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## **Challenges and Strategies for Post-harvest Processing and Marketing of Mechanically Harvested Cotton in India**

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### **Introduction:**

The harvesting of cotton in India is at present manual where the cotton is handpicked which is labour intensive and is getting affected by shortage of labour and high cost. All efforts are being made to introduce mechanical harvesting in India but various issues such as; uneven size of varieties grown, excessive branching of cotton plants, small land holdings, high cost of mechanical pickers, non-availability of defoliant etc. are making it difficult to implement mechanical harvesting in India, however stakeholders are trying to find out the ways and means to implement mechanical harvesting and be future ready in case of implementation of mechanical harvesting to process and market the mechanical harvested cotton in India. Though mechanical harvesting of cotton in India is a subject which involves finding out the correct varieties, proper farm practices, suitable harvesters and working on economy of scale etc. however this paper only discusses the challenges and strategies for post-harvesting processing and marketing of mechanically harvested cotton in India when the harvesting is done mechanically in future. Here it has to be clearly understood that the use of a handheld mechanical picker cannot be called mechanical harvesting and the same has a reverse effect as the picking person has to carry an extra weight of about 2-3 kgs. which develops fatigue and picking efficiency is reduced, hence only spindle picker and stripper picker can only be termed as mechanical harvesting. The post-harvest processing challenges may be outlined as below:

### **(A) The Challenges for Post-harvest Processing of Mechanically Picked Seed Cotton in India**

1. Transportation and Feeding Mechanism of Mechanically Harvested Cotton in India: In normal courses wherever mechanical harvesting is practised, the cotton is transported in modules, where module makers, module trucks, module feeders, and module un-wrappers are used to handle the feeding of mechanically harvested cotton in the ginning factories, however, time being the conventional methods of cotton transportation can also be continued in India to save high capital cost but this will certainly increase the transportation cost as trash and extra moisture weight shall also have to be incurred in case of conventional transportation of the mechanically harvested cotton therefore the transportation cost control shall be a challenge in India if conventional method is used for transportation or heavy capital and running cost will be required if module making and module transportation has to be adopted.

### **2. Higher Trash and Moisture Contents:**

When the harvesting of cotton is done mechanically by spindle harvester, the water has to be continuously flown on the spindles for trapping the cotton fibre which increases the moisture and the trash present in the field is also coming with the seed cotton where the moisture contents and trash contents are normally above 15% while in case of seed cotton which is having semi-opened bolls etc., has to be mechanically harvested by stripper picker then stems, leaves and other biological impurities are stripped with the seed cotton and the trash is normally very high i.e. above 30% in stripper harvesting, which is a big challenge to remove before ginning.

### **3. Drying of Extra Moisture Before Cleaning:**

The cleaning of extra trash necessarily requires drying of seed cotton to about 6-8% from the moisture contents above this limit in the mechanical harvested cotton, which requires single or double-stage or multiple-stage drying. The heavy cost of drying equipment, fuel for drying, electricity charges, and weight loss due to the removal of moisture has to be incurred which certainly forms a challenge.

#### 4. Cleaning of Trash to bring Seed Cotton Trash in Permissible Limit for Ginning:

After proper drying, the cleaning equipment of various stages such as; stripper cleaners, impact cleaners and inclined cleaners are required to bring the trash within the permissible limit in the seed cotton for ginning, which is recommended to be below 5% from the existing high trash of 15% to 35% etc. These equipment require high capital investment as well as extra electrical power costs which again forms a challenge.

#### 5. Additional Lint Cleaning:

Mechanically harvested cotton normally requires additional cleaning for cotton fibre/lint after ginning also, where additional lint cleaners such as air-jet / centrifugal lint cleaners and saw-type lint cleaners are additionally required for machine-picked cotton as compared to handpicked cotton. These additional lint cleaners also require additional capital cost, electrical costs, and some shortages apart from the requirement of the suction system against belt conveyors or gravity conveying of lint therefore this is also a challenge.

#### 6. Recommendations of Saw Ginning in place of Single or Double Roller Ginning:

As the mechanical harvesting is normally employees single picking where micronaire and strength parameters of seed cotton are comparatively higher while the length of the varieties used in majority farming is somewhat lower i.e. up to 29 mm, hence it can withstand comparative harsh treatment while high capacity, high volume ginning, which is normally done by saw ginning. The modern saw ginning setup is widely available in India in the per machine, per hour capacity of 5 bales per hour to 25 bales per hour (up to 228 kgs bale).

#### 7. Availability of Seed cotton handling, Cleaning, and Saw Gin Machines in India:

At present almost entire cotton in India is ginned on Double Roller Gins and the mechanical harvested seed cotton may require the all machineries for seed cotton handling, cleaning, saw ginning, and lint cleaning as well as high capacity ginning plant baling presses but this is not a challenge for India as these machines for saw ginning set up are majorly exported by Bajaj Steel Industries Limited, Nagpur India worldwide, hence are available within India if the mechanical harvested cotton is required to be ginned on saw ginning set up.

#### (B) The Recommended Strategies for Processing and Marketing of Mechanically Harvested Cotton in India.

##### 1. Adoption of Cooperative or Corporate Ginning of Mechanically Harvested Cotton:

The capital investment and higher electrical power required for the ginning of mechanically harvested cotton can be addressed by high-capacity, high capitalintensive ginning plants for which the high-capacity saw ginning plants may be set up on a cooperative or corporate basis.

##### 2. Advanced practices required for Mechanically Harvested Higher Volume Cotton Bales:

The advanced practices, such as sampling and testing of each bale, barcoding, and database of each bale for sale in automatic mode may be adopted similarly to the USA and the testing labs like USDA should be established in India for testing of each bale and upload the data on digital platforms so that automatic sales route based on listed quality parameters and declared prices may take place.

##### 3. The Improvement in the BIS Specifications:

The Indian BIS Cotton Bales Standard IS 12171 may be improved to cater for the requirement of world-class packing of cotton bales and cotton specifications so that bale quality is improved and trustworthy. The challenges and Suggested strategies may give insight into the preparation of the ginning sector to be ready for future requirements of Post-harvest Processing and Marketing of Mechanically harvested cotton in India when the need arises.

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