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Cotton innovation

Developing cotton quality innovation analysis tool.

2009

KNOWLEDGE FOR LIFE



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1.0- Introduction

Pakistan is the fifth largest producer of cotton in the world, the third largest exporter of raw cotton, the fourth largest consumer of cotton, and the largest exporter of cotton yarn. About 1.3 million farmers (out of a total of 5 million) cultivate cotton over 3 million hectares, covering 15 per cent of the cultivable area in the country. Cotton accounts for 7.3 percent of the value added in agriculture and about 1.6 percent to GDP. About 30-40 percent of the cotton ends up as domestic consumption of final products and the remaining is exported as raw cotton, yarn, cloth and garments. The cotton value chain management has an origin in cotton crop. The time has come to place higher priority for raising the standards in cotton quality rather limiting or concentrating the approaches for increasing the yield. It is an ironic fact that despite notable increase in the production of cotton over the years, the quality of cotton has been declining. One of the reasons for low per unit returns from the export of cotton and cotton products is due to the fact that Pakistani cotton products are labelled as low quality and low priced products. Generally raw cotton in Pakistan contains more than 8 percent trash while trash in US cotton varies from mere 0.31 percent to 0.78 percent (average less than 0.40 percent). FAO has pointed out existence of high impurity content and high counts trash and moisture in Pakistan, which result in poor ranking as per international standards.

The major identified quality issues in the cotton value chain in 2008 are: high impurity content and high counts trash and moisture, poor quality, improper picking methods, adulteration of cotton with water and other material, mixed grades and seed varieties and improper packing, storage and transportation means. Farmers are not conscious of the quality of cotton. In past, cotton producers got prices 30% below international prices, eventually the emphasis of farmers has been quantity not the quality.

According to a recent study, Pakistan is projected to be a net importer of cotton due to strong domestic demand for better grades of cotton. During the first ten months of 2008-09, Pakistan imported 698,127 MT and exported 73,553 MT of cotton. Pakistan is one of the largest importers of U.S. Pima/ELS cotton for its specialized export industry. Given the need for higher-count yarns and better quality fabrics for the export market and specialized products demanded by the domestic market, Pakistan's textile industry is expected to rely increasingly on U.S. Pima cotton and contamination-free upland cotton. The textile industries often import upland cotton for their export programs due to contamination problems with local cotton, particularly with alien fibres -- mainly polypropylene and jute. The problem occurs during harvesting and post-harvesting of seed cotton. These alien fibres wreak havoc in the industry by creating yarn with different yarn strengths and dye uptake. Estimates suggest that contamination raises costs by 10 percent. Some mills have standardized their blend for export markets, with a predefined origin and percentage of imported cotton in the product (Annual Cotton report 2009 by Global Agricultural information Network).

It is imperative to develop innovative technical solutions and develop capacity of value chain stakeholders in cotton quality management issues in Pakistan. The proposed innovation system analysis tools will be developed around the above quality issues in order to address them in a contextualized fashion which takes into account vertical and horizontal innovation system factors.

1.1- Objectives of the Study

Specific objectives of the study include to:

- To carry out innovation system analysis of the stakeholders
- To develop innovative tools and procedures
- To test and validate in the context of implementing social and technical management options to address cotton quality issues.



2.0 - Methodology:

Both qualitative and quantitative approaches were employed to accomplish above stated objectives of the study. Data was collected from both primary and secondary sources. Secondary sources included government publications, world literature on the subject. Primary sources included 10 ginners, 10 beoparies and 50 sampled farmers. Views were also sought from focused group discussions. Semi-structured questionnaires were designed to interview each of these stakeholders. Questionnaires were pre-tested before their administration.

The data was collected from Multan, Bahawalpur, Lodhran and Vehari districts during the 4th week of July and 1st week of August, 2009.

Organization of the report:

This report is divided into 4 sections. Section 1 describes the role of cotton in Pakistan's economy and the problem statement, and outlines the objectives of the study. Section 2 gives methodological considerations of the study. Section 3 presents an overview of the innovation system. Section 4 present the analysis on the survey data, discusses the role of ginners, beoparies and farmers. Section 5 discusses the cotton quality innovation system analysis tool. And last section contains relevant references.

3.0- What is an Innovation System?

An innovation system can be defined as the network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect the system's behaviour and performance. Innovation systems help to create knowledge, provide access to knowledge, share knowledge, and foster learning. The innovation systems concept embraces not only the science suppliers but the totality and interaction of actors involved in innovation. In other words, the concept extends beyond the creation of knowledge to encompass the factors affecting demand for and use of knowledge in novel and useful ways (World Bank 2006b).

The socio-economic performance of a particular sector depends on the participation of many innovative stakeholders that foster the surfacing of an innovation system. However innovations frequently come up in the search for added value, a market opportunity alone is often not enough to encourage collaboration and partnerships. Coordination mechanism/ or organizations can play an important role in establishing networks when the market is not sufficiently developed to provide incentives to do so.

4.0- Ginners practices, behaviour and attitude

In total 10 owners of the ginning factories were interviewed from the four districts. Almost 100% of the ginning factories have their proper platform for seed cotton stocking but none of the factory had a proper shed and open stocking of seed cotton exposed to sun heat, dust and dew. About 20% labour of the ginning factories beat the jute bags on heap of cotton and 30% cut the twine instead of unsewing the jute bag, which cause the mixing of jute threads in seed cotton and badly impacts the quality of cotton lint. Most of the ginning factories (80%) feed the conveyers properly, however 20% gineries still use the malpractices for feeding the conveyers. 60% of the gineries use the moisture meter, a standard practices, to measure the moisture in the cotton lint to avoid heating and discolouration. About 100% of the ginning factories use the allowance



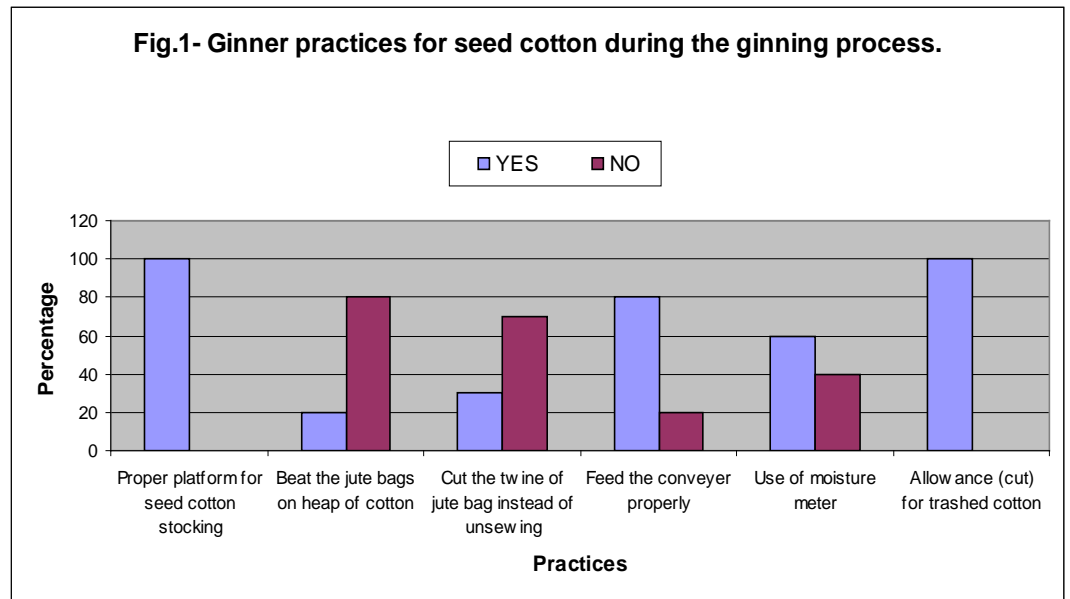
Malpractice of feeding conveyor



practices (cut) for the trashed contaminated cotton. The seller (farmer or beopari) and buyer (ginner) agree on a specific %age of trash in the seed cotton and the weight of trash is deducted from the bulk seed cotton weight. While for the quality seed cotton, this practices is not adopted and price is paid for the bulk without any deduction. The saving of deduction in quality seed cotton is considered as premium. Fig.1



Proper practice of feeding conveyer



4.1- Beoparies practices, behaviour and attitude:

A total of ten beoparies were interviewed from four districts and focused group discussion was also conducted in the market committee office in Bahawalpur district. About 100% of beoparies pay seed cotton price based on quality measured through percentage of trash, moisture and dust in seed cotton. Stocking of cotton on dry, covered, ventilated and cemented platform eliminate the risk of cotton contamination. Around 40% of the beoparies stored the seed cotton on improper places. There was behavioural temptation to stock cotton piles on wet and dirty places so that its weight increases. Although, beoparies suffer the weight loss of contaminated dirty seed cotton at ginning factory gate by the ginners.



Handling of seed cotton in jute bags and at soil by a small Beopari)



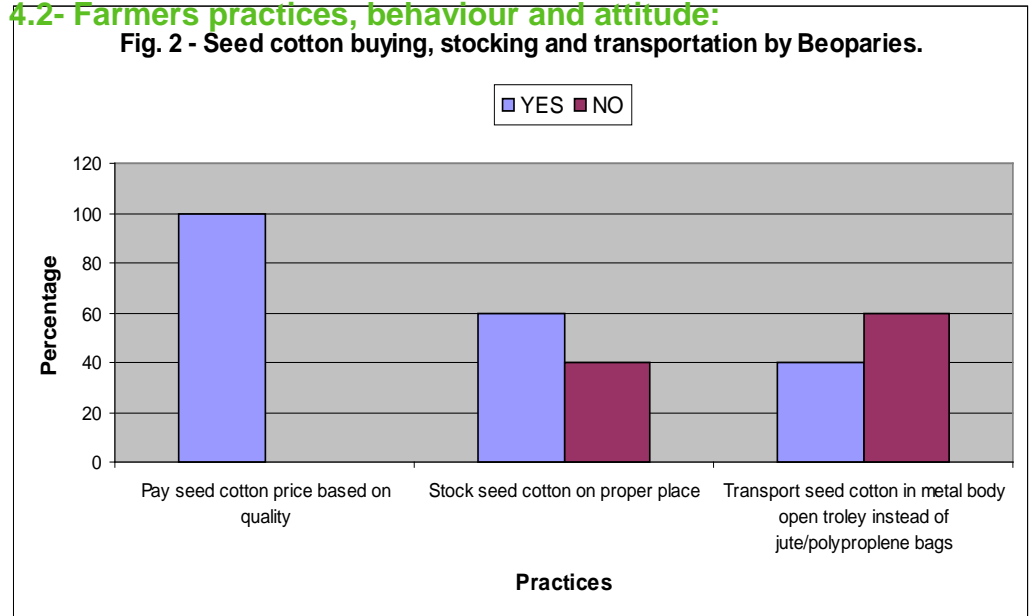
Proper transportation of seed cotton play a significant role in delivering the quality seed cotton at ginning factories. About 60% of the beoparies use the metal body open trolleys having polypropylene/jute bags sheet on the sides of trolley. The jute bag fibbers mix with the seed cotton and can not be separated while ginning process. These alien jute fibres cause havoc in the industry by creating yarn with different yarn strengths and dye uptake. The socio-economic factors involved in practicing the transportation with jute bags. The cost of tough cotton cloth for transportation is very high as compared to jute bags. Furthermore, the jute bags are easily accessible and ready to use. Fig.2



Open metal trolley with jute bags sheet on sides (Seed cotton transportation by Beopari)

4.2- Farmers practices, behaviour and attitude:

Fig. 2 - Seed cotton buying, stocking and transportation by Beoparies.



Attitude and behaviour of farmers play an important role in the decision making process for quality cotton production. A total of 50 farmers were interviewed. This information was mainly focused on the farmer behaviour and attitude towards adoption of Good Agriculture Practices during the harvest and post-harvest of seed cotton. The data reveals that 100 % of the respondents using the untrained labour (not trained by a recognized organization like Pakistan Cotton standard institute) but traditionally self trained pickers and learnt from their forefather about picking techniques. The



Female pickers cleaning seed cotton after picking on roadside

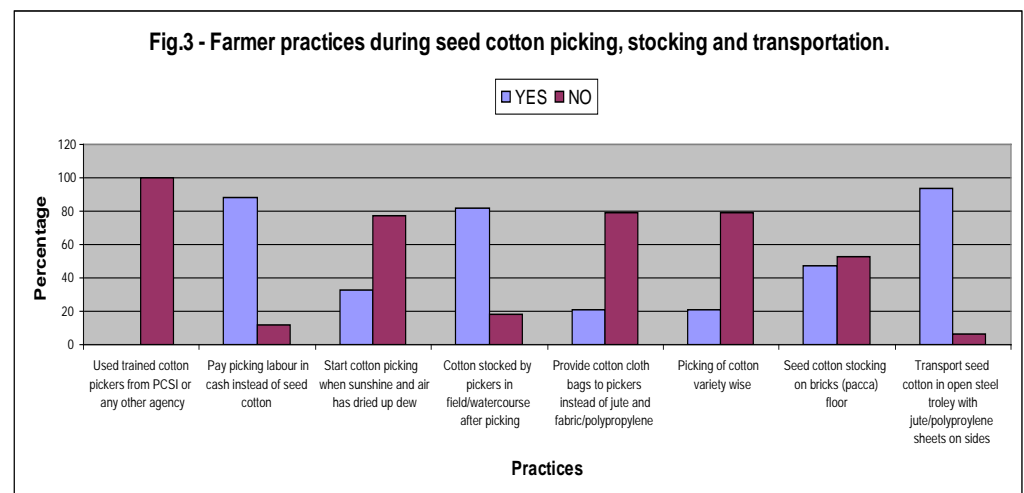


mode of payment to the pickers by the farmers also affects the quality of seed cotton. The result shows that 83% of the farmers paid picking charges to pickers in cash (Rs.100/40kg seed cotton) instead of seed cotton. The farmers considered it as an easy way to pay the charges of picking. This practice also contribute in assisting the pickers to put some water in seed cotton with water bottles and store on wet places to increase the weight as they are being paid on weight basis. Another major factor effecting cotton quality is the time of picking. It was observed that 81 % of the respondents start cotton picking before sunshine when high concentration of moisture in the cotton field. The contributing factors were; a) exclusively 100 % pickers were female and have other domestic business/ engagements like preparation of food, caring of their livestock and look after their children. Therefore, the pickers want to complete their work early in the morning. b) There is tempted behaviour of farmers and pickers to increase the weight of seed cotton to earn more. c) The non availability of pickers in the peak picking season also exploit farmers to avoid the proper timing of picking. Stock of seed cotton during picking was a major issue for quality seed cotton. Survey shows that 80 % of the respondents stocked cotton in the wet field / watercourse while 20% use the plastic sheets to stock the seed cotton to avoid the increase in moisture contents. About 80% of pickers have their own material (jute/polypropylene or polyester fabric cloth) for picking however 20% farmers provide cotton cloth/bags to pickers. Mixing of varieties affects the individualistic characteristics of a particular variety. The variety wise picking was only practiced for producing the cotton seed for the next crop or selling in the market. Nearly 80% of respondents practiced combine variety picking because there was no variety wise selling and buying system in the market. The stocking of seed cotton at farm level is also a contributing factor towards quality of seed cotton. Data shows that 54% of the respondents stocked seed cotton on kacha floor (soil) while 46% on bricks floor (pacca). Transportation of seed cotton is foremost factor in deteriorating the seed cotton quality. Almost 98% respondents use the steel/ metal open trolley having polypropylene/jute bags sheet on the sides of trolley. The jute bag fibbers mix with the seed cotton and can not be separated while ginning process. These alien jute fibres cause creation of yarn with different yarn strengths and dye uptake. The polypropylene fibbers cause a huge problem while ginning process. Fig. 3



Open metal trolley with jute bags sheet on sides
(Seed cotton transportation by farmer)

Therefore, the pickers want to complete their work early in the morning. b) There is tempted behaviour of farmers and pickers to increase the weight of seed cotton to earn more. c) The non availability of pickers in the peak picking season also exploit farmers to avoid the proper timing of picking. Stock of seed cotton during picking was a major issue for quality seed cotton. Survey shows that 80 % of the respondents stocked cotton in the wet field / watercourse while 20% use the plastic sheets to stock the seed cotton to avoid the increase in moisture contents. About 80% of pickers have their own material (jute/polypropylene or polyester fabric cloth) for picking however 20% farmers provide cotton cloth/bags to pickers. Mixing of varieties affects the individualistic characteristics of a particular variety. The variety wise picking was only practiced for producing the cotton seed for the next crop or selling in the market. Nearly 80% of respondents practiced combine variety picking because there was no variety wise selling and buying system in the market. The stocking of seed cotton at farm level is also a contributing factor towards quality of seed cotton. Data shows that 54% of the respondents stocked seed cotton on kacha floor (soil) while 46% on bricks floor (pacca). Transportation of seed cotton is foremost factor in deteriorating the seed cotton quality. Almost 98% respondents use the steel/ metal open trolley having polypropylene/jute bags sheet on the sides of trolley. The jute bag fibbers mix with the seed cotton and can not be separated while ginning process. These alien jute fibres cause creation of yarn with different yarn strengths and dye uptake. The polypropylene fibbers cause a huge problem while ginning process. Fig. 3





4.3 - Focused group discussions to analyse the cotton quality:

Picker's view point: (100% picking by females)

- Picking according to the farmer's demand as most of the farmers asks to pick cotton with trash (along with dried bolls, leaves etc.) to increase the weight of seed cotton.
- No provisions of special cotton cloth/bags to pickers by farmers. They use their own cloth and empty fertilizer bag (polypropylene) to pick the cotton.
- Pickers are paid on the basis of weight (Rs. 100/40kg of seed cotton). **This practice also contribute in assisting the pickers to put some water in seed cotton with water bottles and store on wet places to increase the weight. Picking labour on day basis or seed cotton share to pickers can enhance the quality of cotton.**
- The trashed cotton turned in to loss for pickers as the beoparies/middleman buy from them as clean cotton.
- Self trained labour as pickers from forefathers.
- Picking in the morning time as;
 - Try to buy more time for cotton picking.
 - Try to finish their job before the temperature rises.
 - They have to prepare the lunch for the family and care their children and livestock.
- Easy to pick seed cotton along with dried bolls and leaves.
- Share of cotton as labour charges of picking is appropriate for pickers.
- During peak picking season, picker like to go to farmers who wants to add trash in cotton as it easy to pick for pickers and at the same time increases the weight of cotton, which benefits to picker in the form of more labour charges.

Ginner's view point:

- Ginners use the labour to clean the seed cotton. Labour paid at Rs. 20/40 Kg.
- Some of the ginners (5%) have their own cotton selectors to check the cotton quality at factors gate
- Wet trash in cotton is a big source of contamination. When the Sawjin cut the cotton trash/wood that goes to the lint which give a specific colour to whole cotton lot and deteriorate the quality
- Vigilance at village level and awareness raising about cotton quality
- Premium can be cut by the ginners in the form of "WATTA/ALLOWANCE".
- 3050kg allowance (cut) On 26930kg lint, for low quality by the textile (3-star textile mills).
- **Enforcement of standards by law.**
- Mixing of trash and moisture is a habit of farmers.
- Beopari mix with 50:50 quality and poor quality cotton and shift (transport) at night time to ginning factories.
- Ginners mix all grades of cotton and gin to get equal staple/quality cotton.
- Textile owners send their representatives (cotton selectors) to select the cotton in ginning factories. The ginners put some money in the pocket of selectors and they select even poor quality cotton as good quality cotton for textile owner.
- Ginners fully depend on the monopoly of textile owners.
- **Ginners should call a meeting of farmers and beoparies before the start of picking season and declare quality standards of seed cotton.**
- Pest attacked cotton deteriorate the cotton quality.
- **Ginning factories should hire the services of cotton selectors and should follow the PCSI standards strictly. Pay the premium price to farmers and beoparies for quality.**
- Good quality cotton fetch high price in the market as compared to a middleman/beopari. So farmers like to sell quality cotton in market for good price.
- Trained labour is an issue in the peak picking period. Cotton pickers become short and they exploit the farmers and goes to the farmers who like to pick cotton with trash as easy to pick.
- There is difficulty for pickers to pick the bollworm attacked cotton. Pink bollworm attacked cotton is a disliked quality cotton for both beoparies and ginners.
- **Paid labour by weight did not attract pickers towards clean cotton. But paid labour by parts (in kind) of seed cotton can play a vital role in clean cotton picking.**



Farmer's view point:

- Farmers try to hire the trained labour.
- Starts early picking / short picking duration to pay the credit lend from the middle man/ beopari.
- The short picking duration contribute in low quality due to un- ripened cotton bolls.
- There is lack of premium price in the markets for quality cotton or very low premium as compare to labour.
- ***Both beopari and ginner cut the prices of trashed cotton which considered as a premium price for the quality cotton sellers but the farmers don't consider it as a premium price.***
- Cash payment to pickers benefits to farmers
- There is need to introduce incentives for pickers to maintain the quality.
- High labour cost for variety wise picking but having no benefit to farmer in market.
- Pickers prefer to pick early morning because dew increase the weight of the cotton.
- There is no financial return to farmers in case of quality cotton. All grades of seed cotton have the same price in market.
- The difference between the rate of the clean cotton and contaminated cotton is very low i.e 10-15 rupees per 40 kg, which did not encourage farmers to deliver contamination free cotton.
- ***Picker needs proper picking training.***

Pakistan Cotton Standard Institute:

- Established in 1980 through an FAO project, having mandate of establishing and implementing cotton standards.
- National cotton standards/grades developed.
- Technical capabilities for the implementation of cotton standardization system available.
- In order to encourage the instrumental classification of cotton PCSI has established 10 cotton fibre testing laboratories in the districts of Sindh and Punjab.
- PCSI is providing training to the personnel's of Public and Private Sectors in the skills of cotton classing and grading.
- PCSI in collaboration with TCP and Provincial Agriculture Departments of Sindh and Punjab is successfully implementing the clean cotton programme in the selected ginning factories of Sindh and Punjab.
- Visual classification (only for grading) for quick decision.



Beoparies view point:

- Like to buy good quality cotton as easy to sell to ginning factories.
- Transportation of cotton through trolley with polypropylene sheets on sides by farmers. ***The role of traffic police can be included in quality transportation.***
- Quality campaign by Govt. played a positive role in cotton quality (2006-2008). ***Agriculture department should appoint a quality controller in the area to raise awareness and skills among the farmers on quality issues.***
- Farmers' attitude towards adding trash will increase the weight. But actually the phenomenon is reverse. There is low price for cotton having more trash.
- ***Ginners should approach to beoparies and indicate the cotton quality.***
- There was a price difference according to variety. Bt cotton fetch low price as the lint contents are low and seed contents are high.
- The cotton with high moisture will cause cotton heat up that contributes discoloration of lint
- Two types of beoparies. One who buy cotton from farmers and did not pay premium for quality cotton (Middle man), the other one to whom farmer sell their seed cotton directly and get the premium price.
- Storage of cotton near the jut bags business in the market also a source of contamination
- No proper storage facilitates of seed cotton in the markets
- Currently cotton tax is Rs. 1 per 3700 kg of lint but in the India it is 2 %.
- Beoparai buy the trashed cotton on credit from farmers that help them in getting momentum in their business
- Beoparai buy both clean and trashed cotton and mixed to get the single grade for selling to ginners. ***Quality related laws can be enforced by PCGA.***
- ***75 % quality can be enhanced through educating the farmers***
- ***Somehow the school children can be educate in managing the quality issue while picking as they are involved as family labour.***
- ***Cotton tax can be increased to pay as premium price for quality cotton***
- Beopari give credit to farmers to buy inputs for quality cotton .production.

4.4 - Consultative meeting with cotton quality experts:

A series of consultative meeting were held with cotton quality experts to get the experts opinion for innovation options of cotton quality management (experts opinion is given in the cotton innovation analysis too).

5.0- Innovation system analysis tool for cotton quality:

Based on the survey results and the focused group discussion with different stakeholders, an innovation system analysis tool for cotton quality was developed and given in Tabel-1.

INNOVATION SYSTEM ANALYSIS TOOL FOR COTTON QUALITY

Sr. No	Issues	Effect on cotton quality	Practices causing the issue	Attitude and socio-economic barrier contributing to that practice	Existing practices to manage the issue, if available	Innovative options to manage the issue by the respondents	Experts opinion for innovation options
1	Cotton contains high concentration of trash, dust.	Discolouration of lint	Unskilled labour (child labour) for picking. Picking charges paid per seed cotton weight bases. This practice encourages pickers to add trash in cotton for weight increase to fetch more picking charges. Shortage of labour in the peak picking season that allow the picker to exploit the farmers who wants to maintain the quality. The trashed cotton is easy to pick for pickers	To increase weight. To increase labour charges as being paid by weight (This did not attract pickers towards clean cotton). The pickers try to pick more cotton by weight in less time. They utilize children as family labour. It is easy to pick seed cotton along with dried boll.	About 10-15 % of Ginners use labour to separate the trash from cotton at factory gate.	Clean cotton production campaign by GOP should be continued as previous. Capacity building of pickers along with incentives for clean picking. Mass media campaign for quality cotton. Linking farmers with the market forces (National and international buyers) for quality cotton. PCGA should enforce the ginners to implement the Cotton procurement SOPs as agreed. PCSI should develop and implement a capacity building plan of pickers, Beoparies / middle men and ginners. Cotton inspector role can be expanded at farm and market level for cotton quality control. Introduction of certification process for quality cotton grower/ farm.	Support price for quality cotton only. Capacity building of picker for clean picking. PCSI to develop and implement a quality management plan at field level. Cotton inspectors should be mobilized to check the cotton quality. Picking charges to pickers should be paid to pickers on cotton quality. Clean cotton campaign.

2	High moisture level in cotton	Heating up of cotton stock that causes discolouration. Cotton seed oil content deteriorates	Early picking before sun shine. Picking charges paid for seed cotton on weight basis. This practice contributes to assist the pickers to put some water in seed cotton with water bottles and stored on wet places in the field to increase the weight.	The pickers to buy more time for cotton picking. They try to finish their job before the temperature rises. The female pickers have to prepare lunch for their family. They try to increase the moisture content of seed cotton for increasing the weight as well.	Open stocking of seed cotton in the ginning factory	Premium price for standard moisture (8%) compared to high moisture seed cotton. PCGA should enforce the ginners to accept the standard moisture (8%) in seed cotton as agreed in the SOP. To create a market for skilled pickers through capacity building programs. Law enforcement for picking time by the cotton inspector/ agriculture extension	Premium price for the quality cotton (with 8% moisture). PCGA should enforce the ginners to reject the cotton with high moisture contents.
3	Mixing of cotton varieties	Individualistic characteristics of different varieties lost. Staple length effected.	Variety wise picking not seen as a priority due to no demands from the buyers in the market. Farmer do not bother to pick the different varieties separately	No market force to encourage farmers for variety wise picking.	Variety wise picking is only practiced for seed purpose	Market force to encourage variety wise procurement. Introduction of certification process as quality cotton grower/ farm.	Market force to encourage variety wise procurement.

4	Improper picking practices	Clean and good quality cotton is not delivered to the ginning factories. High concentration of trash and moisture. Female pickers hairs and threads of seed cotton collecting materials (polypropylene/ Polyester fabrics)	Traditional labour for picking including child as family labour. Shortage of pickers. Gender biased (100% female pickers). No proper dress for pickers. No proper use of picking cloth/ materials. Lack of knowledge and skills of pickers and farmers	No market demand for skilled pickers. Limited role of PCSI in implementing the cotton standardization procedures. Cultural limitations for female pickers skill development	Nil	Clean cotton production campaign by GOP should be continued as previous. Creation of skilled pickers. Developing and introducing proper picking kit among the pickers. Recognition of skilled labour through monetary benefits. Introduction of certification process as quality cotton grower/ farm.	Capacity building of the pickers in proper picking practice i.e. start picking from the base of plant, 50% cotton bolls open and picking time at 1000 in morning.
5	Improper transportation	Poor quality due to dust and threads of polypropylene and Jute bags	Use of donkey/camel carts and trolleys for cotton transportation in polypropylene and Jute bags.	Economically viable transportation.	limited practices in open trolley with cotton cloth in BWP and RYK	Mass Media campaign for using cotton cloth in trolleys and packing materials for donkey cart.	Proper transportation. Proper cotton transportation campaign.
6	Adulteration with polypropylene/Jute bags threads	Discolouration (spots) spots while cotton yarn processing	Use of polypropylene/Jute bags	Easily available. Other options are costly. No incentives for quality packing materials	Farmers avoid using jute bags in BWP and RYK but practices not completely eliminated.	Incentives for quality packing materials. Designing and introducing cheap cotton based packing materials	Introduction of proper packing material. Agriculture marketing department should be involved in maintaining cotton quality.

7	Mind set to increase the earning through seed cotton weight	High moisture concentration in seed cotton that resulted in heating up of cotton stock and discoloration	Storage of cotton on wet land	To increase weight. Paid labour by weight did not attract pickers towards clean/dry cotton.	Nil	Social mobilization and awareness rising through mass media. Monetary benefits for standard moisture seed cotton. Introduction of certification process as quality cotton grower/ farm.	Mass media campaign. Monetary benefits for quality cotton.
8	Expose to sun heat, dust, dew and inert materials in the Mandi/ Market	Cotton contamination	Open stocking of cotton	Non availability of proper sheds/ platform in the market and ginning factories	Nil	Elevated platforms in Mandi/ Market. Subsidized facility for Beoparai/ middle man to construct proper shed.	Availability of proper stocking places.
9	Damage seed cotton by insect pest attack	yellowish spot on damaged lint that can not be recovered during processing	poor insect pests and diseases management.	Poor economic condition of small farmers. High cost of agriculture inputs. Lack of knowledge and skills	IPM projects in cotton area. Agricultural extension campaign for cotton crop management	Participatory capacity building of farming community	Capacity building of farmers in proper insect pest management.
10	Poor crop stand and susceptibility to incidence of insect pest and disease	low quality seed cotton	Poor crop husbandry practices. Conventional crop management practices	Lack of knowledge and skills of good agricultural practices	Agricultural extension campaign for cotton crop management.	Implementation of Good Agricultural Practices at farm level.	Capacity building of farmers in proper insect pest management.



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