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# Life Cycle Assessment of Indian Cotton

GUEST COLUMN

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## The Cotton Foundation

The Cotton Foundation, created in 1955, is an organisation that gives US cotton's agribusiness, allies and opportunities to support the US cotton industry, over and above the products and services these firms provide. Membership includes banks, seed companies, chemical and equipment manufacturers, publishers and others whose success depends at least in part on US cotton and who share a common concern for a healthy US cotton industry.

Agribusiness members' dues support general research and education projects. For 2017-18, Foundation member dues are supporting 12 general research and education projects at a $202,000 funding level. All of these projects are chosen specifically to help the Foundation to achieve its mission support.

In 2010, the Cotton Foundation performed the most comprehensive life cycle assessment (LCA) of cotton clothing ever attempted. An update and expansion to the original LCA was completed in 2016 to provide the most detailed and current data for the sustainability community and sourcing professionals.

The updated research provided a more comprehensive snapshot of cotton across all phases of product life and its relationship to the environment. A larger pool of global consumers was included in the update to more accurately reflect the impact of consumer use and disposal of cotton textiles. The data for fibre production represents a global average of the three largest cotton-producing regions (the United States, India and China) and top three-

cotton exporting countries (the United States, India, and Australia).

Brief information of said report has been published earlier. Information about India v/s United States, China and Australia provided in this study is being presented here for the benefit of our readers. In this report, we are examining the results of an LCA of cotton clothing conducted by the Foundation in 2010 and further updated in 2016.

For this particular assessment, the Cotton Foundation examined three distinct phases of the product's life cycle: cotton fibre production, cotton textile and garment manufacturing and consumer use and final disposal. The foundation studied fourteen different impact categories in this life cycle assessment, including global warming potential, primary energy demand, eutrophication potential, blue water consumption and use and ozone depletion potential. The most significant impact across these categories was in the textile manufacturing and consumer use

## Agricultural Data Collection and Modeling Procedure

All primary data were collected using customised data collection templates, which were sent out by email to the respective data providers in the participating companies. Upon receipt, each questionnaire was cross-checked for completeness and plausibility using mass balance, stoichiometry, as well as internal and external benchmarking. If gaps, outliers, or other incon-sistencies occurred, Think step's was engaged to resolve any open issues.

Primary data collection was conducted globally based on regions in the United States, China, India and Australia, representative of specific growing conditions. Primary data collection was accomplished in the form of spreadsheets and questionnaires, supplemented by surveys and conversations with cotton growers and other country specific regional cotton growing experts (i.e. extension agents, grower group executives). In cases where primary data were not available or were inconsistent, secondary data that were readily available from literature, machinery manufacturers, previous Life Cycle Inventory (LCI) studies, and life cycle databases were used for the analysis. The sources for any secondary data used are documented throughout the report.

Average cotton cultivation in the United States, China, India and Australia for the years 2010 to 2014 was incorporated in Think step's cultivation model based on regional production-weighted averages. The United States, Australia, China and India represented 67.2% of the world's cotton fibre production for the study period.

Agricultural data were taken from direct grower interviews and surveys, scientific papers, reports, and national statistics. The data were reviewed by experts from different areas and compared with already existing LCA studies. Standardised questionnaires were developed and adapted to cotton-specific cultivation and post-harvest situations.

The secondary data from literature and the primary data from surveys were compared and matched to obtain highest data quality. Nevertheless, the data used for the four countries (the United States, India, China and Australia) vary in completeness, representativeness and age. Data for China was obtained in a lower quality and completeness due to non-disclosure rules and less extensive statistical reporting, but has improved since the last global cotton LCA was conducted.

## Overview of Agricultural System

As mentioned above, the top three producing cotton countries (China, India and the United States) and the top three exporting cotton countries (the United States, India and Australia) were selected for inclusion in this study based on data for USDA for the study period 2010 to 2014. In many cases, those conducting an LCA for a cotton product may not know the country of origin for the fibre, so top producing and exporting countries were considered the most important to characterise. China, India and the United States all have distinctive growing regions within the countries, where the environment and cultural practices have significant differences. Thus, data collection and modeling of the agricultural system were conducted on a regional basis, and then regional production weighted averages were calculated for these countries.

Australia has more uniform growing conditions across the country and was treated as a single region.

Agricultural production in China and India is conducted on small farm holdings using labour

intensive practices, in contrast to the United States and Australia where cotton production is conducted on farm holdings of 500 hectares (ha) or larger and is highly mechanised.

In China, the majority of farms are less than 1 ha in size and in India the average farm size ranges from 0.5 to 2 ha. The exceptions for both China and India are in the northern growing regions of both countries where farms tend to be larger and there is a higher level of mechanisation.

The land in the southern provinces of China and India are intensively farmed, often using relay and intercropping production practices. Bullocks (or other animals) are used frequently in India and to a lesser extent in China for land preparation and ploughing. Some farmers in both countries have access to hand (walk-behind) tractors and many use powered backpack sprayers to apply farm chemicals.

The level of irrigation varies by region with irrigated cotton ranging from 10% to 100% of the cotton area based on climate and average annual rainfalls. Transgenic technology has been adopted globally for cotton, estimating that biotechnology adoption is above 90% in all four countries considered.

Note that all information is based on data from UDSA to allow global comparisons using a consistent data source. India had the largest area planted to cotton (11.9 million ha) in the world and was a close second in cotton production (29.1 million 218 kg bales) to China. However, yields of 532 kg per ha are lower than in the other countries for the study period. China, number one in cotton production, harvested 32.5 million bales from 5.1 million ha. Australia had the greatest yield of 1,997 kg per ha, primarily due to the ideal climate for cotton and uniform access to irrigation water. While China and India both have smallholder farms, farmers in China typically have greater access to new technologies than those in India. The United States is third in production with 12.2 million bales harvested from 4.3 million ha. Cotton yields in the U.S averaged 924 kg per ha during the study period.

Together the four countries produced an average of 81.8 million bales, 67% of world's cotton production. The United States, India, and Australia also accounted for more than half of the cotton exported in the world from 2010 to 2014.

## Climate, Water Use and Soil Data

Global climate and soil data sets of relatively high quality were available for all countries considered in the study. The database includes temperature, rainfall, wind speed, radiation, relative humidity, and rainfall for over 5,000 weather stations worldwide. In most cases, at least six weather stations were available per region within a country and data from these individual stations was combined to create an average condition for each region.

This data was used in the Think step agricultural model, as well as to verify irrigation levels in each region, through a computer program for the calculation of crop water requirements and irrigation requirements based on soil, climate, and crop data using a crop coefficient approach to estimate evapo transpiration. For each region, a custom crop coefficient was created to reflect typical planting and harvest times in that region. Several studies in diverse environments in the United States have shown that there is not a large difference in magnitude of the crop coefficient for cotton, but it is highly dependent on season length. From the average climate data compiled for each region it is clear that cotton is produced in a wide variety of climates and this study captures a wide range of conditions.

A common global data set was also used to estimate soil properties in each region (percent sand, silt and clay) using. Average soil textural values were calculated for each region. In some cases, this did homogenise the soil properties, but it was deemed the best approach feasible. Information was collected from all the four countries on the same pattern. However, detailed data collected from India has been presented below:-

## INDIA
## Agricultural Data Collection:

India is highly dependent on agriculture. Within the study period, approximately 7 million Indian farmers produced almost 30 million, 218 kg bales of cotton. This was 24% of the world's cotton, thus making India second only to China in production. At 12 million ha, India ranks number one in area planted to cotton but has lower yields than China and the United States,

with the average cotton holdings per farm being about 1.5 ha. The majority of the cotton is grown in ten provinces that are grouped into three different regions: North, Central and South. Provinces making up these regions are:

North: Punjab, Haryana and Rajasthan
Central: Gujarat, Maharashtra, Madhya Pradesh and Orissa
South: Andhra Pradesh, Karnataka and Tamil Nadu

A summary of production for the above regions is presented below:-

| Region | Harvested Area (ha) | Number of 218 kg Bales | Yield (kg/ ha) | Weighting Factor |
|---|---|---|---|---|
| North | 1,523,500 | 4,717,890 | 677 | 16% |
| Central | 7,501,250 | 16,805,046 | 488 | 56% |
| South | 2,949,500 | 7,846,904 | 578 | 26% |
| India | 12,134,500 | 29,827,982 | 536 | 100% |

## Data Sources

India has a fairly significant set of publically available data sources, such as province level production data by year (CAB, 2015) and grower recommended practices by region, from public university support outreach centers in each province (ICAR, 2014). Cotton Incorporated contracted Agribusiness Associates to interview growers and their advisors in each of the three regions in India at the end of the 2014 growing season. The questions asked were focused on how closely the farms in each region adhered to the recommended practices. Grower interviews were focused in at least one province per region. Approximately 30 to 40 farmers were interviewed by Agribusiness Associates (ABA) representatives in each region.

The Indian government maintains a very detailed database of ground water levels and this data was used in calculating irrigation energy use. There are significant variations in water levels across the country, with the greatest depth to water in the most arid region in the northwest part of the country.

## Grower Practices

India is the only country to grow all four species of cultivated cotton. These are the Asian cottons G. arboreum (Desi cotton) and G. herbaceum, as well as G. barbadense and G. hirsutum. Hybrid cottons are planted on 90% of the cotton area. Production practices varied somewhat according to the type of cotton planted.

The North Region is characterised by cotton grown entirely as an irrigated crop. The climate is adverse at planting with high temperatures and the growing period is limited to May to October. The Central Region is characterised by a hot, semi-arid climate. Planting in this region is dependent upon the onset of monsoon (middle of June to July). The South Region is also characterised by a hot semi-arid climate. However, the agro-climate is more suitable for cotton, especially with the bimodal distribution of rainfall in some areas of the South Region. The planting season is primarily August to September but there is also a small summer crop planted in January to February in Tamil Nadu.

Approximately 65% of India's cotton is produced on non-irrigated land and the remaining 35% on irrigated land. The North Region is almost 100% irrigated while the Central and South regions are primarily produced without irrigation. Other characteristics of the regions are given below:-

### Summary of Key Data Collection Metrics By Region In India:

| Measure | Units | North | Central | South |
|---|---|---|---|---|
| Planting: | Date | 01-May | 15-Jun | 01-Jul |
| Harvesting: | Date | 20-Oct | 15-Nov | 15-Dec |
| Total Harvested Area: | 1000ha | 1,524 | 7,501 | 2,950 |
| Soil Data: | | | | |
| Clay | % | 20 | 56 | 36 |
| Silt | % | 30 | 28 | 23 |
| Sand | % | 50 | 16 | 41 |
| Soil Erosion Rate | kg soil/ ha | 4,000 | 6,000 | 7,000 |

| | | | | |
|---|---|---|---|---|
| Direct Energy and Irrigation: | | | | |
| Diesel Use | Lit./ ha | 20 | 14.82 | 18.5 |
| Irrigated Area | % | 100 | 17 | 10 |
| Irrigated Amount* | mm | 475 | 200 | 100 |
| Weighted Irrigation* | mm | 475 | 34 | 10 |
| Irrigation Energy | KWH /ha | 618 | 115 | 64 |
| Fertilizer Rates: | | | | |
| N | kg /ha | 84.5 | 79.5 | 95.6 |
| P2O5 | kg /ha | 45.5 | 22.7 | 17 |
| K2O | kg /ha | 7.8 | 2.3 | 2.3 |
| Harvest Ginning | | | | |
| Seed Cotton | kg /ha | 1782 | 1287 | 1521 |
| Fibre Yield | kg /ha | 677 | 489 | 578 |
| Distance to Gin | Km | 1 | 2 | 1 |
| Gin Electrical Use | KWH (218kg bale) | 31.8 | 31.8 | 1.8 |

*Irrigation amount is the level of water applied in the region if the land is irrigated. The "Weighted Irrigation" was used in the study to adjust the water applied to represent the amount of water that would have been used if distributed across all acres in the region.*

## Results

- For the life cycle phases that are outlined (Agricultural Production, Textile Manufacturing, and Consumer Use), textile manufacturing was the largest contributor to 12 of the 14 impact categories.

- The major sources of potential impact for manufacturing were waste-water emissions from wet processing facilities, energy use in yarn manufacturing and weaving, and upstream production of energy and process chemicals.

- The Agricultural phase had significant impacts on eutrophication potential and blue water consumption. Nitrogen fertilizer production and use and irrigation water contributed the largest share to impacts in the Agricultural Production phase.

- While the Consumer Use phase was not a primary driver for any one metric, the impact of laundering and disposal was similar in magnitude to the Textile Manufacturing phase on several metrics, such as energy use and greenhouse gas emissions.

- A key source of variance in the use phase is the number of launderings, which indirectly relates to garment life. That is, a garment which is well-constructed has a long life and is more likely to have more laundering cycles that would increase the impact of the use phase and change the relative ranking of the phases.

- Creating textiles with a shorter useful life as a means to decrease impact in the consumer phase would not have the desired positive impact on the environment.

On the lines of 'Cotton Foundation' in USA, there has been an urgent need to create an agency that may perform the most comprehensive life cycle assessment of Indian cotton. Such detailed studies of LCAs under Indian conditions may provide valuable insights to decision makers by identifying key impact areas – "hotspots" – and may enable environmental benchmarking to measure future progress

## Smart, Disruptive Technology and The Future of Farming

In February 2019, various news portals in India carried an article on the creation of a consortium that will advocate and push for the application of disruptive technologies in agriculture, with the aim of making farming an "assured" activity. The platform, the Consortium of Researchers for Disruptive Technologies in Agriculture (CDTA), is a joint venture of the academic-cum-research scientists of IIITMK, Thiruvananthapuram, GB Pant University of Agricultural Sciences and Technology, Pant Nagar (Uttarakhand) and Indian Institute Space Technology.

More information on disruptive technologies in agriculture will be published as a separate article, shortly.

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

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# CAI Releases its March Estimate of the Cotton Crop for 2018-19 Season; Reduces the Crop Further by 7 Lakh Bales from its Previous Month Estimate

Cotton Association of India (CAI) has released its March estimate of the cotton crop for the season 2018-19 beginning from 1st October 2018.

The CAI has estimated cotton crop for 2018-19 at 321 lakh bales of 170 kgs each which is lower by 7 lakh bales than its previous estimate of 328 lakh bales made during last month. Statements containing the State-wise Estimate of the cotton crop and the Balance Sheet for the season 2018-19 with the corresponding data for the previous year are enclosed. The CAI has reduced the crop estimate for Gujarat by 1 lakh bales, Maharashtra by 80,000 bales, Telangana by 4 lakh bales, Andhra Pradesh by 1 lakh bales and Karnataka by 75,000 bales whereas there is marginal increase of 50,000 bales in Tamil Nadu and 5,000 bales in the State of Orissa.

As mentioned in our earlier Press Releases, the main reason for reduction in cotton crop during this year is the scarcity of water in some states and the fact that farmers uprooted their cotton plants in about 70-80% area without waiting for 3rd and 4th pickings.

Total cotton supply projected by the CAI during the period from October 2018 to March 2019 is 290.00 lakh bales of 170 kgs each which consists of the arrival of 255.83 lakh bales upto 31st March 2019, imports of 6.17 lakh bales upto 31st March 2019 and the opening stock at the beginning of the season at 28 lakh bales.

Further, the CAI has estimated cotton consumption during the months of October 2018 to March 2019 at 158 lakh bales while the export shipment of cotton upto 31st March 2019 has been estimated at 39 lakh bales. Stock at the end of March 2019 is estimated at 93 lakh bales including 45.85 lakh bales with textile mills and remaining 47.15 lakh bales with CCI and others (MNCs, Traders, Ginners, etc.).

The CAI has also projected yearly Balance Sheet for the cotton season 2018-19 wherein total cotton supply till end of the cotton season i.e. upto September 2019 has been estimated at 376 lakh bakes of 170 kgs each consisting of the Opening Stock of 28 lakh bales at the beginning of the cotton season, cotton crop for the season estimated at 321 lakh bales and imports estimated by the CAI at 27 lakh bales, which are higher by 12 lakh bales compared to the previous year's import estimated at 15 lakh bales.

The CAI has estimated domestic consumption of 316 lakh bales i.e. at the same level as estimated during the last month while the CAI has estimated exports for the season 2018-19 at 47 lakh bales which are lower by 22 lakh bales compared to the export of 69 lakh bales estimated during last year. The carry-over stock at the end of the season is estimated at 13 lakh bales.

### Highlights of Deliberations held at the Crop Committee Meeting of Cotton Association of India on 8th April 2019

Crop Committee of Cotton Association of India (CAI) met yesterday and based on the data available from various trade sources, upcountry associations and other stakeholders arrived at its March estimate of the cotton crop for the 2018-19 season beginning on 1st October 2018 and drew estimated cotton balance sheet.

The following are the highlights of the deliberations at the said meeting:-

1) The cotton crop estimate for the season 2018-19 is reduced by 7 lakh bales to 321 lakh bales from the CAI's previous month estimate of 328 lakh bales.
2) The projection of cotton export for the season is reduced from 50 lakh bales to 47 lakh bales on account of prevailing higher prices of Indian cotton and smaller crop size. Last year, cotton exports from India were 69 lakh bales.
3) Import of cotton has projected at 27 lakh bales compared to the last year's import of 15 lakh bales. Indian mills have to resort to import compulsorily to cater to their needs and to continue running their day-to-day operations.
4) Estimate of yearly consumption is maintained at 316 lakh bales.
5) Indian cotton arrivals during the months of October 2018 to March 2019 are estimated at 255.83 lakh bales.
6) Shipment of imports during the months of October 2018 to March 2019 are estimated at 6.17 lakh bales.
7) Cotton export shipments during the months of October 2018 to March 2019 are estimated at 39 lakh bales.

8) Consumption by Indian spinning mills during the months of October 2018 to March 2019 is estimated at 158 lakh bales.

9) Cotton stock held by mills in their godowns on 31st March 2019 is estimated at 45.85 lakh bales. This means the mills are having 53 to 55 days stock.

10) CCI, MNCs, Ginners and MCX are estimated to have stock of 47.15 lakh bales as on 31st March 2019.

11) Thus, total stock held by spinning mills and stockists on 31st March 2019 is estimated at 93 lakh bales of 170 kgs. each which is equal to around 98 to 100 lakh running bales.

12) Due to small crop size and a very tight cotton balance sheet, closing stock as on 30th September 2019 is estimated by the Committee at 13 lakh bales of 170 kgs. each.

### CAI's Estimates of Cotton Crop as on 31st March 2019 for the Seasons 2018-19 and 2017-18

*(in lakh bales)*

| State | Production * | | Arrivals as on 31st March 2019 (2018-19) |
|---|---|---|---|
| | 2018-19 | 2017-18 | |
| Punjab | 10.00 | 9.00 | 7.61 |
| Haryana | 25.00 | 23.60 | 20.56 |
| Upper Rajasthan | 12.00 | 11.15 | 12.44 |
| Lower Rajasthan | 13.00 | 12.25 | 13.57 |
| **Total North Zone** | **60.00** | **56.00** | **54.18** |
| Gujarat | 82.50 | 105.00 | 61.00 |
| Maharashtra | 76.20 | 83.00 | 59.00 |
| Madhya Pradesh | 24.25 | 21.50 | 20.00 |
| **Total Central Zone** | **182.95** | **209.50** | **140.00** |
| Telangana | 39.00 | 51.50 | 33.25 |
| Andhra Pradesh | 15.00 | 18.50 | 10.15 |
| Karnataka | 14.25 | 18.75 | 11.00 |
| Tamil Nadu | 5.50 | 5.75 | 3.00 |
| **Total South Zone** | **73.75** | **94.50** | **57.40** |
| Orissa | 3.30 | 4.00 | 3.25 |
| Others | 1.00 | 1.00 | 1.00 |
| **Total** | **321.00** | **365.00** | **255.83** |

** Including loose*

The Balance Sheet drawn by the Association for 2018-19 and 2017-18 is reproduced below:-

*(in lakh bales)*

| Details | 2018-19 | 2017-18 |
|---|---|---|
| Opening Stock | 28.00 | 36.00 |
| Production | 321.00 | 365.00 |
| Imports | 27.00 | 15.00 |
| **Total Supply** | **376.00** | **416.00** |
| Mill Consumption | 276.00 | 275.00 |
| Consumption by SSI Units | 28.00 | 29.00 |
| Non-Mill Use | 12.00 | 15.00 |
| **Total Domestic Demand** | **316.00** | **319.00** |
| **Available Surplus** | **60.00** | **97.00** |
| Exports | 47.00 | 69.00 |
| **Closing Stock** | **13.00** | **28.00** |

### Balance Sheet of 6 months i.e. from 1.10.2018 to 31.03.2019 for the season 2018-19

| Details | (in lakh b/s of 170 kg) | (in '000 Tons) |
|---|---|---|
| Opening Stock as on 01.10.2018 | 28.00 | 476.00 |
| Arrivals upto 31.01.2019 | 255.83 | 4349.11 |
| Imports upto 31.01.2019 | 6.17 | 104.89 |
| **Total Available** | **290.00** | **4930.00** |
| Consumption | 158.00 | 2686.00 |
| Export Shipment 31.01.2019 | 39.00 | 663.00 |
| Stock with Mills | 45.85 | 779.45 |
| Stock with CCI, MNCs, MCX & Ginners | 47.15 | 801.55 |
| **Total** | **290.00** | **4930.00** |

### As per Cotton Association of India Stock on 31.03.2019

| State | Ginners | MNC | CCI | MCX | Total |
|---|---|---|---|---|---|
| PUNJAB | 0.37 | 0.20 | NIL | NIL | 0.57 |
| HARYANA | 0.40 | 0.14 | NIL | NIL | 0.54 |
| RAJASTHAN | 2.00 | 0.54 | NIL | NIL | 2.54 |
| GUJARAT | 7.05 | 3.10 | 0.50 | 0.50 | 11.15 |
| MAHARASHTRA | 7.00 | 2.30 | 1.80 | 1.40 | 12.50 |
| ANDHRA PRADESH | 2.50 | 0.70 | 0.10 | NIL | 3.30 |
| TELANGANA | 2.30 | 1.00 | 7.70 | 0.17 | 11.17 |
| MADHYA PRADESH | 1.93 | 0.60 | 0.50 | NIL | 3.03 |
| ORISSA | 0.70 | NIL | 0.30 | NIL | 1.00 |
| KARNATAKA | 1.00 | 0.20 | 0.15 | NIL | 1.35 |
| **TOTAL** | **25.25** | **8.78** | **11.05** | **2.07** | **47.15** |

## UPCOUNTRY SPOT RATES

(Rs./Qtl)

| Sr. No. | Growth | Grade Standard | Grade | Staple | Micronaire | Strength /GPT | Spot Rate (Upcountry) 2018-19 Crop April 2019 1st | 2nd | 3rd | 4th | 5th | 6th |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 | 11670 (41500) | 11754 (41800) | 11810 (42000) | 11867 (42200) | 11867 (42200) | H |
| 2 | P/H/R | ICS-201 | Fine | Below 22mm | 5.0-7.0 | 15 | 11810 (42000) | 11895 (42300) | 11951 (42500) | 12007 (42700) | 12007 (42700) | |
| 3 | GUJ | ICS-102 | Fine | 22mm | 4.0-6.0 | 20 | 9983 (35500) | 9983 (35500) | 10039 (35700) | 10123 (36000) | 10208 (36300) | |
| 4 | KAR | ICS-103 | Fine | 23mm | 4.0-5.5 | 21 | 11023 (39200) | 11135 (39600) | 11304 (40200) | 11445 (40700) | 11529 (41000) | O |
| 5 | M/M | ICS-104 | Fine | 24mm | 4.0-5.0 | 23 | 11529 (41000) | 11614 (41300) | 11698 (41600) | 11782 (41900) | 11895 (42300) | |
| 6 | P/H/R | ICS-202 | Fine | 26mm | 3.5-4.9 | 26 | 12682 (45100) | 12738 (45300) | 12795 (45500) | 12879 (45800) | 12963 (46100) | L |
| 7 | M/M/A | ICS-105 | Fine | 26mm | 3.0-3.4 | 25 | 11276 (40100) | 11304 (40200) | 11445 (40700) | 11529 (41000) | 11642 (41400) | |
| 8 | M/M/A | ICS-105 | Fine | 26mm | 3.5-4.9 | 25 | 11642 (41400) | 11670 (41500) | 11782 (41900) | 11867 (42200) | 11979 (42600) | |
| 9 | P/H/R | ICS-105 | Fine | 27mm | 3.5.4.9 | 26 | 12851 (45700) | 12879 (45800) | 12935 (46000) | 13020 (46300) | 13104 (46600) | I |
| 10 | M/M/A | ICS-105 | Fine | 27mm | 3.0-3.4 | 26 | 11557 (41100) | 11614 (41300) | 11754 (41800) | 11838 (42100) | 11951 (42500) | |
| 11 | M/M/A | ICS-105 | Fine | 27mm | 3.5-4.9 | 26 | 12007 (42700) | 12007 (42700) | 12120 (43100) | 12204 (43400) | 12317 (43800) | D |
| 12 | P/H/R | ICS-105 | Fine | 28mm | 3.5-4.9 | 27 | 12907 (45900) | 12935 (46000) | 13020 (46300) | 13104 (46600) | 13188 (46900) | |
| 13 | M/M/A | ICS-105 | Fine | 28mm | 3.5-4.9 | 27 | 12232 (43500) | 12317 (43800) | 12457 (44300) | 12541 (44600) | 12654 (45000) | |
| 14 | GUJ | ICS-105 | Fine | 28mm | 3.5-4.9 | 27 | 12288 (43700) | 12373 (44000) | 12513 (44500) | 12598 (44800) | 12710 (45200) | A |
| 15 | M/M/A/K | ICS-105 | Fine | 29mm | 3.5-4.9 | 28 | 12457 (44300) | 12485 (44400) | 12626 (44900) | 12710 (45200) | 12823 (45600) | |
| 16 | GUJ | ICS-105 | Fine | 29mm | 3.5-4.9 | 28 | 12598 (44800) | 12654 (45000) | 12795 (45500) | 12879 (45800) | 12991 (46200) | Y |
| 17 | M/M/A/K | ICS-105 | Fine | 30mm | 3.5-4.9 | 29 | 12710 (45200) | 12766 (45400) | 12935 (46000) | 13048 (46400) | 13160 (46800) | |
| 18 | M/M/A/K/T/O | ICS-105 | Fine | 31mm | 3.5-4.9 | 30 | 12935 (46000) | 12991 (46200) | 13132 (46700) | 13244 (47100) | 13357 (47500) | |
| 19 | A/K/T/O | ICS-106 | Fine | 32mm | 3.5-4.9 | 31 | 13244 (47100) | 13301 (47300) | 13413 (47700) | 13526 (48100) | 13638 (48500) | |
| 20 | M(P)/K/T | ICS-107 | Fine | 34mm | 3.0-3.8 | 33 | 15466 (55000) | 15466 (55000) | 15747 (56000) | 15747 (56000) | 15888 (56500) | |

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