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Cotton Shirt as Strong as Steel?

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The views expressed in this column are his own and not that of Cotton Association of India)

Can you imagine a normal light weight shirt that may act as a durable bullet proof vest? Unbelievable, but true, spider silk proteins expressed within the lumen of cotton fibre produce flexible light weight fibre with properties of steel. Spider silk is 5 times stronger than steel and a pencil thick spider silk strand can stop a Boeing 707 in flight. Can you imagine that cotton fibre can be genetically modified to contain proteins of silk from the silkworm or spinach or the wild plant Calotropis? Such genetically modified fibres have superior fibre traits of high strength, durability, climate friendly and favourable thermal properties. This is not futuristic research. There are several patents and scientific papers in recent times with such outstanding accomplishments made by either altering cotton fibre regulatory genes or by expressing proteins from any external sources inside the cotton fibre to enhance its value.

EXPERT's Column

Dr. K.R. Kranthi

For more than a century, cotton breeders across the world have been working on improving fibre quality through classical plant breeding approaches. The main subject areas of focus have been fibre quality parameters such as length, strength, fineness and maturity. Over the past two decades, significant progress was made in unravelling the molecular aspects of fibre development and identification of genes and tissue specific promoters that regulate length, strength and fineness. The new knowledge of fibre molecular biology along with genetics has strengthened cotton breeding approaches. The step by step process of cotton fibre development has been tracked to identify the genes involved in determining the specific properties of the cotton fibre. Currently efforts are being made by cotton breeders and biotechnologists to explore possible modifications in key parts of the biochemical processes which could lead to improvements in cotton fibre quality.

Fibre quality and yield can be improved by either a) Regulating genes to modify cell wall synthesis, elongation and deposition of cellulose or b) Genetic engineering to express specific proteins in the fibre cell lumen to add strength or special properties. This article describes the recent research progress made in both approaches to increase cotton fibre strength, length and thermal properties.

Cotton fibre is a single elongated cell derived from the ovule epidermis. The formation of cotton fibre happens in four well-defined sequential steps of initiation, elongation, secondary cell wall synthesis and maturation. In the process of fibre development, plant hormones (auxin, gibberellins, cytokinins and ethylene) play very important roles at various stages of growth. Auxin and cytokinin determine fibre initiation and number of fibres. Several studies showed that targeted regulation of auxin and cytokinin hormones in specific parts of the flowers and ovules can improve quality and yield. Interestingly, the number of fibres per ovule increased significantly even with external application of Indole acetic acid (Auxin) on squares and flowers of cotton (Seagull et al., 2004). In 2011, Professor Zhang and his group reported an increase of more than 15% increase in lint yield by expressing the auxin gene iaaM in cotton fibres. Cellulose synthase genes, ces that control secondary wall formation of cotton fibre were also explored to improve fibre quality. Several attempts were made to increase fibre quality and yield by regulating fibre specific genes of cotton through over-expression or gene silencing.

Recent reports published during 2011-2013 showed that fibre strength and yield could be improved through genetic manipulation of cotton fibre regulating genes. A few candidate genes such as Sucrose phosphate synthase susA1 genes, extension, Myb, aquaporin, expansin, annexin were tried with fibre specific promoters using low fibre length and strength genotypes to improve fibre strength. Professor Jiang's group showed in 2012, that over-expression of a sucrose synthase gene GhSusA1 increased plant biomass and improved cotton fibre yield and quality. Transgenic cotton over-expressing a profilin gene GhPFN2 that codes for actin bundling protein resulted in higher fibre bundle strength (Bao et al. 2011; Hinchliffe et al., 2011; Haigler et al., 2012).

Over the past decade, attempts were made to increase fibre length through genetic engineering. Lee et al., (2010) developed transgenic cotton plants to over-express a native gene GhXTH1 that produced 15–20% longer fibre. Xiao et al. (2010) reported that an enzyme Gibberellin 20-oxidase promotes initiation and elongation of cotton fibers by regulating gibberellin synthesis. Wang et al., (2009) developed transgenic cotton with increase in fibre length (+5.6%) and thicker secondary walls by regulating the expression of actin-depolymerizing genes GhADF1. Recently, Chen et al. (2012) reported that down-regulated expression of abscisic acid (ABA) and ethylene signalling pathway genes and high-level and long-term expression of positive regulators including auxin and cell wall enzyme genes for fibre cell elongation at the fibre developmental transition stage may account for superior fibre qualities. Jin Qu et al. (2013) from University of Singapore achieved increased fibre length by silencing an endogenous gene 'Wrinkled1'in cotton.

The earliest attempts of genetic transformation of fibre using genes from external sources, were pioneered by Professor John Maliyakal and his colleagues. In 1996, they produced genetically modified (GM) cotton by introducing poly hydroxyl butyrate, PHB genes isolated from bacteria Alcaligenes eutrophus. The transgenic fibres expressed PHB proteins inside the fibre lumen to exhibit better insulating characteristics with higher heat capacity, lower thermal conductivity, slower cooling, and take up more heat than natural cotton fibre. However the changes in thermal properties were relatively small, as expected from the small amounts of PHB in fibres (0.34% fibre weight). Attempts are being made to increase the PHB synthesis several fold for product applications. PHB proteins were also expressed in linseed (flax fibre) through genetic engineering technologies by Professor Wroebel's group in 2004, to improve thermal insulation.

Over the past 10 years, a few potential candidate genes from various biological sources have been explored for fibre quality improvement. Some of the interesting and useful sources are, SPS gene from spinach, acsA and acsB genes of bacteria Acetobacter xylinum, the spider silk gene, spindroin and genes governing the expression of Fibroin (H- Fib, L- Fib, P25), Sericin (Ser1 and Ser 2) and Seroin in the silk worm Bombyx mori.

Silk from silkworms is composed of two proteins, fibroin and sericin and is 5-10 times more extensible than cellulose with superior thermal properties. Fibroin is a natural keratin protein with high tensile strength and soft texture. Expression of fibroin gene in cotton plants resulted in significant changes in fibre quality traits (LI FeiFei et al 2009). Insect silk proteins were also produced in wool producing mammals through genetic engineering Patent no: 2001-218289/22 Karatzaz and Huang (China).

Spider webs made of the thin silk appear extremely delicate. But, interestingly, spider silk is one of the strongest natural substances available in nature. Spider silk is at least 5 times stronger than steel, twice as elastic as nylon, water proof, stretchable and exhibit extreme heat stability. Spider silk is so strong that a pencil thick silk strand can stop a Boeing 707 in flight. Spider silk is being used commercially in spacecraft, artificial ligaments, biodegradable fishing lines, super strong surgery thread for ocular, neurological, cosmetic surgeries, and for light bullet proof fabric. Expression of spider proteins as leaf protein and seed protein has been achieved in plant vacuoles and endoplamic reticulum of potato and tobacco. Spindroins were expressed up to 2 % of the total soluble protein in tobacco leaves and potato tubers. Barr et al. (2004) produced spider silk proteins in genetically modified Arabidopsis leaves and seeds. In 2010, Randy Lewis and his group at the University of Wyoming isolated spider silk protein gene from the spider species, golden orb weaver, Nephila clavipes to produce the spider silk proteins in the milk of genetically engineered goats, that can be inter-bred and perpetrated as genetically modified (GM) goats. The silk is extracted from milk and extruded through fine nozzles to reproduce threads of spider silk commercially called 'Bio-steel'. In 2012, Teule and co-workers from the University of Wyoming developed genetically modified silk worms engineered to produce a spider silk protein 'Spindroin-1' from Nephila clavipes. The silk fibres produced by the silk worms is commercially called "Big Red" monster silk. The fibre comprises of composite chimeric silkworm/spider silk proteins that are tougher than the parental silkworm silk fibres and as tough as native dragline spider silk fibres. Such bio-silks can be used commercially in the textile, pharmaceutical, aeronautical, spacecraft and satellite related industries. Wang, Li and Niu (2002) obtained a patent -CN1380418:2:20.11.2002 on 'cotton fibrocyte expression vector plasmid of spider silk gene'.

Shehzad et al. (2013) from University of Punjab, Pakistan isolated an expansin gene CpEXPA3 from the wild plant Calotropis procera and introduced it into local cotton (Gossypium hirsutum variety NIAB-846) through genetic engineering. Data from three years of field performance of the transformed cotton plants indicate that fibre strength was significantly improved as compared to a control. Five years ago in 2007, Professor Haigler's group isolated 'sucrose phosphate synthase' sps gene from spinach and introduced it into cotton to improve fibre quality especially under stress. The quality of the genetically engineered fibre was of a premium range even when grown under stressful cool night conditions.

Thus it is clear that there can be unlimited opportunities for the creation of 'wonder-cotton-fibres' either through modification of fibre-regulatory genes within cotton itself, or by over-expressing some external proteins in fibre lumen. Such achievements are likely to get consolidated through strong research efforts in the near immediate future not just for the creation of wonder-cotton-fibres, but also for wonder-cotton-fabric with unimaginable superior qualities such as strength and durability. 'Cotton shirt as strong as steel', will not be just a slogan, but something that all of us may live to use.

Timely Rains and Fast Pace of Sowings Bodes Well for the 2013-14 Cotton Season

The Association has recently released its monthly estimates for June cotton crop for the season 2012-13. The State-wise production estimates of the Association along with the market arrivals are given below:

CAI's Estimates of Cotton Crop as on 6th June 2013

(in lakh bales)

State	Production 2012-13	Production 2011-12	Arrivals as on 30.06.13
Punjab	15.50	18.00	15.00
Haryana	24.00	27.50	23.25
Upper Rajasthan	7.50	10.00	7.25
Lower Rajasthan	8.50	7.75	8.50
Total North Zone	54.50	63.25	54.00
Gujarat	85.75	114.00	83.25
Maharashtra	72.00	72.00	71.00
Madhya Pradesh	18.00	18.00	17.75
Total Central Zone	175.75	204.00	172.00
Andhra Pradesh	75.00	58.00	73.00
Karnataka	13.00	13.00	12.00
Tamil Nadu	5.00	5.00	2.75
Total South Zone	93.00	76.00	87.75
Orissa	3.00	2.00	3.00
Others	2.00	2.00	2.00
Total	329.25	347.25	318.75
Loose Cotton	26.00	26.00	26.00
All-India	355.25	373.25	344.75

The Balance Sheet drawn by the Association for 2012-13 and 2011-12 is reproduced below:

(in lakh bales)

Details	2012-13	2011-12
Opening Stock	53.21	53.27
Production	355.25	373.25
Imports	15.00	9.00
Total Supply	**423.46**	**435.52**
Mill Consumption	245.00	217.68
Consumption by SSI Units	22.00	21.63
Non-Mill Use	16.00	16.00
Exports	-	127.00
Demand	**283.00**	**382.31**
Available Surplus	**140.46**	**-**
***Closing Stock**	**-**	**53.21***

CAI has placed the cotton crop for the season 2012-13 at 355.25 lakh bales. The projected Balance Sheet drawn by the CAI for the year 2012-13 estimated the total cotton supply at 423.46 lakh bales while the domestic consumption is estimated at 283 lakh bales, thus leaving an available surplus of 140.46 lakh bales. The arrivals as on 30th June 2013 are placed at 344.75 lakh bales. A statement containing the State-wise estimates of Crop and Balance Sheet for the season 2012-13 and the corresponding data for the previous season 2011-12 is enclosed.

The timely rains and the fast pace at which sowing of cotton is reportedly taking place bodes well for a good crop during the 2013-14 crop year.

Update on Cotton Acreage (as on 04.07.2013)

Sl. No	States	Normal of Year*	Normal on Week**	Area Sown (During the corresponding week in)	
				2013	2012
1	2	3	4	5	6
1	Andhra Pradesh	20.09	7.07	10.90	9.04
2	Gujarat	26.97	6.07	19.91	5.38
3	Haryana	5.82	4.86	5.22	5.15
4	Karnataka	5.28	1.49	2.76	1.52
5	Madhya Pradesh	6.55	2.32	6.09	1.71
6	Maharashtra	40.71	13.46	28.19	14.97
7	Orissa	0.98	0.34	0.55	0.53
8	Punjab	5.24	5.50	5.03	5.16
9	Rajasthan	4.18	2.89	2.75	2.80
10	Tamil Nadu	1.28	0.07	0.10	0.05
11	Uttar Pradesh	0	0.26	0.23	0.30
12	West Bengal	0	0	0	0
13	Others	0.43	0	0	0
	Total	**117.53**	**44.33**	**81.73**	**46.61**

*Normal area mentioned above is average of last three years ** It is average of last three years*
(Source: Directorate of Cotton Development, Mumbai)

ICAC'S Cotton This Month

The Cotlook A Index rose to 96.65 cents per pound around mid-June 2013 before receding to the low 90s cents level towards the end of the month. While such price fluctuation is not uncommon, it is worth examining several variables related to policy and the economy that have impacted world cotton supply and demand and are reflected in movements in world cotton prices this month.

On June 12th, the USDA revised its estimates of U.S. cotton production and exports for 2012/13 and 2013/14 (USDA World Agricultural supply and Demand Estimates WASDE-519). The 2012/13 U.S. export estimate was increased by 76,000 tons to 3 million tons due to continued strong sales to China. On the other hand, the estimate of 2013/14 U.S. production was decreased by 78,000 tons to 2.9 million tons due to drought in the southwest. On June 19th, the Federal Reserve's signal that it could start scaling back its huge economic stimulus program later this year and end it by the middle of 2014 triggered a major sell-off in the stock and bond markets, but only a modest drop of 1.75 cents per pound in the Cotlook A Index.

As cotton stockpiling continues in China, more storage is needed. China's national cotton reserve is estimated at close to 9 million tons as of the end of June. The largest cotton warehouse in northern China, with a capacity of 100,000 tons, was setup in Shandong province in May. There are plans to expand the facility to a capacity as high as 500,000 tons. At the same time, the government is actively trying to reduce the reserve by 4.5 million tons this

year. In June, over half a million tons of cotton were sold at state reserve auction, and 2.5 million tons of cotton have been sold from the state reserve year-to-date. About 30% of reserve cotton offered at auction has been sold on average. At the current rate of auction sales, a total of 3 million tons of reserve cotton will be sold by the end of July, well below the target of 4.5 million tons. However, there are rumours that the government may extend auctions until the end of September.

In May the International Monetary Fund lowered its forecast for China's growth to 7.75% this year and the next, down from April forecasts of 8% and 8.2% respectively. The new administration in China has initiated a series of reforms designed to open up the economy to private investment and alter a household registration system that holds back urbanization. Certainly these policies will accelerate the reduction of cotton area, particularly in the Yangtze region and the Yellow River region.

On June 24th the People's Bank of China stated that the Chinese government was willing to tighten monetary policy to achieve more stable economic growth. The new policy could result in bankruptcies, and the tighter credit policy has already had an immediate impact on spinners. Spinners are reducing purchases from the reserve, which requires payment upon delivery, and are expanding imports with 90-day letters of credit.

All in all, China's cotton policy remains the main driver of world cotton prices. As long as China maintains state reserve purchases at a minimum support price higher than world cotton prices, the world cotton market will remain relatively stable but distorted. With the recent acknowledgement of the market distortion created by its national cotton reserve programs, Chinese policy makers are already planning to experiment with a direct subsidy in Xinjiang. At the provincial level, in an effort to stop the rapid decline of cotton planting in Hebei, cotton farmers were paid a direct subsidy in April this year.

Since 2010/11 world cotton production has exceeded world cotton consumption. But world cotton production for 2013/14 is projected to drop from 26 million tons to 25 million tons, the lowest in three seasons. While the 2012/13 global ending stocks are expected to be approximately split evenly between China and the rest of the world, China is projected to hold close to 60% of the global stocks by the end of 2013/14.

The world cotton demand and supply, as drawn up by the ICAC, is given below.

(in mt)

	2011-12	2012-13	2013-14
Production	27.79	26.39	24.95
Consumption	22.10	23.78	24.33
Imports	9.82	9.79	9.22
Exports	9.82	9.79	9.22
Ending Stocks	15.27	17.88	18.51

(Source: ICAC Monthly - 01.07.2013)

SUPPLY AND DISTRIBUTION OF COTTON

July 01, 2013

Seasons begin on August 1 — Million Metric Tons

	2008/09	2009/10	2010/11	2011/12 Est.	2012/13 Proj.	2013/14 Proj.
BEGINNING STOCKS						
WORLD TOTAL	**12.257**	**11.942**	**8.676**	**9.580**	**15.27**	**17.88**
China (Mainland)	3.321	3.585	2.688	2.087	6.18	9.12
USA	2.188	1.380	0.642	0.566	0.73	0.79
WORLD TOTAL	**23.503**	**22.247**	**25.368**	**27.793**	**26.39**	**24.95**
China (Mainland)	8.025	6.925	6.400	7.400	7.30	6.70
India	4.930	5.185	5.865	6.345	5.97	6.20
USA	2.790	2.654	3.942	3.391	3.77	2.94
Brazil	1.214	1.194	1.960	1.877	1.26	2.02
Pakistan	1.926	2.070	1.907	2.294	2.09	1.42
Uzbekistan	1.000	0.850	0.910	0.880	1.00	1.00
Others	3.617	3.369	4.385	5.601	4.96	4.66
CONSUMPTION*						
WORLD TOTAL	**23.862**	**25.520**	**24.502**	**22.102**	**23.78**	**24.33**
China (Mainland)	9.265	10.192	9.580	8.635	8.29	8.04
India	3.872	4.300	4.509	3.700	5.00	5.50
Pakistan	2.519	2.393	2.100	2.163	2.44	2.49
East Asia & Australia	1.714	1.892	1.796	1.646	1.86	1.92
Europe & Turkey	1.458	1.600	1.549	1.495	1.51	1.55
Brazil	1.000	1.024	0.958	0.888	0.90	0.92
USA	0.771	0.773	0.849	0.718	0.75	0.76
CIS	0.596	0.604	0.577	0.551	0.61	0.63
Others	2.666	2.743	2.583	2.305	2.42	2.51
EXPORTS						
WORLD TOTAL	**6.609**	**7.798**	**7.636**	**9.821**	**9.79**	**9.22**
USA	2.887	2.621	3.130	2.526	2.96	2.39
India	0.515	1.420	1.085	2.159	1.53	1.47
Brazil	0.596	0.433	0.435	1.043	0.91	0.79
Australia	0.261	0.460	0.545	1.010	1.10	1.24
CFA Zone	0.469	0.560	0.476	0.592	0.77	0.95
Uzbekistan	0.650	0.820	0.600	0.550	0.65	0.65
IMPORTS						
WORLD TOTAL	**6.647**	**7.928**	**7.725**	**9.808**	**9.79**	**9.22**
China	1.523	2.374	2.609	5.342	3.95	3.36
East Asia & Australia	1.714	1.989	1.825	1.999	2.25	2.21
Europe & Turkey	0.862	1.170	0.972	0.725	1.01	1.08
Pakistan	0.417	0.342	0.314	0.191	0.52	0.55
CIS	0.231	0.209	0.132	0.098	0.11	0.11
TRADE IMBALANCE 1/	**0.038**	**0.130**	**0.089**	**-0.013**	**0.00**	**0.00**
STOCK ADJUSTMENT 2/	**0.007**	**-0.122**	**-0.051**	**0.013**	**0.00**	**0.00**
ENDING STOCKS						
WORLD TOTAL	**11.942**	**8.676**	**9.580**	**15.271**	**17.88**	**18.51**
China (Mainland)	3.585	2.688	2.087	6.181	9.12	11.11
USA	1.380	0.642	0.566	0.729	0.79	0.57
ENDING STOCKS/MILL USE (%)						
WORLD-LESS-CHINA(M) 3/	**57**	**39**	**50**	**68**	**57**	**45**
CHINA (MAINLAND) 4/	**39**	**26**	**22**	**72**	**110**	**138**
Cotlook A Index 5/	**61.20**	**77.54**	**164.26**	**100.01**	**88***	

1/ The inclusion of linters and waste, changes in weight during transit, differences in reporting period and measurement error account for difference between world imports and exports.
2/ Difference between calculated stocks and actual; amounts for forward seasons are anticipated.
3/ World-less-China's ending stocks divided by World-less-China's mill use, multiplied by 100.
4/ China's ending stocks divided by China's mill use, multiplied by 100.
5/ U.S. Cents per pound
* The price projection for 2012/13 is based on the ending stock/mill use ratio in the world-less-China in 2010/11(estimate), in 2011/12(estimate) and in 2012/13(projection), on the ratio of Chinese net imports to world imports in 2011/12(estimate) and 2012/13(projection), and on the average price for the first ten months of 2012/13.
95% confidence interval:85 to 93 cents per pound
(Source : ICAC Monthly July 2013)

UPCOUNTRY SPOT RATES

(Rs./Qtl)

Standard Descriptions with Basic Grade & Staple in Millimetres based on Upper Half Mean Length [By law 66 (A) (a) (4)]							Spot Rate (Upcountry) 2012-13 Crop JULY 2013					
Sr. No.	Growth	Grade Standard	Grade	Staple	Micronaire	Strength /GPT	1st	2nd	3rd	4th	5th	6th
1	P/H/R	ICS-101	Fine	Below 22mm	5.0 – 7.0	15	11220 (39900)	11079 (39400)	10939 (38900)	11079 (39400)	11079 (39400)	11079 (39400)
2	P/H/R	ICS-201	Fine	Below 22mm	5.0 – 7.0	15	11501 (40900)	11360 (40400)	11220 (39900)	11360 (40400)	11360 (40400)	11360 (40400)
3	GUJ	ICS-102	Fine	22mm	4.0 – 6.0	20	8099 (28800)	8155 (29000)	8155 (29000)	8211 (29200)	8211 (29200)	8267 (29400)
4	KAR	ICS-103	Fine	23mm	4.0 – 5.5	21	8886 (31600)	8886 (31600)	8886 (31600)	8970 (31900)	8970 (31900)	9026 (32100)
5	M/M	ICS-104	Fine	24mm	4.0 – 5.5	23	10208 (36300)	10208 (36300)	10348 (36800)	10432 (37100)	10432 (37100)	10489 (37300)
6	P/H/R	ICS-202	Fine	26mm	3.5 – 4.9	26	11360 (40400)	11360 (40400)	11417 (40600)	11501 (40900)	11501 (40900)	11557 (41100)
7	M/M/A	ICS-105	Fine	26mm	3.0 – 3.4	25	10461 (37200)	10461 (37200)	10545 (37500)	10629 (37800)	10629 (37800)	10714 (38100)
8	M/M/A	ICS-105	Fine	26mm	3.5 – 4.9	25	10714 (38100)	10714 (38100)	10798 (38400)	10882 (38700)	10882 (38700)	10967 (39000)
9	P/H/R	ICS-105	Fine	27mm	3.5 – 4.9	26	11473 (40800)	11473 (40800)	11557 (41100)	11642 (41400)	11642 (41400)	11698 (41600)
10	M/M/A	ICS-105	Fine	27mm	3.0 – 3.4	26	10657 (37900)	10657 (37900)	10742 (38200)	10826 (38500)	10826 (38500)	10911 (38800)
11	M/M/A	ICS-105	Fine	27mm	3.5 – 4.9	26	10882 (38700)	10939 (38900)	11023 (39200)	11107 (39500)	11107 (39500)	11192 (39800)
12	P/H/R	ICS-105	Fine	28mm	3.5 – 4.9	27	11614 (41300)	11614 (41300)	11670 (41500)	11754 (41800)	11754 (41800)	11810 (42000)
13	M/M/A	ICS-105	Fine	28mm	3.5 – 4.9	27	11389 (40500)	11473 (40800)	11557 (41100)	11670 (41500)	11670 (41500)	11754 (41800)
14	GUJ	ICS-105	Fine	28mm	3.5 – 4.9	27	11389 (40500)	11473 (40800)	11557 (41100)	11670 (41500)	11670 (41500)	11754 (41800)
15	M/M/A/K	ICS-105	Fine	29mm	3.5 – 4.9	28	11529 (41000)	11614 (41300)	11698 (41600)	11810 (42000)	11810 (42000)	11895 (42300)
16	GUJ	ICS-105	Fine	29mm	3.5 – 4.9	28	11529 (41000)	11614 (41300)	11670 (41500)	11810 (42000)	11810 (42000)	11895 (42300)
17	M/M/A/K	ICS-105	Fine	30mm	3.5 – 4.9	29	11670 (41500)	11810 (42000)	11895 (42300)	11951 (42500)	11951 (42500)	12035 (42800)
18	M/M/A/K/T/O	ICS-105	Fine	31mm	3.5 – 4.9	30	11726 (41700)	11867 (42200)	11951 (42500)	12092 (43000)	12092 (43000)	12176 (43300)
19	K/A/T/O	ICS-106	Fine	32mm	3.5 – 4.9	31	11895 (42300)	12035 (42800)	12092 (43000)	12232 (43500)	12232 (43500)	12317 (43800)
20	M(P)/ K/T	ICS-107	Fine	34mm	3.0 - 3.8	33	14341 (51000)	14341 (51000)	14341 (51000)	14341 (51000)	14341 (51000)	14341 (51000)

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