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Best Practices for Irrigated Extra Long Staple Cotton Production under High Density Planting System

EXPERT's Column

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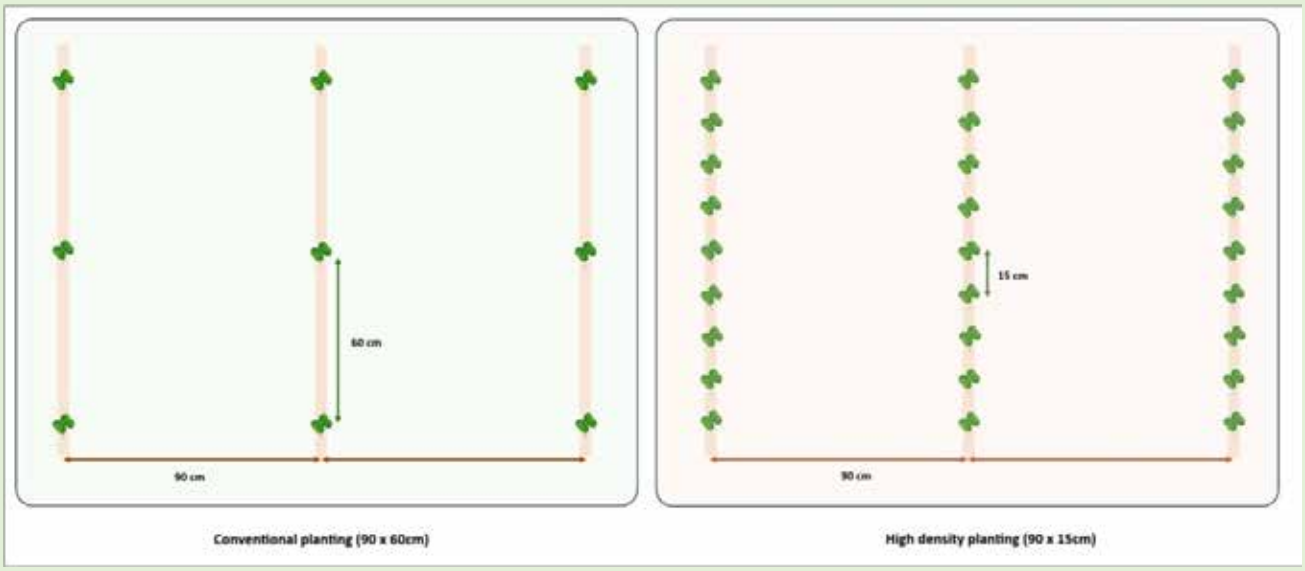
Dr. R. Raja, Principal Scientist at the ICAR-Central Institute for Cotton Research, Regional Station, Coimbatore, is an experienced agronomist with 21 years of research expertise across various regions of India. His work focuses on crop production under challenging weather conditions, and he has successfully developed and demonstrated climate-resilient production technologies. He has developed technology for yield enhancement in extra-long staple cotton. Currently, he is actively engaged in advancing precision agriculture and exploring the use of drones in cotton farming.

For achieving higher productivity and profitability in irrigated Extra Long Staple (ELS) cotton production system, High Density Planting System (HDPS) is emerging as an option for progressive farmers. The HDPS is a method of growing cotton plants in close proximity to each other, which can increase yields and make mechanical harvesting possible.



Planting Geometry in Conventional and HDPS Methods

The best practices need to be adopted for getting higher yield from conventional ELS cotton varieties like Suraksha under HDPS are discussed in brief hereunder.

Tillage Management

The land has to be prepared properly. For this disc plough or mould board plough can be used. Then, using 5-bottom plough or spring tine harrow the land has to be tilled. If clods are there, disc harrow or rotovator can be used to break them to achieve good tilth. If the field is having uneven and undulating topography, levelling should be done using laser leveller for uniform distribution of irrigation water across the field. This will also facilitate easy drainage of excess rainwater during intense rainfall events. If the problem of subsurface hard pan is there, plough the land with chisel plough in criss-cross manner at one meter interval. This can be done once in three years to achieve desirable results.

Reversible Mould Board Plough

Reversible Disc Plough

5-Bottom Plough

Laser Land Leveler

Manure Application

Well decomposed farm yard manure (FYM) @ 5t/ acre (or) vermicompost @ 1 t/ acre need to be applied before final ploughing. Biofertilizers like Azospirillum and Phosphorus Solubilizing Bacteria has to be applied @ 800g (4 packets of 200 g each) per acre.

Seed Rate

The recommended seed rate (delinted seeds) is 6 - 7 kg per acre under HDPS for semi-compact ELS varieties like Suraksha. Care should be taken while selecting ELS varieties for HDPS and spreading type varieties like Suvin may not be suitable for HDPS under high soil fertility conditions.

Spacing

Spacing depends on soil type and soil fertility level. However, the generally recommended spacing for Suraksha under HDPS is 90 cm x 10-15 cm.

Sowing

High density planting of cotton variety Suraksha @ 90 x 10cm spacing amounts to 1,11,111 plants/ ha which is equivalent to approximately 45,000 plants/ acre. Manually planting these many seeds will increase the cost of planting five-fold. Hence, use of seed drills like inclined plate planter or pneumatic precision planter is highly recommended to cover larger area under HDPS system. Seed has to be sown at 3 cm depth at the recommended spacing. Hence, the planting needs to be done using the planters on flat levelled land. Bunds and irrigation channels need to be formed, using tractor drawn ridges for the latter. If drip irrigation facility is there, planting can be done at recommended spacing in a well ploughed and levelled land and drip laterals can be placed along the seed row and irrigation can be done.

Fertilizer Management

In general, fertilizer dose for cotton is recommended based on soil test results or based on the soil health card entries. In the absence of the above, for cotton varieties, the generally recommended dose of 90 kg Urea: 130 kg Single Super Phosphate (SSp): 36 kg Muriate of Potash (MOP) has to be applied for one acre. In this, 30 kg Urea: 130 kg SSP: 18 kg MOP can be applied as basal dose. The recommended dose of basal fertilizers should be applied as a band by opening a small furrow 5 cm (2 inches) away from the cotton seed row and after application of fertilizers, the furrow needs to be closed. In case of Ferti-seed drill is used for sowing, basal fertilizer can be applied at the time of sowing itself in a single go. First top dressing of 30 kg Urea and 18 kg Muriate of Potash can be applied during 40-45 days after sowing during earthing up operations and the remaining 30 kg urea can be applied as second top dressing at 60th day after sowing.

Precision sowing of ELS cotton seeds using Pneumatic Planter

Field view of precision planted HDPS cotton

Field view of 100% N fertilized (Left) vs No nitrogen applied cotton crop (Right) under HDPS system

Recommended dose of fertilizers for one acre ELS cotton crop under HDPS system

Particulars	Urea	SSP	MOP
Basal	30 kg	130 kg	18 kg
First top dressing	30 kg	-	18 kg
Second top dressing	30 kg	-	-


Harrowing (Left) and Earthing up (Right) using Tractor Drawn implements

Earthing up

Intercultural operation, earthing up need to be done around 45 days after sowing using bullock pair/ mini tractor/ tractor for providing support to the plants.

Canopy Management

Canopy management is a technique practiced in cotton to control excessive vegetative growth, prevent lodging and improve yield. This can be done either manually or using plant growth regulating (PGR) chemicals like Mepiquat Chloride. Application of PGR chemical alters plant growth and partitioning by inhibiting endogenous gibberellic acid biosynthesis, which in turn inhibits cell elongation and results in compact plant structure with reduced inter-nodal length and reduced plant height.

As the plant population per unit area under HDPS is much higher than conventional planting system, proper canopy management is very important to maintain crop architecture and to allow the solar radiation to reach the lower layers of the crop canopy. For semi-compact ELS cotton varieties like Suraksha, need based Mepiquat Chloride spray was carried out @ 60ppm when Height to Node Ratio (HNR) reached 1.5 (usually this value is reached when the crop is 50-60 days old) followed by 30 ppm twice at 15 days interval after first spray. By adding 1.2ml of commercially available Mepiquat Chloride 5% w/w in one (1) litre of water we can achieve 60ppm Mepiquat Chloride spray. The final spray of 30 ppm Mepiquat Chloride should be optional and depends on crop height and vigour.

Micronutrient Application

In fields having history of micronutrient deficiency, micronutrient mixture for cotton can be applied at the time of sowing along the seed row @ 5 kg/ acre by mixing it with 20 kg sand or well decomposed Farm Yard Manure.

Spraying of Mepiquat Chloride using Battery operated Knapsack Sprayer

Spraying of Mepiquat Chloride using Agro-chemical Spraying Drone

Weed Management

Though weeds can be managed through manual weeding in cotton fields, the cost of cultivation increases owing to the increasing labour cost as well as there is shortage of labours during peak season which results in delay in weeding. Herbicides provide timely and cheaper weed control option to cotton farmers now-a-days. Pre-emergence application of Pendimethalin 38.7 CS @ 70 ml per 10 litre of water will provide good control of weeds during the initial period (25-30 days after sowing) of cotton growth. For controlling weeds that emerge after earthing operation, post-emergence herbicides can be used. Tank mix application of Quizalofop ethyl 5%EC @ 25ml and Pyrithiopac sodium 10EC @ 25ml per 10 litre of water has to be done when the

Pre-emergence herbicide application using Boom Sprayer

Optimal weed growth stage (2-3 leaf stage) for selective post- emergence herbicide application

HDPS ELS cotton crop under drip irrigation at seedling stage (Left) and square forming stage (Right)

weeds are in 2-3 leaves stage for control of grasses and broad leaved weeds.

Foliar Application of Nutrients

At the time of flowering and boll formation stage, foliar application of 19:19:19 N:P:K water soluble fertilizer @ 1 kg/ acre (i.e., 10g 19:19:19 N:P:K fertilizer per litre of water) can be done twice or thrice at 10-15 days interval. During boll development, Multi-K water soluble fertilizer @ 1 kg/ acre (i.e., 10g Multi-K fertilizer per litre of water) along with Boron water soluble fertilizer @ 100g/ acre (i.e., 1g Boron fertilizer per litre of water) can be applied as foliar spray twice at 10-15 days interval. This will improve boll setting and development and in turn increase seed cotton yield.

Naphthalene Acetic Acid Application

Application of 40 ppm of Naphthalene Acetic Acid (NAA) at 60 and 90 DAS reduces bud and square dropping and improves boll setting. Mixing of 4 ml of planofix in 10 litres of water will give 40 ppm NAA solution.

Water Management

Irrigation has to be given immediately after sowing and life irrigation needs to be given five days after sowing. After that, irrigation need to be scheduled based on the soil type, rainfall, crop growth stage. Generally, cotton fields have to be irrigated once in 15-20 days. In case of drip irrigation system, based on the drip system design and soil type the frequency (every day or alternate days) and duration of irrigation has to be fixed.

Integrated Pest Management

Like normal cotton crop, periodical monitoring should be done for pest and disease incident. Using Economic Threshold Levels, integrated pest and disease management has to be carried out in a timely manner to achieve higher yield.

Harvesting

Cultivation of cotton under HDPS is amenable for machine picking. However, the machine picking involves, spraying of defoliant chemical for facilitating complete shedding of leaves from the plants. This technology is in developmental and evaluation stage and soon defoliant chemicals may be made available in market. Until then, we can go for manual picking in which kapas has to be picked from fully opened bolls only at frequent intervals. Care should be taken to avoid contamination and the kapas has to be graded and stored properly before taking it to the market.

By adopting the above mentioned best practices under HDPS system, ELS cotton farmers can achieve higher productivity and profitability.

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

Egyptian Delegation Visits India

At the invitation of the Government of India and the Cotton Association of India (CAI), a 3-members Egyptian delegation was in India for inspection, following which Egypt would provide their "no objection" to the import of raw cotton. The export of raw cotton from India to Egypt has been banned for the last several years on the ground of the alleged presence of pests in shipments. The delegation stayed in India from Saturday, 7th December 2024 to Friday, 13th December 2024.

The Egyptian delegation had meetings with the Ministry of Commerce and Industry and the Plant Protection department of the Ministry of Agriculture and Farmers Welfare on 9th December 2024 and held discussions to address their concern areas in allowing import of Indian raw cotton into Egypt.

The delegation also visited the Mundra port to inspect the fumigation and other facilities and also meet ginners and traders in Ahmedabad,

before concluding their India visit. This visit was sponsored by Cotton Association of India (CAI).

The Egyptian delegation has acknowledged that India has the potential in the area of raw cotton. The delegation has assured CAI that Egypt is keen to maintain good trade relations with India and that it will recommend for removal of ban on import of Indian raw cotton to Egypt.

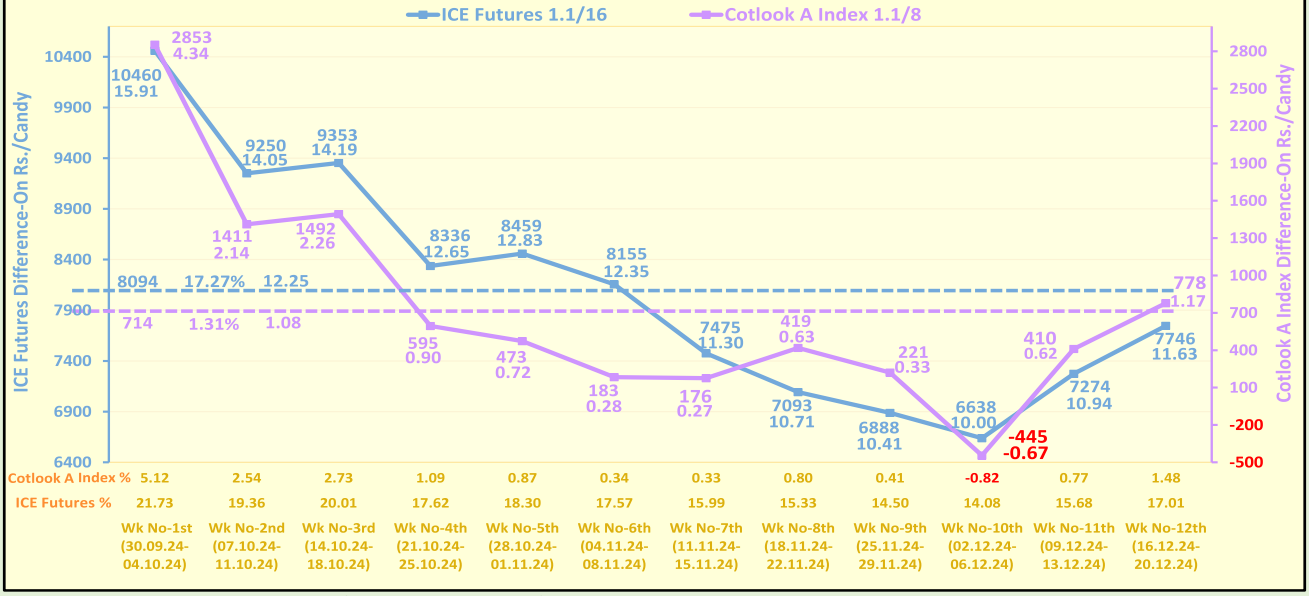
Basis Comparison of ICS 105 with ICE Futures and Cotlook A Index -21st December 2024

SEASON 2024-2025

Comparison M/M(P) ICS-105, Grade Fine, Staple 29mm, Mic. 3.7-4.5, Trash 3.5%, Str./GPT 28 with ICE Futures & Cotlook A Index

Date 2024	1 US $ = Rs.	CAI Rates Rs./c.	Indian Ctn in USc/lb.	ICE Settlement Futures 1.1/16 Mar.'24 USc/lb.	Difference-ON/OFF ICE Futures		%	Cotlook A Index M-1.1/8	Difference-ON/OFF Cotlook A Index		%
					USc/lb.	Rs./c			USc/lb.	Rs./c	
A	B	C	D	E	F	G	H	I	J	K	L
Cotton Year Week No-12th											
16th Dec	84.87	53300	80.10	69.06	11.04	7346	15.99	79.50	0.60	399	0.75
17th Dec	84.90	53300	80.08	68.69	11.39	7581	16.58	79.25	0.83	552	1.05
18th Dec	84.95	53300	80.03	68.08	11.95	7959	17.55	78.85	1.18	786	1.50
19th Dec	85.07	53300	79.92	67.91	12.01	8010	17.69	78.35	1.57	1047	2.00
20th Dec	85.02	53200	79.81	68.06	11.75	7832	17.26	78.15	1.66	1106	2.12
Weekly Avg.	**84.96**	**53280**	**79.99**	**68.36**	**11.63**	**7746**	**17.01**	**78.82**	**1.17**	**778**	**1.48**
Cotton Year Week No-11th											
09th Dec	84.73	53900	81.14	69.95	11.19	7433	16.00	80.35	0.79	525	0.98
10th Dec	84.85	53700	80.73	69.48	11.25	7484	16.19	80.10	0.63	419	0.79
11th Dec	84.84	53600	80.58	70.15	10.43	6938	14.87	79.60	0.98	652	1.23
12th Dec	84.87	53600	80.56	70.09	10.47	6967	14.94	80.25	0.31	206	0.39
13th Dec	84.80	53600	80.62	69.27	11.35	7546	16.39	80.25	0.37	246	0.46
Weekly Avg.	**84.82**	**53680**	**80.73**	**69.79**	**10.94**	**7274**	**15.68**	**80.11**	**0.62**	**410**	**0.77**
Cotton Year Week No-10th(2nd Dec 2024-6th Dec 2024)											
Weekly Avg.	**84.71**	**53820**	**81.04**	**71.04**	**10.00**	**6638**	**14.08**	**81.71**	**-0.67**	**-445**	**-0.82**
Cotton Year Week No-09th (25th Nov 2024-29th Nov 2024)											
Weekly Avg.	**84.41**	**54380**	**82.17**	**71.77**	**10.41**	**6888**	**14.50**	**81.84**	**0.33**	**221**	**0.41**
Cotton Year Week No-08th (18th Nov 2024-22nd Nov 2024)											
Weekly Avg.	**84.44**	**53400**	**80.66**	**69.95**	**10.71**	**7093**	**15.33**	**80.03**	**0.63**	**419**	**0.80**
Cotton Year Week No-07th (11th Nov 2024-15th Nov 2024)											
Weekly Avg.	**84.40**	**54300**	**82.07**	**70.77**	**11.30**	**7475**	**15.99**	**81.80**	**0.27**	**176**	**0.33**
Cotton Year Week No-06th (04th Nov 2024-08th Nov 2024)											
Weekly Avg.	**84.24**	**54600**	**82.67**	**70.32 Dec.'24**	**12.35**	**8155**	**17.57**	**82.39**	**0.28**	**183**	**0.34**
Cotton Year Week No-05th (28th Oct 2024-01st Nov 2024)											
Weekly Avg.	**84.08**	**54680**	**82.95**	**70.12 Dec.'24**	**12.83**	**8459**	**18.30**	**82.23**	**0.72**	**473**	**0.87**
Cotton Year Week No-04th (21st Oct 2024-25th Oct 2024)											
Weekly Avg.	**84.07**	**55660**	**84.44**	**71.80 Dec.'24**	**12.65**	**8336**	**17.62**	**83.54**	**0.90**	**595**	**1.09**
Cotton Year Week No-03rd (14th Oct 2024-18th Oct 2024)											
Weekly Avg.	**84.06**	**56100**	**85.12**	**70.93 Dec.'24**	**14.19**	**9353**	**20.01**	**82.86**	**2.26**	**1492**	**2.73**
Cotton Year Week No-02nd (7th Oct 2024-11th Oct 2024)											
Weekly Avg.	**83.98**	**57040**	**86.63**	**72.58 Dec.'24**	**14.05**	**9250**	**19.36**	**84.49**	**2.14**	**1411**	**2.54**
Cotton Year Week No-01st (30th Sep 2024-04th Oct 2024)											
Weekly Avg.	**83.86**	**58600**	**89.13**	**73.22 Dec.'24**	**15.91**	**10460**	**21.73**	**84.79**	**4.34**	**2853**	**5.12**
Total Avg.	**84.34**	**54962**	**83.13**	**70.89**	**12.25**	**8094**	**17.27**	**82.05**	**1.08**	**714**	**1.31**

GRAPHICAL REPRESENTATION



Note:- Weeks taken as per Cotton Year (October To September).

UPCOUNTRY SPOT RATES

(Rs./Qtl)

Sr. No.	Growth	Grade Standard	Grade	Staple	Micronaire	Gravimetric Trash	Strength /GPT	Spot Rate (Upcountry) 2023-24 Crop December 2024 16th	17th	18th	19th	20th	21st
3	GUJ	ICS-102	Fine	22mm	4.0 – 6.0	13%	20	11754 (41800)	11754 (41800)	11754 (41800)	11754 (41800)	11754 (41800)	11698 (41600)
4	KAR	ICS-103	Fine	22mm	4.5 – 6.0	6%	21	12317 (43800)	12317 (43800)	12317 (43800)	12317 (43800)	12317 (43800)	12148 (43200)
								Spot Rate (Upcountry) 2024-25 Crop					
1	P/H/R	ICS-101	Fine	Below 22mm	5.0 – 7.0	4%	15	14229 (50600)	14229 (50600)	14229 (50600)	14229 (50600)	14229 (50600)	14116 (50200)
2	P/H/R (SG)	ICS-201	Fine	Below 22mm	5.0 – 7.0	4.5%	15	14397 (51200)	14397 (51200)	14397 (51200)	14397 (51200)	14397 (51200)	14285 (50800)
5	M/M (P)	ICS-104	Fine	23mm	4.5 – 7.0	4%	22	14397 (51200)	14397 (51200)	14397 (51200)	14369 (51100)	14341 (51000)	14341 (51000)
6	P/H/R (U) (SG)	ICS-202	Fine	27mm	3.5 – 4.9	4.5%	26	14763 (52500)	14763 (52500)	14735 (52400)	14707 (52300)	14622 (52000)	14594 (51900)
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	14932 (53100)	14932 (53100)	14904 (53000)	14875 (52900)	14791 (52600)	14735 (52400)
9	M/M(P)/ SA/TL/G	ICS-105	Fine	27mm	3.0 – 3.4	4%	25	- -	- -	- -	- -	- -	- -
10	M/M(P)/ SA/TL	ICS-105	Fine	27mm	3.5 – 4.9	3.5%	26	- -	- -	- -	- -	- -	- -
11	P/H/R(U)	ICS-105	Fine	28mm	3.5 – 4.9	4%	27	14960 (53200)	14960 (53200)	14932 (53100)	14904 (53000)	14819 (52700)	14791 (52600)
12	M/M(P)	ICS-105	Fine	28mm	3.7 – 4.5	3.5%	27	14735 (52400)	14735 (52400)	14735 (52400)	14735 (52400)	14679 (52200)	14650 (52100)
13	SA/TL/K	ICS-105	Fine	28mm	3.7 – 4.5	3.5%	27	14594 (51900)	14594 (51900)	14594 (51900)	14594 (51900)	14538 (51700)	14510 (51600)
14	GUJ	ICS-105	Fine	28mm	3.7 – 4.5	3%	27	14791 (52600)	14791 (52600)	14735 (52400)	14735 (52400)	14707 (52300)	14679 (52200)
15	R(L)	ICS-105	Fine	29mm	3.7 – 4.5	3.5%	28	15072 (53600)	15044 (53500)	15016 (53400)	14988 (53300)	14904 (53000)	14904 (53000)
16	M/M(P)	ICS-105	Fine	29mm	3.7 – 4.5	3.5%	28	14988 (53300)	14988 (53300)	14988 (53300)	14988 (53300)	14960 (53200)	14932 (53100)
17	SA/TL/K	ICS-105	Fine	29mm	3.7 – 4.5	3%	28	14847 (52800)	14847 (52800)	14847 (52800)	14847 (52800)	14819 (52700)	14791 (52600)
18	GUJ	ICS-105	Fine	29mm	3.7 – 4.5	3%	28	15016 (53400)	15016 (53400)	15016 (53400)	15016 (53400)	14988 (53300)	14960 (53200)
19	M/M(P)	ICS-105	Fine	30mm	3.7 – 4.5	3%	29	15213 (54100)	15213 (54100)	15213 (54100)	15213 (54100)	15185 (54000)	15129 (53800)
20	SA/TL/K/O	ICS-105	Fine	30mm	3.7 – 4.5	3%	29	15129 (53800)	15129 (53800)	15129 (53800)	15129 (53800)	15100 (53700)	15044 (53500)
21	M/M(P)	ICS-105	Fine	31mm	3.7 – 4.5	3%	30	15522 (55200)	15466 (55000)	15438 (54900)	15410 (54800)	15382 (54700)	15353 (54600)
22	SA/TL/ K / TN/O	ICS-105	Fine	31mm	3.7 – 4.5	3%	30	15522 (55200)	15466 (55000)	15410 (54800)	15382 (54700)	15353 (54600)	15325 (54500)
23	SA/TL/K/ TN/O	ICS-106	Fine	32mm	3.5 – 4.2	3%	31	- -	- -	- -	- -	- -	- -
24	M/M(P)	ICS-107	Fine	34mm	2.8 - 3.7	4%	33	24605 (87500)	24183 (86000)	24183 (86000)	24183 (86000)	24043 (85500)	23621 (84000)
25	K/TN	ICS-107	Fine	34mm	2.8 - 3.7	3.5%	34	25027 (89000)	24746 (88000)	24746 (88000)	24746 (88000)	24605 (87500)	24183 (86000)
26	M/M(P)	ICS-107	Fine	35mm	2.8 - 3.7	4%	35	25027 (89000)	24605 (87500)	24605 (87500)	24605 (87500)	24464 (87000)	24183 (86000)
27	K/TN	ICS-107	Fine	35mm	2.8 - 3.7	3.5%	35	25730 (91500)	25449 (90500)	25449 (90500)	25449 (90500)	25308 (90000)	25027 (89000)

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