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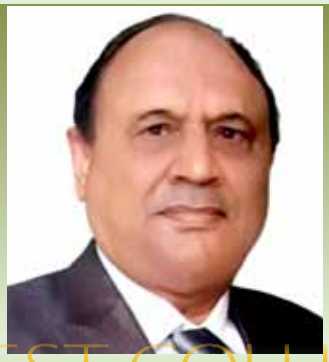
Mechanical Picking of Cotton in India



GUEST COLUMN

Dr. Brijender Mohan Vithal
Cotton Expert

Dr. Brijender Mohan Vithal has a Ph.D. Agric (Plant Breeding-Cotton) from Punjab Agriculture University (PAU) Ludhiana. He has been associated with cotton R&D activities for more than three decades. He has worked as a Senior Cotton Breeder with PAU, GM Production / Executive Director with National Seeds Corporation and Director, DOCD, Ministry of Agriculture (MOA). He was Officer on Special Duties (OSD) to look after activities related with Tech Mission on Cotton (TMC) in CCI Ltd during its pre-launch period. He joined CCI Ltd - TMC Cell (MMIII & IV) during 1999 and continued working there till the end of the TMC Project in December 2010. He is still associated with cotton through agencies like ISCI.

Cotton has always been one of the most important crops throughout the history of India and it continues to play an important role in the social and economic aspects of Indian society to date. Recent technological advances and trade liberalisation have made India a major player in international cotton markets. India is the largest producer of cotton, second largest exporter as well as second largest consumer of cotton in the world. Since the demand for cotton is expected to remain robust in India, there is a clear need to improve the productivity to meet this increasing demand. Total cotton production in India is mired by low productivity, driven by rain fed conditions, small farm size, increasing pests and diseases and labour intensive methods of cultivation. Moreover, the labour cost in India is increasing rapidly.

Status of Mechanical Picking of Cotton in India and Abroad

In India, normally farmers go for two to five pickings of cotton till the final stage of crop harvesting. It is expected that 85 percent of the seed cotton (kapas) is picked during the initial three pickings and the subsequent pickings sometimes may not be economical even by manual labour. Cotton picking is tedious hard work and ten times costlier than irrigation and twice of weeding operation. The cost of picking accounts for 30 to 35 % of the total cost of cultivation. During the peak season, the availability of labour for cotton picking becomes even more scarce.

Cotton is completely machine-picked in Australia, Israel and U.S.A. Over 90 % is machine-picked in Greece, Mexico and Spain. Almost 75 % of total production is machine- picked in

Brazil (Status Paper Min. of Agric. 2017). In most of other countries including China, India and Pakistan, cotton picking is done manually.

Issues Related to Manual Picking of Cotton

In India, cotton, whether it is rain fed or irrigated, is hand-picked by labourers. Problems associated with the hand-picking of cotton are as follows:-

- Manual picking is not only tedious but also costlier than other agricultural operations. Manual picking of cotton requires around 465 labour-hours per hectare.
- Due to non-availability of labourers when required, cotton picking gets delayed causing yield loss which may be up to 15 per cent and also affecting the overall quality of lint.
- The change in weather conditions forces the farmers to harvest cotton quickly and non-availability of labour and less available time for total pickings, makes it expensive and complex.
- Area under cotton in India is increasing during recent years.
- Farmers are finding difficulties to complete picking operation in time even after spending more money.
- Cotton yields have also increased with the near universal use of Bt cotton in India, since its approval for commercial cultivation since 2002. Consequently, there is more cotton to be picked.
- Children, being deft, used to be engaged.
- Farmers also have to compete with alternative sources of employment, like on construction sites which pay more, or MGNREGA, the rural jobs scheme, where the work is less demanding.
- The shortage of labour in some areas of India, which are fast industrialising, is also impacting the profitability of the cotton crop.

Considering the constraint of availability of labourers, especially during peak season, using mechanical picking machines has become necessary to minimise the drudgery involved in hand-picking. Mechanical picking will also enhance the production of cleaner grade of seed cotton. Further, mechanical cotton picking system will also be helpful in achieving timeliness of operation, for the next crop.

Problems Associated with Mechanical Picking of Cotton in India

The problems confronting Indian producers/ processors, in mechanising cotton operations, (elaborated below) was discussed in detail at the World Cotton Research Conference held at CIRCOT, on 5th May 2017, in Mumbai.

- Small-sized holdings of Indian farmers.
- In India, cotton is picked in two to three pickings or even more. Mechanisation means the picking can be done only once. Thus, the opening of the cotton bolls may have to be synchronised.
- No basic categories of chemicals such as, defoliants, desiccants, boll openers/ conditioners/enhancers and re-growth inhibitors, etc. used as harvest aids are presently available in India.
- The problem here is that almost all varieties/ hybrids (including Bt hybrids being largely cultivated in India) are sympodial which are not suitable for mechanical harvesting of cotton.
- The plant height of cotton varieties/ hybrids cultivated in India grow up to six feet or even more, which does not match mechanical picking specification. Thus, managing the cotton plants' height is another major issue.
- Duly approved varieties/ hybrids in India run into thousands. Currently, Bt hybrids account for nearly 95 per cent of the total 120 lakh hectares under cotton in the country. May be, restricting the number of varieties/ hybrids grown, would help.
- While hand-picking of cotton results in 2-2.5 per cent trash content, it would be much higher in cotton picked mechanically. For ginning mills, pre-cleaning will become a big operation.

- The initial large cost of the imported mechanised picker is also major hindrance in making mechanical picking, a success. Moreover, credit agencies also do not offer suitable credit facilities to farmers wanting to adopt mechanical harvesting.

What Needs to Be Done?

To adopt mechanical picking of cotton in India, lots of changes in agronomic practices of cotton cultivation, need to be adopted, as discussed below:

- Plants needs to be uniform and much lower in height for mechanical picking than in the conventional method. Thus, there is a need to develop matching varieties. Or search and evaluation of chemicals is to be done that may be required to control plant height and to keep it uniform.

- In the conventional way, the cotton plants have much more branches (sympodes) to get more bolls per plant. In cotton field cultivated for mechanical harvesting, plants should be monopodial. There is a need to develop monopodial plant type varieties/ hybrids for mechanical picking of cotton.

- Monopodial plants with short height will have less number of bolls. Thus, the plant population / ha needs to be much higher in order to achieve sufficient number of bolls to get matching yields. So there is a need to find out the matching quantities of seed per ha of such cultivars that may be required to achieve best yields.

- R & D activities are also required to find out inter-row and inter-plant spacing for mechanical harvesting that may be less than conventional methods, to accommodate more number of plants.

- The cotton plants that are going to be mechanically harvested also need to be sprayed with defoliants and other chemicals, to make the harvesting process clean and efficient. Thus, appropriate chemicals and their dosages may have to be evaluated to get the desirable results.

- Mechanically harvested cotton also needs to be pre-cleaned, as cotton pickers gather more debris than manually picked cotton. Some machinery manufacturers have done a good job in this regard which needs to be evaluated and confirmed by the experts.

- R & D activities are also needed to find out ways and means to reduce expenses incurred on above activities and to increase productivity by increasing plant population per ha. This yield increase may compensate additional expenses to be incurred for mechanical picking.

- Apart from hybrid seeds and Bt-technology, we also need to look at mechanisation coupled with high density planting, to further increase the productivity.

- Economists may have to find out the economic viability of using mechanical pickers for harvesting cotton over the existing method of hand-picking in India.

Thus, adoption of mechanical harvesting by Indian farmers is not dependent upon just the availability of suitable harvesters, but also depends upon availability of appropriate cotton varieties; suitable agronomic practices like the seed rate, nutrient and defoliant application; systems for pre-cleaning of cotton before sending it to cotton gins / in Ginning & Pressing units; etc.

Cotton Pickers' Suitability under Indian Conditions

The pickers, being used all over the world, mostly have spindle type of cotton picking mechanism. The same pickers have been tested in India. But suitability of these cotton pickers is questionable due to the high trash percentage in seed cotton which is in the range of 20-30 % and also due to their high initial cost. Thus, it is not economical for Indian plant type and also for cotton farmers with small holdings.

As of now, the mechanical cotton pickers suitable for Indian field test conditions operate by suction valve and include Pneumatic Cotton Picker; Power Tiller Operated Cotton Picker and Tractor Operated Cotton Picker. Recently, the John Deere Company has come up with two-row pickers in Turkey and Uzbekistan, but the company has yet to figure out what type of mechanical picker would be suitable for Indian conditions.

(to be continued ....)

(The views expressed in this column are of the author and not that of Cotton Association of India)

Cotton Trade in Medieval Times Part-II

(Continued from Issue No. 49 dated 6th March 2018

Dr. T.R. Loknathan has a Ph. D. in plant breeding. He is currently working as a Principal Scientist in the Division of Crop Improvement at ICAR-CICR, Nagpur. He is pursuing his research on genetic enhancement of cotton.

GUEST COLUMN

Dr. T.R. Loknathan
Principal Scientist, Division of crop improvement, ICAR-CICR, Nagpur

Major Inventions That Influenced Cotton Commerce

This dramatic shift to machines in the cotton industry was amazingly rapid. England was, however, the last country in Europe to take up manufacture. But it made a mighty stir when it did wake up. The seductive Indian cottons attracted the fancy of the people in spite of the political pressure (laws and penalties) to abandon them, The weavers were encouraged to imitate the forbidden fripperies (curtains) of Indian cotton. English enterprise rose, by applying brains and skills to handling Indian cottons more proficiently than the native Indians.

The following table provides the list of inventions which played a great role in the ascent of cotton trade and commerce.

While Richard Arkwright left a great fortune and during his time cotton trade trebled, many of these inventors did not reap the benefits. John Kay had to flee to France and died a penury; James Hargreaves' patent was stolen and he died a poor man in 1778, writing in his will that a guinea be given to the vicar for preaching his funeral sermon while Mr. James gave the widow 400 pounds for her husband's share in the factory. The golden age of cotton lasted from 1788-1803. The English cotton trade flourished. This confirms what Erasmus Darwin had to say, "It is probable that the clothing of this small seed will become the principal clothing of mankind."

Cotton in America

The short staple cotton fibre from India created difficulty amongst the English spinners. At that

Table 1 : Machinery which revolutionised the textile industry

Sr. No.	Name of the Invention	Year	Inventor	Remarks
1	Fly Wheel or the Fly Shuttle	1730	John Kay	Enhanced the efficiency of spinning, reducing the number of spinning hands (the word, " Spinster" a proficient unmarried woman spinner. She provided her spun weft required for the looms.
2	Drop Box	1761	Robert Kay	Increased the efficiency of the Dutch loom enabling the weaver to ply the separate shuttles.
3	Steam Engine	1762	James Watt, a mechanical apprentice	Provided power to the looms
3	Spinning Jenny (spinning machine with upright spindles)	1764	James Hargreaves, carpenter and weaver	Developing yarns through twisting by the spindles in an efficient way giving more power to the handwheel, providing more weft
4	Spinning frame or Water Frame or	1769	Richard Arkwright, the barber	Increased the pace of spinning
5	Numerous spinning jennies with a plentiful supply of	1770	Lewis Paul and John Wyat	Efficient spinning of the yarn into a warp
6	First piece of genuine British made calico	1773	Richard Arkwright, the barber	Set up a water-powered factory at Crafford, Derbyshire
7.	Improved Arkwright machine (combining roller drawing and travelling carriage	1758-1827	Samuel Crompton	Improved the quality of yarn, increasing the number of spindles thus expanding the loom capacity
8.	Automatic loom	1787	Samuel Crompton	Machine of great power attached to the Engine of Watt

time the American upland cottons superior to the short staple Indian cottons gained momentum in production. The production of raw cotton dominated in the select few Southeastern states and the finished products were shipped to England from North America. With the advent of the Civil War from 1861-65, there was a blockade of shipment of Southern cotton by the North to England and Europe, resulting in cotton famines in respective countries. Later on, key policy changes resulted in the encouragement of free trade and ended the blockade. Thus interdependence amongst countries for cotton - both raw and finished products - added revenue to the economy of these countries. Three cotton exchanges viz., New York, Middling and New Orleans were formed to understand the flow of the cotton trade and the economy of cotton commerce. Staple grades were created to classify the quality of different cottons grown in diverse regions of America.

Cotton in Europe

The cotton industry spread to parts of Germany, France, Switzerland, Italy, Austria, Holland, etc. In Germany, it was localised in Alsace and with its favourable conditions for operating machinery, it came to be known as the Manchester of Europe. Saxony also attracted the establishment of mills. Havre and Bremen were the main centres of cotton trade, Havre being the main port. The French industry grew when it made use of English inventions. Switzerland ventured into producing fancy cotton goods like lace, though it was not a cotton producing nation. The re-introduction of the cotton spinning and weaving skills in Netherlands, though they were the pioneers to migrate to England as skilled hands, revived the Netherlands cotton industry. Cotton spinning was introduced by a Russian Ludwig Knop in 1839, in Russia. He had earlier worked in Manchester with a firm of cotton spinners. He was sent as an agent to Moscow and there started as a cotton spinner, importing machinery from England. Italian cotton industry flourished during the American Civil War (1861-1863) due to increased production of cotton in the Italian soil. Thus, the diverse localised geographical advantages aided in the rise of cotton industry at that time.

Conclusion:

Cotton assumes an important role as clothing for mankind. The story of cotton trade extending from the ancient times to the medieval and renaissance period has lifted the veil concealing the potential of cotton as a product of commerce, revealing its glorious past. It still continues to be one of the prime contenders as a revenue fetching commodity crop occupying a universal position in the clothing of mankind.

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Cotton Association of India Reduces its Cotton Crop Estimate for the 2017-18 Crop Year by 5 Lakh Bales to 362 Lakh Bales

Cotton Association of India (CAI) has released its February 2018 estimate of the cotton crop for 2017-18 crop year beginning from 1st October 2017. In this latest estimate, the CAI has estimated cotton crop for the ongoing 2017-18 crop year at 362 lakh bales of 170 kgs. each which is lower by 5 lakh bales than its previous estimate of 367 lakh bales made in the month of February 2018. This lower production estimate of 5 lakh bales consists of 2 lakh bales each now estimated lower in the States of Andhra Pradesh and Karnataka, while production in 'other states' is estimated lower by 1 lakh bales of 170 kgs. each. The CAI has lowered its cotton crop estimate mainly due to the crop damage on account of severe pink bollworm infestation and the scarcity of water in some states. A statement containing the state-wise estimate of the cotton crop and the Balance Sheet for the cotton season 2017-18 with the corresponding data for the year 2016-17 is given below.

The projected Balance Sheet drawn by the CAI has estimated total cotton supply for the season at 412 lakh bales of 170 kgs. each which includes the opening stock of 30 lakh bales at the beginning of the season and the imports which the CAI has retained at 20 lakh bales as in the previous month. The CAI has estimated domestic consumption at 330 lakh bales which is 10 lakh higher than that estimated in the previous month. The increase in consumption estimated for the 2017-18 season is on account of the fact that several new textile mills in Gujarat and other states have already started operations resulting in 35 lakh new spindles. Moreover, the consumption of raw cotton has also seen a jump as the prices of PSF have gone up by more than 20%. The CAI has also estimated an increase in exports for the season from 55 lakh bales to 60 lakh bales because of surge in demand for Indian cotton and increase in ICE futures prices. The carry-over stock at the end of this season on 30th September 2018 is estimated to be 22 lakh bales which is lower by 20 lakh bales than the previous closing stock of 42 lakh bales estimated in the previous month.

As per the data received from various trade sources, the CAI estimates cotton arrivals upto 28th February 2018 at 247.10 lakh bales.

CAI's Estimates of Cotton Crop as on 28th February 2018 for the Seasons 2017-18 and 2016-17

(in lakh bales)

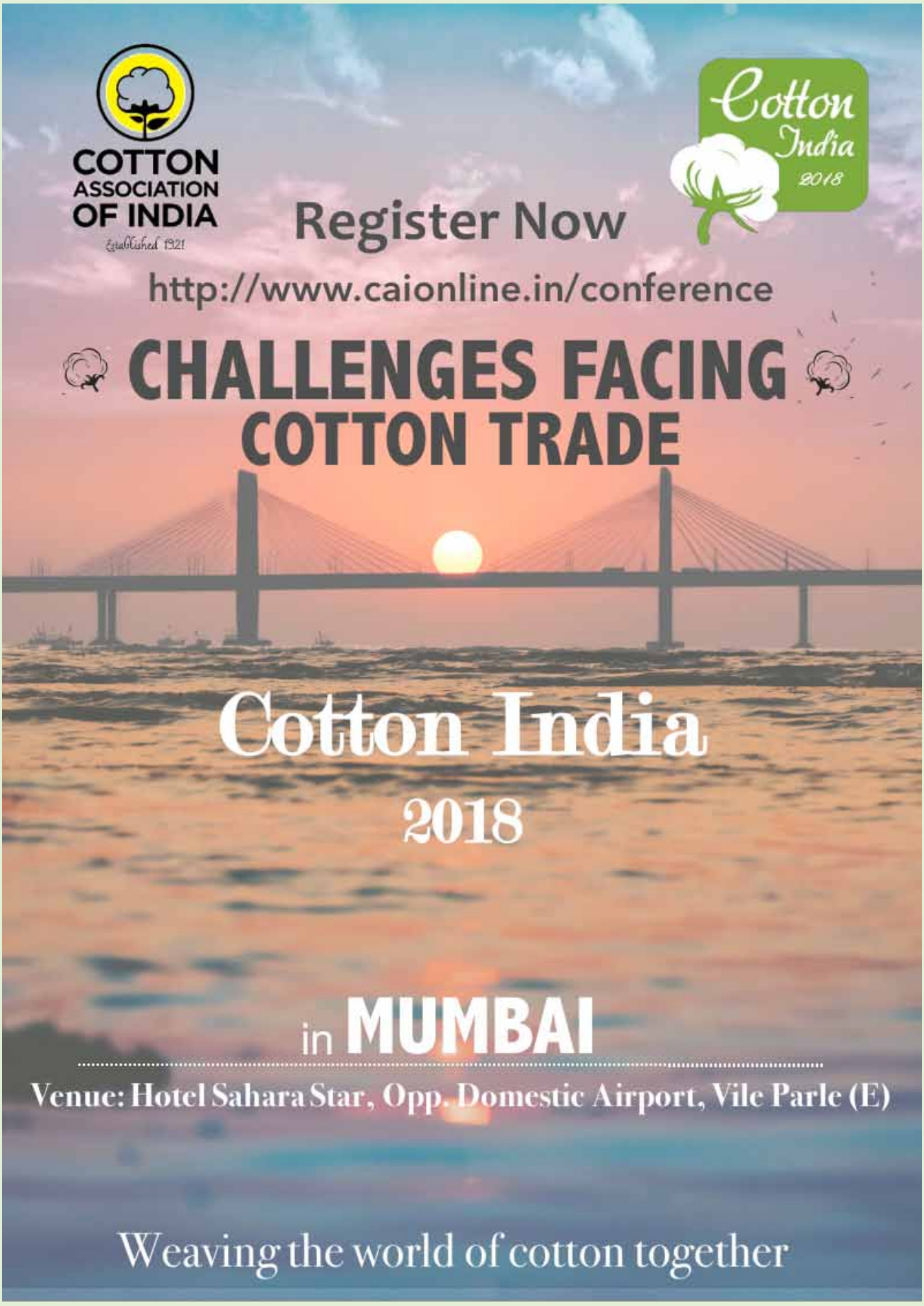
State	Production *		Arrivals As on 28th February 2018 (2017-18)
	2017-18	2016-17	
Punjab	11.00	8.75	7.55
Haryana	24.00	20.50	17.70
Upper Rajasthan	10.00	7.25	8.15
Lower Rajasthan	11.00	9.25	9.40
Total North Zone	**56.00**	**45.75**	**42.80**
Gujarat	105.00	89.00	65.00
Maharashtra	81.00	88.00	58.00
Madhya Pradesh	21.00	20.50	16.00
Total Central Zone	**207.00**	**197.50**	**139.00**
Telangana	53.00	48.00	38.00
Andhra Pradesh	19.00	18.50	10.10
Karnataka	18.00	17.00	12.70
Tamil Nadu	5.00	5.50	2.00
Total South Zone	**95.00**	**89.00**	**62.80**
Orissa	3.00	3.00	2.00
Others	1.00	2.00	0.50
Total	**362.00**	**337.25**	**247.10**

** Including loose*

The Balance Sheet drawn by the Association for 2017-18 and 2016-17 is reproduced below:-

(in lakh bales)

Details	2017-18	2016-17
Opening Stock	30.00	36.50
Production	362.00	337.25
Imports	20.00	27.00
Total Supply	**412.00**	**400.75**
Mill Consumption	285.00	265.00
Consumption by SSI Units	30.00	27.00
Non-Mill Use	15.00	15.75
Total Domestic Demand	**330.00**	**307.75**
Available Surplus	**82.00**	**93.00**
Exports	60.00	63.00
Closing Stock	**22.00**	**30.00**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UPCOUNTRY SPOT RATES

(Rs./Qtl)

Sr. No.	Growth	Grade Standard	Grade	Staple	Micronaire	Strength /GPT	Spot Rate (Upcountry) 2017-18 Crop MARCH 2018 5th	6th	7th	8th	9th	10th
	Standard Descriptions with Basic Grade & Staple in Millimetres based on Upper Half Mean Length [By law 66 (A) (a) (4)]											
1	P/H/R	ICS-101	Fine	Below 22mm	5.0-7.0	15	11895 (42300)	12035 (42800)	12035 (42800)	12035 (42800)	12035 (42800)	12035 (42800)
2	P/H/R	ICS-201	Fine	Below 22mm	5.0-7.0	15	12035 (42800)	12176 (43300)	12176 (43300)	12176 (43300)	12176 (43300)	12176 (43300)
3	GUJ	ICS-102	Fine	22mm	4.0-6.0	20	8239 (29300)	8239 (29300)	8155 (29000)	8155 (29000)	8155 (29000)	8155 (29000)
4	KAR	ICS-103	Fine	23mm	4.0-5.5	21	9420 (33500)	9561 (34000)	9561 (34000)	9561 (34000)	9561 (34000)	9561 (34000)
5	M/M	ICS-104	Fine	24mm	4.0-5.0	23	10320 (36700)	10461 (37200)	10461 (37200)	10461 (37200)	10461 (37200)	10461 (37200)
6	P/H/R	ICS-202	Fine	26mm	3.5-4.9	26	11220 (39900)	11360 (40400)	11220 (39900)	11220 (39900)	11276 (40100)	11276 (40100)
7	M/M/A	ICS-105	Fine	26mm	3.0-3.4	25	9617 (34200)	9617 (34200)	9476 (33700)	9476 (33700)	9476 (33700)	9476 (33700)
8	M/M/A	ICS-105	Fine	26mm	3.5-4.9	25	10067 (35800)	10067 (35800)	9926 (35300)	9926 (35300)	9926 (35300)	9926 (35300)
9	P/H/R	ICS-105	Fine	27mm	3.5.4.9	26	11445 (40700)	11585 (41200)	11445 (40700)	11445 (40700)	11501 (40900)	11501 (40900)
10	M/M/A	ICS-105	Fine	27mm	3.0-3.4	26	9814 (34900)	9814 (34900)	9701 (34500)	9701 (34500)	9701 (34500)	9701 (34500)
11	M/M/A	ICS-105	Fine	27mm	3.5-4.9	26	10348 (36800)	10348 (36800)	10264 (36500)	10264 (36500)	10264 (36500)	10264 (36500)
12	P/H/R	ICS-105	Fine	28mm	3.5-4.9	27	11557 (41100)	11698 (41600)	11557 (41100)	11557 (41100)	11614 (41300)	11614 (41300)
13	M/M/A	ICS-105	Fine	28mm	3.5-4.9	27	10854 (38600)	10854 (38600)	10714 (38100)	10714 (38100)	10770 (38300)	10770 (38300)
14	GUJ	ICS-105	Fine	28mm	3.5-4.9	27	11276 (40100)	11417 (40600)	11332 (40300)	11332 (40300)	11389 (40500)	11389 (40500)
15	M/M/A/K	ICS-105	Fine	29mm	3.5-4.9	28	11135 (39600)	11304 (40200)	11164 (39700)	11164 (39700)	11220 (39900)	11220 (39900)
16	GUJ	ICS-105	Fine	29mm	3.5-4.9	28	11501 (40900)	11614 (41300)	11529 (41000)	11529 (41000)	11585 (41200)	11585 (41200)
17	M/M/A/K	ICS-105	Fine	30mm	3.5-4.9	29	11501 (40900)	11670 (41500)	11529 (41000)	11529 (41000)	11529 (41000)	11529 (41000)
18	M/M/A/K/T/O	ICS-105	Fine	31mm	3.5-4.9	30	11838 (42100)	11979 (42600)	11838 (42100)	11838 (42100)	11838 (42100)	11838 (42100)
19	A/K/T/O	ICS-106	Fine	32mm	3.5-4.9	31	12204 (43400)	12345 (43900)	12260 (43600)	12260 (43600)	12260 (43600)	12260 (43600)
20	M(P)/K/T	ICS-107	Fine	34mm	3.0-3.8	33	15213 (54100)	15353 (54600)	15269 (54300)	15269 (54300)	15269 (54300)	15269 (54300)

(Note: Figures in bracket indicate prices in Rs./Candy)