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**Cotton  
Association  
of India**

# COTTON STATISTICS & NEWS

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## Cotton Speed Breeding: Need of the Hour

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One of India's most significant cash crops and fibres, cotton is crucial to the country's industrial and agricultural economies. It gives the cotton textile industry its main raw material (cotton fibre). In the early days of history, India had a thriving professional commerce in cotton and cotton products. Even today, the world's largest producer of cotton presently is India where all the four cultivated species are grown. The four cultivars of cotton are i) diploid ( $2n=26$ ): *Gossypium arboreum* and *Gossypium herbaceum*, ii) tetraploid ( $2n=52$ ): *Gossypium hirsutum*, and *Gossypium barbadense*. In India, mostly in the Central and Southern states, nearly 65 percent of cotton area is under rainfed conditions. The cotton crop is very vulnerable to illnesses and

### EXPERT'S Column



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pests. Hence, cotton is mainly bred for improvement in yield, fibre qualities, earliness, compactness amenable for mechanical harvesting, genetic engineering strategies for biotic and abiotic stress tolerance and quality trait enhancement in cotton.

### Challenges in Cotton Breeding

The 21st century presents significant difficulties for the production of cotton worldwide.

The demand for higher cotton output is skyrocketing as a result of the world's rapidly growing population as well as the loss of arable land caused by soil erosion, soil salinisation,

harsher climate conditions, and urbanisation.

Determining the key elements that restrict production increases is necessary for establishing research projects to address these problems. Cotton breeders have been researching these elements for many years. They include biotic and abiotic challenges, such as the scarcity of freshwater, climate change, interactions between genotype and environment, the scarcity of germplasm and the poor correlation between yield and fibre quality.

Infrastructures for cotton production have also changed as a result of transgenic

cotton's dominance. This strategy adopts rapid advancement of generation and faster superior varieties. Furthermore, in order to capture the entire variability within a 'core set' requires the evaluation of a larger set of germplasms in a limited period to increase the effectiveness of the management and utilisation of germplasm collection. Above all, the perennial nature of the crop and the long duration have still made the breeding process more challenging. Hence speed breeding in crops like cotton is the need of the hour.

**Cotton Breeding:** Varietal/Hybrid development has the following stages

#### Varietal Development

- Evaluation of germplasm for selection of parents with desirable traits (2 years)
- Crossing the selected parents (1 year)
- Forwarding the crossed seeds for 5 to 6 generations for attaining homozygosity/backcrossing the F1 lines with desirable parent and generation advancement (6 years)
- Evaluation of elite genotype through various trials and release of variety (3 years)

#### Hybrid Development

- Evaluation of germplasm for selection of parents with desirable traits (2 years)
- Development of elite parental lines for hybridisation/ conversion of male sterility (5 years)
- Crossing and evaluation of hybrids (3 years)
- Evaluation of hybrid through various trials and release of hybrid (3 years)

In both varietal development and hybrid development, it will hardly take 12 to 13 breeding cycles which are 12 to 13 years in the case of cotton, as the duration of the crop is >6 months and only one crop can be taken up during the year. Here lies the importance of speed breeding by which the total years can be drastically reduced to half of the period.

#### Speed Breeding

The speed breeding concept was first employed in wheat (*Triticum aestivum* L) to

investigate the seed dormancy trait under controlled conditions (Hickey et al., 2009). Currently, many food crops are widely cultivated with the speed breeding concept. Speed breeding in simple terms is an array of practices that tries to alter the environmental condition making the crop complete the breeding cycle rapidly. This helps in forwarding the plants to the next breeding cycle which reduces breeding time and cost. Speed breeding allows for quick generation advancement and homozygous stable genotype development, which speeds up the development and dissemination of novel cultivars. The method relies on adjusting photoperiod, light intensity, temperature, soil moisture, soil nutrition, and a high-density planting system. Additionally, MAS and high-throughput phenotyping approaches for multiple trait selection aid speed breeding technology.

The cotton breeding programme has to concentrate its efforts on modernizing the breeding programme to take advantage of the technologies and meet the challenges of the 21st century through the integration of Genome Selection, gene editing, phenomics, and GM traits for yield enhancement with the current, largely traditional, field-based phenotypic breeding programme.

#### The Strategies for Speed Breeding In Cotton

As the cotton crop has a longer duration, the following strategies could be employed for achieving speed breeding in cotton

- The summer crop could be taken up in comparatively cooler areas like parts of Southern India
- Growing cotton in controlled situations like greenhouses and growth chambers, by providing all favourable climatic like altering photoperiod, air temperature, nutrient flow, etc. to make the plant flower earlier
- Altering plant population density, where high plant densities due to competition for light, results in tall plants, leads to a rapid transition from the vegetative to the reproductive growth stages.
- Increasing in carbon dioxide (CO<sub>2</sub>) may hasten the transition of cotton from the vegetative to

## Achieving speed breeding through genomics



*High yielding Compact variety/hybrid*

**Main aim of cotton breeding**



*With Superior fibre quality*



*Bigger bolls*

reproductive stages and promote rapid plant development.

- Embryo rescue technique where the crossed bolls or bolls based on molecular screening could be harvested in the initial crop stage i.e. between 60 to 80 days and grown in growth media to generate plants. This can save up to three months and thereby three breeding cycles per year could be completed.
- DNA extraction from embryos by the non-destructive method as employed in other crops could aid in the selection of plants for particular traits, even before the seed is harvested. This helps to drastically reduce the plant population under screening thereby saving land, labour and time.
- Techniques like genomic selection, gene editing, etc., will further help the cotton breeder in fastening the breeding cycle and thereby developing climate-resilient ideotypes.
- Phenomics is the new arena in cotton breeding, where advancement in phenotyping technologies for quicker

assessment of genotypes is being explored. By minimising the time, space, and money spent on the selection and genetic development of superior varieties, speed breeding can hasten the generation of cotton cultivars with market-preferred features. Plant breeders can produce superior varieties more quickly thanks to this technology.

### Limitation Of Speed Breeding In Cotton

With all such possibilities, there are also limiting factors to consider regarding speed breeding in cotton. They are as follows:

- Growing summer crops needs facilities like a growth chamber which involves high establishment costs.
- Cotton requires an optimum soil temperature of about 15°C to 20°C and air temperature of about 29°C to 37°C. Increasing the temperature above the optimal level causes pollen sterility, and draining of carbohydrates which leads to higher boll shedding. The next criterion is managing soil moisture as cotton cannot withstand intense irrigations that saturate the soil and produce anaerobic stress. This can quickly lead to wilting of plants in the warm



and wet conditions. Similarly, extended drought periods may cause sterility in plants.

- Pink bollworm incidence may be higher in places where cotton is grown continuously throughout the year.
- Well-established embryo rescue techniques and tissue culture methods are not available for hard crops like cotton, as only a few genotypes respond well to this method.
- Non-destructive DNA extraction method from the embryo has to be established.

Though there are limitations, the successful incorporation of speed breeding into a crop development strategy depends on streamlined operations that cut down on labour and lost-cost

facilities. The effective selection of elite genotypes and lines with innovative traits, such as increased yield and better fibre quality, along with biotic and abiotic stress tolerance, can also be improved by integrating speed breeding with conventional, MAS, and GE breeding procedures, thereby making varietal/hybrid development possible in a span of five years.

#### Reference:

Hickey L.T., Dieters M. J., DeLacy I. H., Kravchuk O. Y., Mares D. J., and Banks P. M. (2009). Grain dormancy in fixed lines of white-grained wheat (*Triticum aestivum* L) grown under controlled environmental conditions. *Euphytica*. 168: 303-310.

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

## CAI Crop Committee Estimates All India Cotton Pressing till May End at 256.31 Lakh Bales

The CAI Crop Committee, which met on Monday, the 12th June 2023, has released all India cotton pressings upto 31st May 2023 at 256.31 lakh bales of 170 kgs. each (equivalent to 268.97 lakh running bales of 162 kgs. each) as per the data received from various associations. The state-wise break-up of cotton pressing released by the Committee is given in the table.

In view of differing crop estimates of various agencies for ongoing crop year 2022-23, all 25 members of the CAI Crop Committee representing various cotton growing regions of the Country who attended this meeting have decided to convene its all India meeting with all stakeholders (all upcountry associations registered with CAI, MNCs, Exporters, Importers, Mill-Members, etc.) for the purpose of arriving at an accurate crop estimate for 2022-23 crop year, draw a cotton balance sheet as per the input to be received from all stakeholders and to reconcile the differences. This meeting will be held on Monday, the 10th July 2023. The Committee has decided to retain its earlier crop estimate and publish its new crop estimate and cotton balance sheet for the season 2022-23 only after the all India National Committee meeting scheduled on Monday, the 10th July 2023 is held.

State	Pressed Cotton Bales as on 31st May 2023 (in lakh b/s of 170 kgs. each)
Punjab	2.35
Haryana	8.45
Upper Rajasthan	16.78
Lower Rajasthan	10.25
<b>Total North Zone</b>	<b>37.83</b>
Gujarat	75.95
Maharashtra	62.68
Madhya Pradesh	17.10
<b>Total Central Zone</b>	<b>155.73</b>
Telangana	27.40
Andhra Pradesh	9.15
Karnataka	18.60
Tamil Nadu	1.50
<b>Total South Zone</b>	<b>56.65</b>
Orissa	3.35
Others	2.75
<b>Grand Total</b>	<b>256.31</b>

## Cotton's Slow Period Continues ... But Planting Decisions Are Coming Soon

There has been little movement in the global cotton market recently, with projections for production coming in at 24.51 million tonnes and consumption expectations remaining unchanged from last month at 23.79 million tonnes. It would seem that the lull will likely continue for another month or two at most, because that's when farmers need to decide what they're going to plant for the year.

Even trade — while considerably lower than it was at this point last year — remains largely unchanged since we reported on it in May. It is true that trade data lags real time by several months due to the need to compile and assess the global numbers, but there are few indications that there will be significant changes to trade before the season ends on 31 July 2023.

This month's CTM also takes a long look at the history of cotton in West Texas, the heart of the

US cotton industry. The same approach was taken with India in the April 2023 CTM; it is our step-by-step approach to building national cotton industry profiles that will be incorporated in the ICAC Data Dashboard in coming months, giving users detailed information on the major cotton producing and consuming countries.

For the most up-to-date statistics, please refer to the Data Dashboard. It is updated with new data constantly and that new information is immediately reflected in the Dashboard, making it a valuable, up-to-date resource all month long.

### Price Projections

The Secretariat's current price forecast of the season-average A index for 2022/23 ranges from 96.36 cents to 106.47 cents, with a midpoint of 100.78 cents per pound.



Source: ICAC Cotton This Month, June 1, 2023

# Supply and Distribution of Cotton

01 June 2023

Seasons begin on August 1

	2017/18	2018/19	2019/20	2020/21 est.	Million Metric Tonnes 2021/22 proj.	2022/23 proj.
<b>BEGINNING STOCKS</b>						
<b>WORLD TOTAL</b>	<b>18.88</b>	<b>19.43</b>	<b>19.34</b>	<b>22.11</b>	<b>20.19</b>	<b>19.42</b>
China	10.35	9.03	8.88	9.02	9.37	8.60
USA	0.60	0.82	0.83	1.23	0.26	0.34
<b>PRODUCTION</b>						
<b>WORLD TOTAL</b>	<b>27.00</b>	<b>25.98</b>	<b>26.26</b>	<b>23.99</b>	<b>25.18</b>	<b>24.51</b>
China	5.89	6.04	5.80	5.91	5.73	5.98
India	6.35	5.66	6.20	6.02	5.22	5.20
USA	4.56	4.00	4.34	3.18	3.81	3.15
Brazil	2.01	2.78	3.00	2.36	2.55	3.02
Pakistan	1.80	1.67	1.46	0.96	1.27	0.85
Uzbekistan	0.96	0.64	0.53	0.70	0.59	0.59
Others	5.44	5.20	4.93	4.86	6.00	5.72
<b>CONSUMPTION</b>						
<b>WORLD TOTAL</b>	<b>26.35</b>	<b>26.01</b>	<b>23.05</b>	<b>25.69</b>	<b>25.81</b>	<b>23.79</b>
China	8.50	8.25	7.23	8.40	8.31	7.50
India	5.42	5.40	4.45	5.70	5.30	5.01
Europe & Turkey	1.73	1.82	1.60	1.79	2.01	2.05
Pakistan	2.35	2.36	2.34	2.15	2.45	1.90
Bangladesh	1.66	1.58	1.50	1.64	1.73	1.60
Vietnam	1.51	1.51	1.45	1.52	1.46	1.20
Brazil	0.68	0.73	0.57	0.69	0.70	0.70
USA	0.70	0.63	0.47	0.52	0.56	0.46
Others	3.80	3.73	3.44	3.28	3.29	3.38
<b>EXPORTS</b>						
<b>WORLD TOTAL</b>	<b>9.14</b>	<b>9.28</b>	<b>9.21</b>	<b>10.83</b>	<b>9.73</b>	<b>8.98</b>
USA	3.64	3.37	3.47	3.63	3.18	2.30
Brazil	0.91	1.31	1.95	2.42	1.74	1.97
Australia	0.85	0.79	0.30	0.35	0.79	1.55
CFA Zone	1.06	1.16	1.07	1.19	1.31	0.97
India	1.13	0.76	0.70	1.36	0.87	0.42
Uzbekistan	0.22	0.16	0.10	0.10	0.03	0.03
<b>IMPORTS</b>						
<b>WORLD TOTAL</b>	<b>9.04</b>	<b>9.22</b>	<b>8.78</b>	<b>10.63</b>	<b>9.60</b>	<b>8.98</b>
China	1.32	2.10	1.60	2.84	1.85	1.80
Bangladesh	1.67	1.54	1.50	1.69	1.70	1.54
Vietnam	1.52	1.51	1.41	1.55	1.36	1.20
Turkey	0.96	0.79	1.02	1.19	1.24	1.20
Indonesia	0.77	0.66	0.55	0.55	0.58	0.60
<b>TRADE IMBALANCE †</b>	<b>-0.10</b>	<b>-0.06</b>	<b>-0.43</b>	<b>-0.20</b>	<b>-0.13</b>	<b>0.00</b>
<b>STOCKS ADJUSTMENT ‡</b>	<b>0.00</b>	<b>0.00</b>	<b>-0.01</b>	<b>-0.03</b>	<b>0.00</b>	<b>0.00</b>
<b>ENDING STOCKS</b>						
<b>WORLD TOTAL</b>	<b>19.43</b>	<b>19.34</b>	<b>22.11</b>	<b>20.19</b>	<b>19.42</b>	<b>20.14</b>
China	9.03	8.88	9.02	9.37	8.60	8.86
USA	0.82	0.83	1.23	0.26	0.34	0.73
<b>ENDING STOCKS/MILL USE (%)</b>						
WORLD-LESS-CHINA *	58.29	58.86	82.70	62.61	61.85	69.29
CHINA **	106.27	107.69	124.82	111.51	103.46	118.07
<b>COTLOOK A INDEX***</b>	<b>87.98</b>	<b>84.35</b>	<b>71.33</b>	<b>84.96</b>		

Note :

Seasons begin on August 1

† The inclusion of linters and waste, changes in weight during transit, differences in reporting periods and measurement error account for differences between world imports and exports.

‡ Difference between calculated stocks and actual; amounts for forward seasons are anticipated.

\* World-less-China's ending stocks divided by World-less-China's mill use, multiplied by 100.

\*\* China's ending stocks divided by China's mill use, multiplied by 100.

\*\*\* US Cents per pound. Average price for a given season, August 1 to July 31 or average-to-date.

Source: ICAC Cotton This Month, June 01, 2023



# COTTON ASSOCIATION OF INDIA



**COTTON ASSOCIATION OF INDIA**  
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**A CHILD'S CHILDHOOD IS FOR LEARNING  
DON'T USE THEIR CHILDHOOD FOR EARNING  
SAY NO TO CHILD LABOUR**

UPCOUNTRY SPOT RATES													
Standard Descriptions with Basic Grade & Staple in Millimetres based on Upper Half Mean Length [ By law 66 (A) (a) (4) ]								Spot Rate (Upcountry) 2022-23 Crop June 2023					
Sr. No.	Growth	Grade Standard	Grade	Staple	Micronaire	Gravimetric Trash	Strength /GPT	12th	13th	14th	15th	16th	17th
1	P/H/R	ICS-101	Fine	Below 22mm	5.0 – 7.0	4%	15	18137 (64500)	18137 (64500)	17997 (64000)	17997 (64000)	17828 (63400)	17744 (63100)
2	P/H/R (SG)	ICS-201	Fine	Below 22mm	5.0 – 7.0	4.5%	15	18278 (65000)	18278 (65000)	18137 (64500)	18137 (64500)	17969 (63900)	17884 (63600)
3	GUJ	ICS-102	Fine	22mm	4.0 – 6.0	13%	20	13441 (47800)	13441 (47800)	13441 (47800)	13301 (47300)	13216 (47000)	13216 (47000)
4	KAR	ICS-103	Fine	23mm	4.0 – 5.5	4.5%	21	14060 (50000)	14060 (50000)	14060 (50000)	13976 (49700)	13919 (49500)	13835 (49200)
5	M/M (P)	ICS-104	Fine	23mm	4.5 – 7.0	4%	22	15860 (56400)	15860 (56400)	15860 (56400)	15803 (56200)	15747 (56000)	15691 (55800)
6	P/H/R(U) (SG)	ICS-202	Fine	27mm	3.5 – 4.9	4.5%	26	15635 (55600)	15578 (55400)	15410 (54800)	15382 (54700)	15213 (54100)	15269 (54300)
7	M/M(P)/SA/TL	ICS-105	Fine	26mm	3.0 – 3.4	4%	25	-	-	-	-	-	-
8	P/H/R(U)	ICS-105	Fine	27mm	3.5 – 4.9	4%	26	15888 (56500)	15832 (56300)	15663 (55700)	15607 (55500)	15438 (54900)	15494 (55100)
9	M/M(P)/SA/TL/G	ICS-105	Fine	27mm	3.0 – 3.4	4%	25	14341 (51000)	14257 (50700)	14201 (50500)	14201 (50500)	14116 (50200)	14172 (50400)
10	M/M(P)/SA/TL	ICS-105	Fine	27mm	3.5 – 4.9	3.5%	26	15044 (53500)	14960 (53200)	14904 (53000)	14904 (53000)	14904 (53000)	14960 (53200)
11	P/H/R(U)	ICS-105	Fine	28mm	3.5 – 4.9	4%	27	16759 (59600)	16703 (59400)	16535 (58800)	16422 (58400)	16253 (57800)	16310 (58000)
12	M/M(P)	ICS-105	Fine	28mm	3.7 – 4.5	3.5%	27	15832 (56300)	15747 (56000)	15607 (55500)	15550 (55300)	15466 (55000)	15522 (55200)
13	SA/TL/K	ICS-105	Fine	28mm	3.7 – 4.5	3.5%	27	15888 (56500)	15803 (56200)	15663 (55700)	15607 (55500)	15522 (55200)	15578 (55400)
14	GUJ	ICS-105	Fine	28mm	3.7 – 4.5	3%	27	15916 (56600)	15916 (56600)	15916 (56600)	15832 (56300)	15803 (56200)	15803 (56200)
15	R(L)	ICS-105	Fine	29mm	3.7 – 4.5	3.5%	28	16338 (58100)	16310 (58000)	16169 (57500)	16085 (57200)	15916 (56600)	16000 (56900)
16	M/M(P)	ICS-105	Fine	29mm	3.7 – 4.5	3.5%	28	16113 (57300)	16028 (57000)	15916 (56600)	15860 (56400)	15747 (56000)	15803 (56200)
17	SA/TL/K	ICS-105	Fine	29mm	3.7 – 4.5	3%	28	16141 (57400)	16056 (57100)	15944 (56700)	15888 (56500)	15775 (56100)	15832 (56300)
18	GUJ	ICS-105	Fine	29mm	3.7 – 4.5	3%	28	16281 (57900)	16281 (57900)	16225 (57700)	16141 (57400)	16113 (57300)	16113 (57300)
19	M/M(P)	ICS-105	Fine	30mm	3.7 – 4.5	3.5%	29	16338 (58100)	16253 (57800)	16141 (57400)	16085 (57200)	15972 (56800)	16028 (57000)
20	SA/TL/K/O	ICS-105	Fine	30mm	3.7 – 4.5	3%	29	16338 (58100)	16253 (57800)	16141 (57400)	16085 (57200)	15972 (56800)	16028 (57000)
21	M/M(P)	ICS-105	Fine	31mm	3.7 – 4.5	3%	30	16619 (59100)	16535 (58800)	16366 (58200)	16310 (58000)	16253 (57800)	16310 (58000)
22	SA/TL/K/TN/O	ICS-105	Fine	31mm	3.7 – 4.5	3%	30	16675 (59300)	16591 (59000)	16422 (58400)	16366 (58200)	16310 (58000)	16366 (58200)
23	SA/TL/K/TN/O	ICS-106	Fine	32mm	3.5 – 4.2	3%	31	N.A. (N.A.)	N.A. (N.A.)	N.A. (N.A.)	N.A. (N.A.)	N.A. (N.A.)	N.A. (N.A.)
24	M/M(P)	ICS-107	Fine	34mm	2.8 - 3.7	4%	33	19965 (71000)	19965 (71000)	20078 (71400)	20021 (71200)	20021 (71200)	20021 (71200)
25	K/TN	ICS-107	Fine	34mm	2.8 - 3.7	3.5%	34	20134 (71600)	20134 (71600)	20246 (72000)	20190 (71800)	20190 (71800)	20190 (71800)
26	M/M(P)	ICS-107	Fine	35mm	2.8 - 3.7	4%	35	20331 (72300)	20471 (72800)	20556 (73100)	20556 (73100)	20556 (73100)	20556 (73100)
27	K/TN	ICS-107	Fine	35mm	2.8 - 3.7	3.5%	35	20584 (73200)	20724 (73700)	20809 (74000)	20809 (74000)	20809 (74000)	20809 (74000)

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