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Manual Canopy Management
– A Promising Technique to Boost Cotton Yields

EXPERT's Column

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Introduction

Cotton plays a pivotal role in India's economy, employment generation, textile industry, cultural heritage, and rural development. Since one decade, cotton yields in India have plateaued. Addressing cotton yield stagnation requires a holistic approach that includes improved cultivars, agronomic practices, better pest and disease management strategies, enhanced soil and water management techniques, and greater farmer access to technology and extension services. In recent years, breeding for early maturing and compact plant types have led to the development and release of varieties and hybrids which are amenable for high density planting system (HDPS) in light to medium soils. However, HDPS even with compact genotypes still requires canopy management to have better interception of sun light and retention of fruiting bodies. In this case, canopy management is achieved with chemical sprays of plant growth regulator (Mepiquat Chloride 5% AS @ 1 to 1.2 ml/l of water) which reduces the height of main stem by reducing the internodal distance. However, popular commercial hybrids which are generally robust and bushy in growth habit are grown in medium to deep soils for multiple pickings over an extended crop duration. These

hybrids planted at wider spacing with low plant populations, put out up to four vegetative branches called 'monopodia' at lower nodes. Fruiting branches called 'sympodia' are generally seen about 40 days after planting with initiation of squares visible on zig-zag growing branches at higher nodes on main stem. The vegetative branches grow straight like a main stem and also put out fruiting branches at later growth stages.

A technique has been demonstrated which makes it possible to grow commercial bushy hybrids by planting at closer spacing (90 x 30 cm) against the normal practice of wider spacing (90 x 60 cm, 105 x 60 cm, 120 x 45 cm) and adopting manual canopy management involving removal of vegetative branches at square initiation stage followed up with de-topping or nipping of terminal growth at about 90-100 days after planting or at 1-1.2 m plant height or desired boll number per plant is achieved. Here chemical sprays for plant growth regulation is avoided and instead vegetative branches and plant height are manually managed. This is done to avoid chemical locking of the genetic potential of robust hybrids to avoid risks often associated with an unfolding season in rainfed areas.

In cotton plants, the technique of removal of monopodia helps to manage the plant's growth and improve its productivity and yield. This manual canopy management technique we have named as 'CICR-Dada Lad Cotton Production technology' and this has emerged as a game changer in improving cotton productivity.

Major components of CICR-Dada Lad Cotton Production technology include removal of monopodia (vegetative branch) at 40-45 days after sowing (DAS), removing regrowth at sympodial branches (fruiting branches) and de-topping of terminal growing portion of the plant (top 10 to 15 cm) after appropriate plant height is reached. The major changes in cotton agronomy using this technology are explained below:

Key Features of Technology Application

Soil: Medium to deep fertile soils with good drainage.

Sowing: Sow aggressively growing BG II hybrids with a spacing of 90 cm between rows and 30 cm between plants after receiving at least 70 mm of cumulative monsoon rainfall. In irrigated fields, utilising drip irrigation with polymulch on raised beds can result in even higher yields. Seed rate for commercial hybrids is 3 packets/acre planted at a spacing of 90 cm row to row and 30 cm plant to plant distance.

Removal of monopodia: Monopodia removal in cotton is the process of pruning unproductive vegetative branches (monopodia) to enhance growth and yield. This involves cutting off the monopodia at around 40-45 days after sowing redirect the plant's energy toward fruiting branches (sympodial). This practice helps manage the plant's growth, ensuring better light penetration, better boll retention and air circulation, which can lead to higher productivity and improved quality.

- Farmers can manually perform this task preferably using garden secateurs/ sharp scissors
- Correctly identify the monopodial branches and cut them 2-3 cm away from the main stem to prevent injury.
- Typically, 2-4 monopodial branches are present.
- Nipping of sympodial branches should be done once the desired number of bolls has been set.

Removal of monopodia

Removing regrowth

After removing the monopodial branches, regrowth occurs at each node within 15-20 days. This regrowth should be removed either by hand if it's tender or with sharp scissors or garden secateurs.

De-topping

De-topping, also known as topping, is a practice in cotton cultivation where the terminal top portion of plant growth is removed after attaining targeted sympodial branch number and crop age/stage. De-topping helps in preventing apical dominance, vegetative growth and promote the development of fruiting branches. The primary goals are to improve the plant's structure, enhance air circulation, and increase sunlight penetration, which can lead to better boll setting and higher yields. Typically, de-topping is performed in cotton plant when it attains a height of 120 cm (4 feet) and top 10 to 15 cm terminal growing part is removed with sharp scissors or garden secateurs to ensure the best outcomes for cotton production. Depending on season, crop age for de-topping in general is around 90 days after good boll set on plants.

Cotton plant after de-topping

Shri. Dada Lad along with farmers at validation site in CICR research

Reasons For Removal of Monopodia and De-Topping

1. **Promoting lateral growth:** By removing the monopodia, the plant is encouraged to divert its energy towards sympodial branches. This lateral growth can lead to increased flowering and ultimately higher boll number.

2. **Improving microclimate, air circulation and light penetration:** Dense foliage due to excessive growth of monopodia restrict airflow and sunlight penetration within the plant canopy. Removing monopodia improve these conditions, reducing the risk of diseases and optimizing photosynthesis.

3. **Managing plant density:** Removal of monopodia helps to regulate the spacing and density of cotton plants in the field. This can prevent overcrowding, which negatively impacts nutrient uptake and overall plant health.

Implementation and Considerations

1. **Timing:** The timing of monopodia removal and de-topping is crucial and can vary depending on factors such as local climate, soil conditions, and the specific cotton variety being grown. Ideally the timing for monopodia is 40-45 days after sowing. De-topping is done when at least 16-18 sympodial branches have developed, ideally at around 90 days after emergence.

2. **Techniques:** Techniques for monopodia removal can vary from farm to farm and may include manual pruning with sharp scissors or garden secateurs or mechanical trimming with specialized equipment.

3. **Impact on Yield:** Properly managed removal of monopodia has the potential to increase cotton yield by optimizing plant resources and promoting healthier growth conditions.

4. **Crop duration:** Monopodia removal and de-topping promote synchronous boll opening and brings crop to maturity early and shortens

Fig. 1. Seed cotton (Kapas) yield in farmers' fields adopting manual canopy management technique

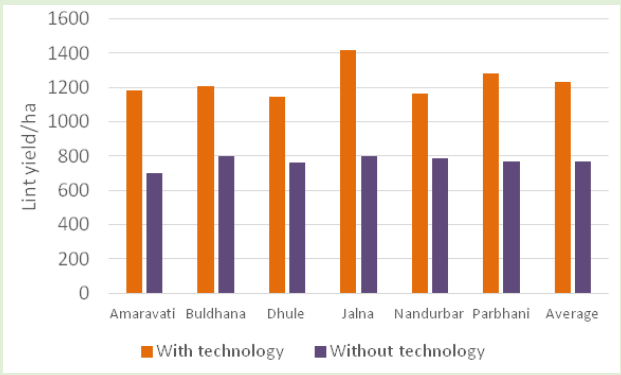


Fig.2. Lint yield/ha with manual canopy management

critical growth window for drought, heat and insect pests.

5. Harvest index: Higher seed cotton yield is achieved through increased harvest index.

In conclusion, CICR-Dada Lad cotton production technology (a manual canopy management technique) promotes the removal of monopodia and de-topping, aimed at enhancing the productivity and health of cotton plants by re-directing growth and energy, improving light and airflow, and managing plant density for higher harvest index. Practice of de-topping alone in both rainfed and irrigated cotton brings about synchronous boll development, maturity and limit crop duration to escape late season pink bollworm infestation, damage to yield and fibre quality. Results of 43 demonstrations in 6 districts of Maharashtra where the technique was practiced by farmers during 2023-24 under the CICR special project on cotton indicated an average yield increase of 60% with a range of 48.3 to 76.5%. The technique holds promise to boost cotton productivity in Maharashtra.

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

CAI Donates Pheromone Traps to Cotton Farmers

Under CAI's Farmers' Training Programme initiative on 11th August 2024, Cotton Association of India donated 20000 pheromone traps and lure to cotton farmers in Dondaicha, taluka Shindkheda, district Dhule, Maharashtra.

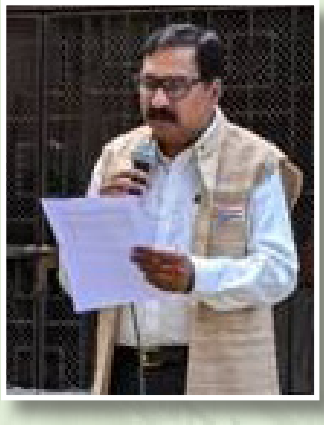
CAI Vice-President Shri. Bhupendra Singh Rajpal, Additional Hon. Treasurer Shri Rintu Pandya and CAI Directors, Shri. Sudhir Kumar Mantri and Shri. Paresh Negandhi were present at the event, which witnessed a large crowd and was attended by many political luminaries.

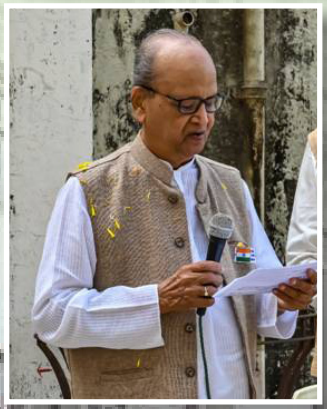
The event organised by the Kesharanand Group of Industries, was presided over by Shri. Gnaneshwar A. Bhamre.

Glimpses of Independence Day Celebrations

The 78th Independence Day of our country was celebrated on Thursday August 15, on the premises of the Cotton Association of India in the presence of CAI President Shri. Atul S, Ganatra. The flag hoisting ceremony was performed by Past President Shri. Purshottamdas Patodia.

This was followed by the screening of a short documentary patriotic film on Kargil Vijay Divas.

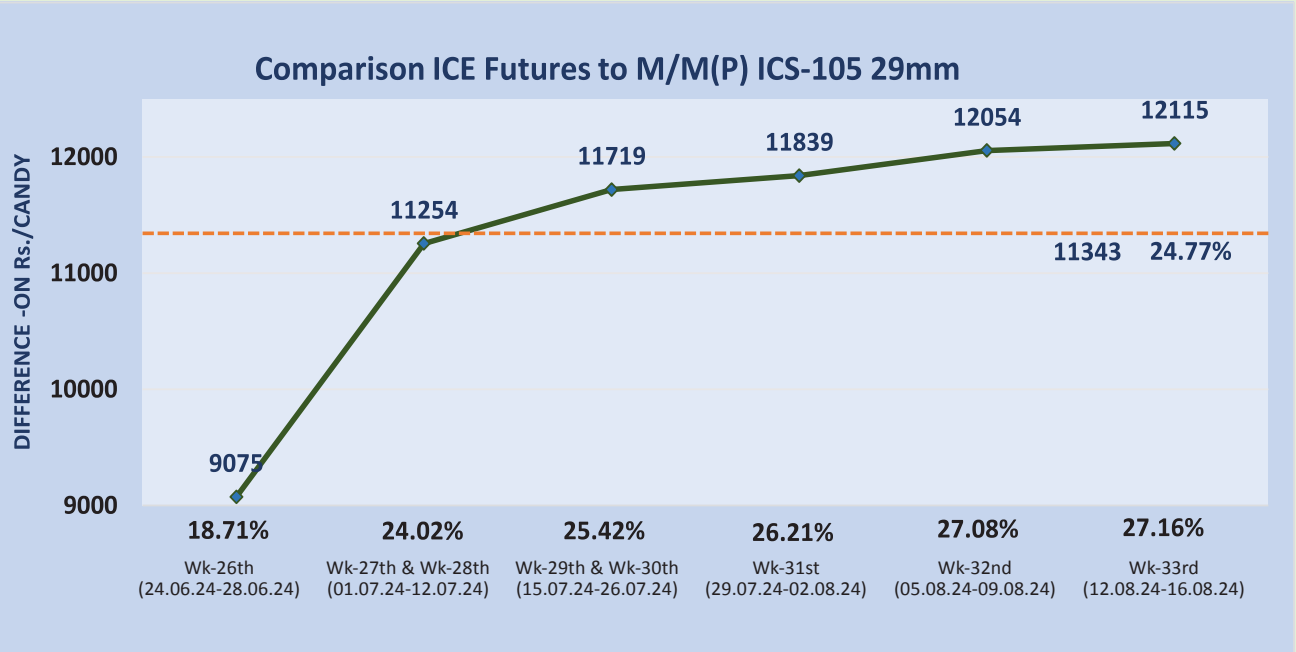




Comparison of ICE-Futures and ICS-105
17th August 2024

M/M(P) ICS-105, Grade Fine, Staple 29mm, Mic. 3.7-4.5, Trash 3.5%, Str./GPT 28

Date 2024	CAI Rates Rs./c.	ICE Settlement Futures		1 US $ = Rs.	Conversion Factor	Indian Ctn in USc/lb.	Difference-ON		%
		Cover Mth.	USc/lb.				USc/lb.	Rs./c	
A	B	C	D	E	F	G	H	I	J
Week No-33rd									
12 Aug	56600	Dec. '24	69.07	83.94	658.09	86.01	16.94	11148	24.53
13 Aug	56800	Dec. '24	67.99	83.93	658.01	86.32	18.33	12061	26.96
14 Aug	56800	Dec. '24	67.05	83.88	657.62	86.37	19.32	12705	28.81
15 Aug	Holiday, CAI Cotton Market closed due to Independence Day						-	-	-
16 Aug	56800	Dec. '24	67.24	83.95	658.17	86.30	19.06	12545	28.35
Wk-33rd (12.08.24-16.08.24)						Avg.	18.41	12115	27.16
Wk-32nd (05.08.24-09.08.24)						Avg.	18.32	12054	27.08
Wk-31st (29.07.24-02.08.24)						Avg.	18.03	11839	26.21
Wk-29th & Wk-30th (15.07.24-26.07.24)						Avg.	17.87	11719	25.42
Wk-27th & Wk-28th (01.07.24-12.07.24)						Avg.	17.19	11254	24.02
Wk-26th (24.06.24-28.06.24)						Avg.	13.87	9075	18.71
						Total Avg.	17.28	11343	24.77



Minimum Support Prices for Kapas of Fair Average Quality for the Cotton Season 2024-25 - (October-September)

(In Rs. per quintal)

Sr. No.	Classes of Cotton	Fibre Quality Parameters		Minimum Support Prices (MSP) for 2024-25	Names of the Indicative Varieties used by the Trade
		Basic Staple Length (2.5% Span Length) in MM	Micronaire Value		
(i)	(ii)	(iii)	(iv)	(v)	(vi)
	Short Staple (20 mm & below)				
1		-	7.0-8.0	6621	Assam Comilla
2		-	6.8-7.2	6621	Bengal Deshi
	Medium Staple (20.5 mm - 24.5 mm)				
3		21.5 - 22.5	4.8 - 5.8	6871	Jayadhar
4		21.5 - 23.5	4.2 - 6.0	6921	V-797 / G.Cot.13 / G. Cot.21
5		23.5 - 24.5	3.4 - 5.5	6971	AK/Y-1 (Mah & M.P.) / MCU-7 (TN)/SVPR-2 (TN)/PCO-2 (AP & Kar) / K-11 (TN)
	Medium Long Staple (25.0 mm - 27.0 mm)				
6		24.5 - 25.5	4.3 - 5.1	7121	J-34 (Raj.)
7		26.0 - 26.5	3.4 - 4.9	7221	LRA-5166/KC-2 (TN)
8		26.5 - 27.0	3.8 - 4.8	7271	F-414/H-777/J-34 Hybrid
	Long Staple (27.5 mm - 32.0 mm)				
9		27.5 - 28.5	4.0 - 4.8	7421	F-414/H-777/J-34 Hybrid
10		27.5 - 28.5	3.5 - 4.7	7421	H-4/H-6/MECH/RCH-2
11		27.5 - 29.0	3.6 - 4.8	7471	Shankar-6/10
12		29.5 - 30.5	3.5 - 4.3	7521	Bunny/Brahma
	Extra Long Staple (32.5 mm & above)				
13		32.5 - 33.5	3.2 - 4.3	7721	MCU-5/Surabhi
14		34.0 - 36.0	3.0 - 3.5	7921	DCH-32
15		37.0 - 39.0	3.2 - 3.6	8721	Suvin

(i) If the micronaire value is in the range of 3.8 to 4.2 for Staple Length of 24.5 mm - 25.5 mm mentioned at Sr. No.6 of above table, a premium of Rs. 30/- per quintal will be given over and above the MSP. If the micronaire happens to be less than 3.8 or more than 5.1, the MSP will be lower by Rs. 15/- per quintal for every 0.2 micronaire.

(ii) If the micronaire values are outside the range in the column (iv) for staple lengths at Sr. No.9 to 15 of above table, a lower MSP of Rs. 25/- per quintal will be given for every 0.2 micronaire value.

(iii) The Minimum acceptable micronaire value shall be 2.8 for Extra Long Staple Cotton mentioned at Sr. No. 13 to 15 of above table. Minimum acceptable micronaire value shall be 3.0 for other varieties of cotton at Sr. No.1 to 12 of the above table.

(iv) The names of varieties mentioned in column No. (vi) of the aforesaid table are only indicative related to the respective length group.

(v) The base line moisture content of kapas shall be 8%. The farmer selling cotton having moisture above 8% but upto 12% will get lesser price proportionately, while it will be a proportionate incentive, if the moisture content of the produce is less than 8%. For the purpose of undertaking price support operation by the designated Procurement Agencies, moisture content of more than 12% is not permitted. The incentive / disincentive will be made on the basis of rate per quintal of kapas on pro-rata basis.

(vi) The procurement agencies should ensure that micronaire and other fibre quality parameters are scientifically assessed by providing the required infrastructure / facilities at the purchase centres.

The Cotton Corporation of India Ltd. (CCI) will be the central nodal agency for undertaking price support operations for cotton. The Minimum Support Price will be effective from 01.10.2024.

Source : Office of the Textile Commissioner

UPCOUNTRY SPOT RATES

(Rs./Qtl)

Standard Descriptions with Basic Grade & Staple in Millimetres based on Upper Half Mean Length As per CAI By- laws								Spot Rate (Upcountry) 2023-24 Crop August 2024					
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	13582 (48300)	13582 (48300)	13582 (48300)		13610 (48400)	13610 (48400)
2	P/H/R (SG)	ICS-201	Fine	Below 22mm	5.0 – 7.0	4.5%	15	13751 (48900)	13751 (48900)	13751 (48900)		13779 (49000)	13779 (49000)
3	GUJ	ICS-102	Fine	22mm	4.0 – 6.0	13%	20	11135 (39600)	11192 (39800)	11192 (39800)		11192 (39800)	11192 (39800)
4	KAR	ICS-103	Fine	22mm	4.5 – 6.0	6%	21	12232 (43500)	12260 (43600)	12260 (43600)		12232 (43500)	12232 (43500)
5	M/M (P)	ICS-104	Fine	23mm	4.5 – 7.0	4%	22	14510 (51600)	14510 (51600)	14510 (51600)	H	14482 (51500)	14482 (51500)
6	P/H/R (U) (SG)	ICS-202	Fine	27mm	3.5 – 4.9	4.5%	26	14847 (52800)	14847 (52800)	14847 (52800)		14847 (52800)	14791 (52600)
7	M/M(P)/ SA/TL	ICS-105	Fine	26mm	3.0 – 3.4	4%	25	N.A. (N.A.)	N.A. (N.A.)	N.A. (N.A.)		N.A. (N.A.)	N.A. (N.A.)
8	P/H/R(U)	ICS-105	Fine	27mm	3.5 – 4.9	4%	26	14988 (53300)	14988 (53300)	14988 (53300)	O	14988 (53300)	14932 (53100)
9	M/M(P)/ SA/TL/G	ICS-105	Fine	27mm	3.0 – 3.4	4%	25	13638 (48500)	13638 (48500)	13638 (48500)		13638 (48500)	13638 (48500)
10	M/M(P)/ SA/TL	ICS-105	Fine	27mm	3.5 – 4.9	3.5%	26	14904 (53000)	14904 (53000)	14960 (53200)		14960 (53200)	14960 (53200)
11	P/H/R(U)	ICS-105	Fine	28mm	3.5 – 4.9	4%	27	15325 (54500)	15325 (54500)	15325 (54500)	L	15325 (54500)	15269 (54300)
12	M/M(P)	ICS-105	Fine	28mm	3.7 – 4.5	3.5%	27	15466 (55000)	15522 (55200)	15522 (55200)		15522 (55200)	15522 (55200)
13	SA/TL/K	ICS-105	Fine	28mm	3.7 – 4.5	3.5%	27	15522 (55200)	15578 (55400)	15578 (55400)		15578 (55400)	15578 (55400)
14	GUJ	ICS-105	Fine	28mm	3.7 – 4.5	3%	27	15691 (55800)	15747 (56000)	15747 (56000)		15747 (56000)	15747 (56000)
15	R(L)	ICS-105	Fine	29mm	3.7 – 4.5	3.5%	28	N.A. (N.A.)	N.A. (N.A.)	N.A. (N.A.)	I	N.A. (N.A.)	N.A. (N.A.)
16	M/M(P)	ICS-105	Fine	29mm	3.7 – 4.5	3.5%	28	15916 (56600)	15972 (56800)	15972 (56800)		15972 (56800)	15972 (56800)
17	SA/TL/K	ICS-105	Fine	29mm	3.7 – 4.5	3%	28	16028 (57000)	16085 (57200)	16085 (57200)		16085 (57200)	16085 (57200)
18	GUJ	ICS-105	Fine	29mm	3.7 – 4.5	3%	28	15944 (56700)	16000 (56900)	16000 (56900)	D	16000 (56900)	16000 (56900)
19	M/M(P)	ICS-105	Fine	30mm	3.7 – 4.5	3%	29	16113 (57300)	16169 (57500)	16169 (57500)		16225 (57700)	16225 (57700)
20	SA/TL/K/O	ICS-105	Fine	30mm	3.7 – 4.5	3%	29	16169 (57500)	16225 (57700)	16225 (57700)		16281 (57900)	16281 (57900)
21	M/M(P)	ICS-105	Fine	31mm	3.7 – 4.5	3%	30	N.A. (N.A.)	N.A. (N.A.)	N.A. (N.A.)	A	N.A. (N.A.)	N.A. (N.A.)
22	SA/TL/ K / TN/O	ICS-105	Fine	31mm	3.7 – 4.5	3%	30	N.A. (N.A.)	N.A. (N.A.)	N.A. (N.A.)		N.A. (N.A.)	N.A. (N.A.)
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.)
24	M/M(P)	ICS-107	Fine	34mm	2.8 - 3.7	4%	33	23340 (83000)	23340 (83000)	23340 (83000)		23340 (83000)	23340 (83000)
25	K/TN	ICS-107	Fine	34mm	2.8 - 3.7	3.5%	34	23480 (83500)	23480 (83500)	23480 (83500)	Y	23480 (83500)	23480 (83500)
26	M/M(P)	ICS-107	Fine	35mm	2.8 - 3.7	4%	35	23902 (85000)	23902 (85000)	23902 (85000)		23902 (85000)	23902 (85000)
27	K/TN	ICS-107	Fine	35mm	2.8 - 3.7	3.5%	35	24464 (87000)	24464 (87000)	24464 (87000)		24464 (87000)	24464 (87000)

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