinners to invest in expensive electronic equipments and still running a high risk in spinning cottons and its blends due to rejections and defects, hence the spinning of artificial fibre and its blends may be preferred. Thus all the stake holders must take necessary steps to control this situation, particularly spinning mills who are most affected should create conditions where ginner are compelled to use cleaning for trash and contamination and produce clean cotton as per acceptable parameters which is

certainly possible by use of cleaning equipments and methods. The higher moisture contents lead to non removal / addition of trash and contamination hence must be controlled. All the efforts should be made that the contamination levels are controlled below 1 gram of fibrous contaminants per ton of raw cotton bales.

The Suggestions to Control the Situation:

1. Since the majority of ginners in various countries are not encouraged to use the adequate cleaning equipments and control the moisture contents as they are not getting proportionate premium from the spinning mills such as if against the accepted trash level of 5% and moisture content of 8% ginner supplies the cotton of 2% trash content he should get 3% premium for lower trash hence for a bale of cotton costing say about US\$ 350, the ginners should get extra US\$ 10.5 for each bale for lower trash and not only consolation increase of US\$3 per bale. Similarly, if the trash contents are below 1 gram of fibrous contamination per ton of raw cotton, at least 25% of the saving in the cost of cleaning of contaminants at spinning mill should be paid to ginners for clean cotton, so that they are encouraged to clean the cotton.
2. Alternatively the initial pricing parameters should be fixed at the best trash contents such as at 1% so that initial price is higher and if the ginner sells the cotton with 4% trash, 3% deduction should be made. As the mills may prefer making the deductions rather than paying proportionate premium and inadequate premium is not solving the problem. The variety wise price as being fixed may just have the consideration for lowest trash percentage and best contamination levels and fix the corresponding higher price which will certainly be beneficial to spinning mills in real sense as they will get better realization and reduced cost of cleaning and to put a challenge before ginners to bring down the trash and contamination contents to the lowest.
3. In case spinning mills are not able to control market mechanism and introduce additional parameters they should themselves go for backward integration and establish their own ginning and pressing factories for their needs and maintain best quality parameters to get the quality cotton for their spinning needs.
4. All the countries should introduce American USDA type arrangements for taking appropriate sample from each bale of cotton and publish quality parameters based on which the prices and trading should take place.
5. The government guidelines may be published for best ginning practices and acceptable cotton parameters and mechanism should be devised for implementation of the same.

Conclusion:

With the brief discussions and observations mentioned above, it may be understood that if proper drying and cleaning practices are used in cotton ginning and pressing factories the contamination, trash and moisture levels can be brought down to acceptable levels however there is urgent need to adopt either commercial or regulatory methods as mentioned in the suggestions above or other similar methods to encourage / implement the best ginning practices to achieve this, which in turn will result in lowest contamination and trash in the cotton and lead to sustainability of the cotton as preferred fibre for spinning in the long run.
