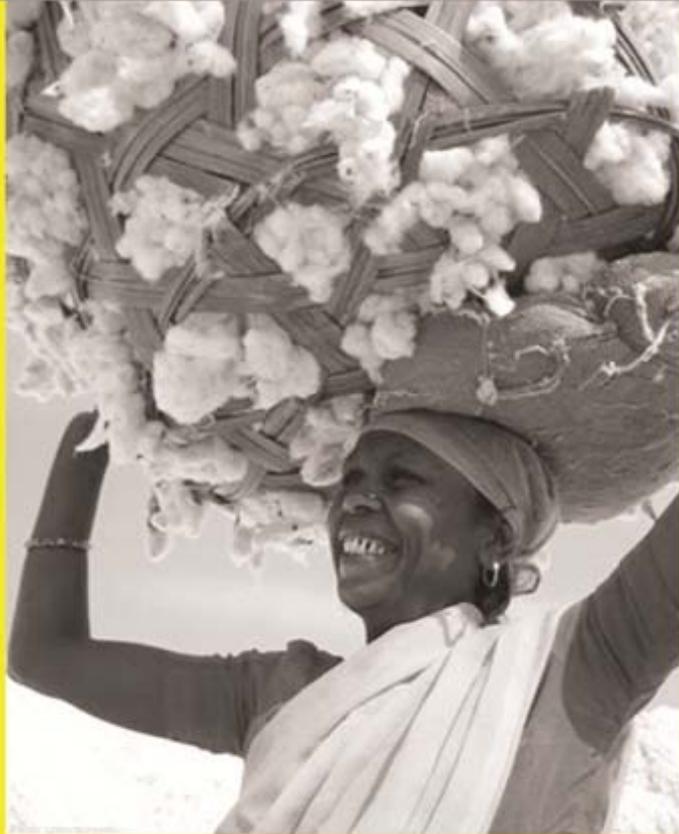




# All India Coordinated Cotton Improvement Project



...in the service of Indian Cotton farmers

...for achieving higher cotton productivity and profitability

...to attain global excellence in cotton



**All India Coordinated Cotton Improvement Project**

*– in the service of Indian Cotton Farmers*

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## Acknowledgement

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*Omissions and errors, if any in this bulletin, are not deliberate and are regretted.*

## ALL INDIA COORDINATED COTTON IMPROVEMENT PROJECT (AICCIP)

Cotton cultivation needs to be sustainable and the productivity needs to be enhanced by effectively managing the resources to offer livelihood security to millions of marginal and small farmers. As has often been stressed, Cotton cultivation has to be knowledge-based and market-driven and needs to evolve continuously through innovations in frontier sciences to break yield and quality barriers for satisfying present and future national needs and attaining global competitiveness with larger spin-off benefits to India. India is the only country where all four cultivated species of cotton are grown on commercial scale and covers about 9.5 – 10.0 million hectares. Qualitative and quantitative transformation has taken place in cotton production in India. Area-wise, India ranks first in global scenario (about one-third of the global cotton area) but with regard to production, it is ranked second, next to China. The production increased from a meagre 2.79 million bales (170 kg lint/bale) in 1947-48 to a high of 17.6 million bales in 1996-97 and an all time record of 31.5 million bales during 2007-08. During the year 2008-09 and also during current year (2009-10), around **30 million bales** is projected, thereby indicating sustainability of the production system and also pointing to the need for generation of newer technologies and innovative approaches for meeting increased requirements, both domestic and global needs. It is very gratifying to note that India has registered a highest growth as regards cotton production is concerned with a share of 22 % in the global production of cotton, more than double its share of 9.6% in 1980-81.

In a historical perspective, it is worth mentioning that the abolition of ICCR in 1966 led to the establishment of ALL INDIA COORDINATED COTTON IMPROVEMENT PROJECT (AICCIP) in 1967 with its Headquarters at Coimbatore (Tamil Nadu) with timely funding from Indian Council of Agricultural Research (ICAR). Concerted efforts by various AICCIP centres for cotton improvement and strides that the country made in cotton production in recent years are well-recorded in the history. **The AICCIP of ICAR knitted together 21 participating centres in 16 State Agricultural Universities involved in Cotton research.** The Central Institute for Cotton Research, Nagpur and its Regional Stations at Coimbatore and Sirsa continue to provide excellent basic research support and also take part in select research activities of the AICRP on Cotton. The Central Institute for Research on Cotton Technology (CIRCOT-ICAR), Mumbai and its Regional units located at Sirsa, Surat, Nagpur, Dharwad, Guntur and Coimbatore are closely associated with AICCIP in assessing the quality parameters of cotton besides ensuring value addition to cotton. The stellar role played by CIRCOT through rigorous evaluation of Cotton fibre quality samples of AICCIP trials has ensured a better place for Cotton in India among all natural fibres.

The present modern cultivars and cotton production and protection technologies developed through conscious efforts of the scientific personnel under All India Coordinated Cotton Improvement Project (AICCIP of ICAR) and envisaged production and protection technologies through multidisciplinary and multi location research under AICCIP need to be given further impetus for effective follow up to meet the ever-increasing challenges. The phenomenal achievements made through deployment of large number of Private Sector Bt cotton hybrids in the cotton production scenario have brought in welcome change as regards production gains are concerned. Here again, the AICCIP personnel have rendered their services by way of unbiased evaluation through multilocation trials in the recent past (2000-2009). The role of AICCIP in ensuring sustainability of cotton production, employment generation, foreign exchange earnings and improving general economy of the country assumes greater significance; and hence, the programmes under AICCIP need to be continued with more fervour and vigour by all concerned in the years to come.

The AICCIP has ensured technological back-stopping so as to encourage its centres in various State Agricultural Universities to promote cotton cultivation in resource poor as well as marginal farming systems too. The enhanced production of this natural fibre following cost effective methods utilizing adequate credit-linked farming is the judicious approach to sustain cotton-based cropping system in the country. In the three cotton growing zones, a lot of interest in farmers to follow integrated practices for nutrient and pest management is much visible. Mitigating economic pressure to grow this commercial crop is the best impact of AICCIP in the country. The Technology Mission on Cotton and other booster plans such as FLDs of Cotton ( Directorate of Cotton Development of the Government of India) to enhance the fibre productivity anchors well on the research results from AICCIP. This growth is evident from the enhanced cotton area, production and productivity. Many high yielding cotton varieties and hybrids as well as improved techniques of their cultivation have paid off in realizing better fibre production in terms of both quality and quantity.

*All these combined efforts have put the AICCIP on a higher pedestal and ensured it to earn a place in the Cotton R & D sector in the Country by way of the Coveted Chaudhary Devi Lal Outstanding AICRP Award being conferred on All India Coordinated Cotton Improvement Project ( AICCIP) on 16<sup>th</sup> July,2007 by the Hon'ble Union Minister of Agriculture in the august presence of Hon'ble Minister of State for Agriculture and Hon'ble Director General of ICAR and other dignitaries.*

## Mandate and Objectives of AICCIP

- To develop superior cotton varieties and hybrids (conventional and male-sterile based) best suited for different agro-climatic regions of the country
- To develop viable and economical production technologies for realizing higher yields from improved cotton varieties and hybrids, both under irrigated and rainfed conditions
- To develop economic and effective plant protection measures for location-specific strategies for integrated biotic stress management
- Multilocation evaluation of transgenic cotton hybrids based on the directives of ICAR
- To conduct Cotton Front Line Demonstrations in farmers' fields and have effective interaction with cotton farmers, extension personnel of State Department of Agriculture and take follow-up action for suitable refinement of cotton technologies, wherever needed

## Organisation and Structure

The AICCIP of ICAR has 21 centres (11 major and 10 sub-centres) in North, Central and South zone catering to cotton growing zones of the country with its headquarters at Coimbatore ( Tamil Nadu). The details of the centres are as follows:

<b>Name of Agricultural University</b>	<b>Main Centres</b>	<b>Sub Centres</b>
Punjab Agril. University	Faridkot	Ludhiana
Chaudhary Charan Singh Haryana Agril. University	Hisar	-
Rajasthan Agril. University	Sriganganagar	-
Chandra Sekhar Azad University of Agril. & Tech.	-	Kanpur
Maharana Pratap Univ. of Agril. & Tech.	-	Banswara
Navsari Agricultural University	Surat	-
Junagadh Agricultural University	-	Junagadh
Orissa University of Agril. & Tech.	-	Bhawanipatna
Mahatma Phule Krishi Vidyapeeth	Rahuri	Pune
Marathwada Agril. University	Nanded	-
Dr.Panjabrao Deshmukh Krishi Vidyapeeth	Akola	-
Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya	Khandwa	Indore
University of Agril. Sciences, Dharwad	Dharwad	
University of Agril. Sciences, Raichur	-	Siruguppa
Acharya N.G.Ranga Agril. University	Guntur	Nandyal
Tamil Nadu Agricultural University	Coimbatore	Srivilliputhur

Besides, various Voluntary Centres spread across several locations in the Cotton growing tracts of the Country take part in evaluation trials of AICCIP and contribute to the development of newer well-adapted cotton technologies. The centres like Abohar, Bhatinda, Sirsa, Tabiji, Anand, Viramgam, Talod, Bharuch, Parbhani, Jalgaon, Yeotmal, Warangal, Mudhol, Adilabad, Raichur, Bheemarangudi, Hageri, Annigere, Aruppukkottai, Kovilpatti, Perambalur deserve special appreciation for tirelessly carrying out multilocation evaluation trials of AICCIP. In addition, various Centres that are under the approved Private sector R&D firms carry out multilocation evaluation trials in a Public-private Partnership mode for the common benefit of Indian Cotton farmers.

### **Cotton Crop Improvement:**

**Around 250** high yielding cotton varieties and hybrids have been released by AICCIP since inception of the Project for commercial cultivation catering to specific needs of the textile industry and possessing special characteristics besides amenable for low cost production technologies and bringing net profit to the farming community in the Country.

World class cotton varieties & hybrids like Suvin, DCH 32, NHH 44, TCHB 213, DHB 105, LHH 144, Shresth, LRA 5166, Anjali, Surabhi, MCU5, MCU 7,SVPR 2, H 777, HHH 287, , HD 123, HD 324, AAH 1, Abhadita, DHH 11, H6, H8, G.Cot DH 7, G.Cot.DH 9, RAJ DH 9, PKV Hy-2, Khandwa 2, JK Hy.2, Narasimha - with higher yield, special characteristics and suitable to low cost production technologies have all been released over the years suiting to the textile needs and bringing net profit to the farming community in the Country.

During the last ten years, high yielding cotton varieties and hybrids have been released for commercial cultivation through AICCIP catering to specific needs and possessing special characteristics. Most of these varieties/hybrids are capable of yielding 18-25q/ha. The details of the varieties/hybrids are presented below.

**Development of new hybrids/ varieties for North zone consisting of Punjab, Haryana, Rajasthan viz: CSHH 238, Omshankar, Shresth Pusa 8-6, F-1861, F1378,LH-1556, LD 491,RG 18, RS 2013, RS 875, Maruvikas, Vagad Kalyan, Raj DH 9, , CISAA 2, CISA 310, HD 101, HD 123, HD 324, H 1226 , H 1117, H 1098, HHH 81,HHH 223, AAH-1, RS 2013, RS 810 and Pratap Kapi**

**Development of new hybrids/ varieties for Central zone consisting of Maharashtra, Gujarat & Madhya Pradesh viz: PKV DH-1, PKV Hy 3, PKV Hy.4, PKV Rajat, PKV Hy.5, AKA-8, AKA-7,NH.545, NH-615, NH-630, PH-348, PA 141,PA 183, PA-255, PA-402, Parbhani Turab, PHA 46, Renuka ,JK Hy 2,**

Jawahar Tapti, JK-4, JK Hy 2, G.Cot.Hy-10 (New), G.Cot 17, G.Cot 19, G.Cot.21, G Cot 23, Phule 492, Phule 388, Pratima and Arogya

**Development of new hybrids/ varieties for South zone consisting of Andhra Pradesh, Tamil Nadu and Karnataka viz:** LAHH 4, L 603, L 604, Sahana, RAMPBS 155, MCU 12, MCU 13, KC 2, Narasimha, Veena, DHH-11, Sumangala, SVPR2, SVPR 3, Aravinda, Raghavendra, Sruthi, Surabhi & K 11.

Name	Species	Year of Release	AICCIP centre	Pedigree	Remarks
RG 18	<i>G. arboreum</i>	2001	RAU, Sriganganagar	SC 75 x RG 2-1	High yielding short staple variety
Vagad Kalyan	<i>G. hirsutum</i>	2001	MPUA&T, Banswara	SRT 1 x MCU 7	Moderate resistance to BLB, ALS, sucking pests & boll worms under natural condition
G.Cot.18	<i>G. hirsutum</i>	2001	GAU, Surat	J 178 x IAN 604	High yielding variety
G.Cot.21	<i>G. herbaceum</i>	2001	GAU, Surat	1502 E x (G.Cot.13 x 4011 D)	High yielding variety
AKA 7	<i>G. arboreum</i>	2001	Dr. PDKV, Akola	Selection from DES (Petaloidy x Chandronela) x AC-69	High yielding variety
PKV HY 4	<i>G. hirsutum</i> x <i>G. hirsutum</i>	2001	Dr. PDKV, Akola	CAK-23A x AKH-07R	Cytoplasmic male sterility based single cross hybrid with high seed cotton yield and superior fibre properties
Pratima	<i>G. hirsutum</i>	2001	CICR, Nagpur	Mutant of SRT 1	High yielding, high ginning and medium staple variety
Sahana	<i>G. hirsutum</i>	2001	UAS, Dharwad	JK 97 x JK 44	High yielding variety suitable for both irrigated and rainfed situations.
RAMPBS 155	<i>G. hirsutum</i>	2001	UAS, Dharwad		
Sumangala	<i>G. hirsutum</i>	2001	CICR, RS, Coimbatore	CW134 x Reba-b-50 x Khandwa-2	Medium staple and long branching. Moderately resistant to sucking pests and recorded less incidence of bollworm infestation
H 1117	<i>G. hirsutum</i>	2002	CCSHAU, Hisar	(H 777 x Ac 134) x (H 777 x GS 21)	High yielding with superior fibre properties, and early maturing
HHH 223	<i>G. hirsutum</i> x <i>G. hirsutum</i>	2002	CCSHAU, Hisar	H 1157 x H 1220	Resistant to cotton leaf curl virus

RS 2013	<i>G. hirsutum</i>	2002	RAU, Sriganganagar	F-520 x (LH-511 x Bombesa)	High yielding with superior medium fibre quality
JK 4	<i>G. hirsutum</i>	2002	JNKVV, Khandwa	GS-23 x Reba-B--50	High yielding with improved fiber properties
G. Cot.23	<i>G. herbaceum</i>	2002	GAU, Surat	625 BB x GBhv 41	High yielding with improved fiber properties
Phule 492	<i>G. hirsutum</i> x <i>G. hirsutum</i>	2002	MPKV, Rahuri	RHC-003 x RHC-004	High yielding hybrid
Phule 388	<i>G. hirsutum</i> x <i>G. barbadense</i>	2002	MPKV, Rahuri	RHC-006 x RHCb-001	High yielding ELS hybrid
PA 402	<i>G. arboreum</i>	2003	MAU, Nanded	Derivative from interspecific cross between <i>G. arboreum</i> x <i>G. hirsutum</i>	High yielding with improved fiber properties
DLSa 17	<i>G. arboretum</i>	2003	UAS, Dharwad		High yielding with long lintered
Veena	<i>G. arboretum</i>	2004	ANGRAU, Mudhol		High yielding
CSHH-198 (Shresth)	<i>G. hirsutum</i> x <i>G. hirsutum</i>	2004	CICR, RS, Sirsa	CSH19 and CSH 8	Resistant to CLCuV
CISAA-2 (CICR-2)	<i>G. arboreum</i> x <i>G. arboreum</i>	2004	CICR, RS, Sirsa	DS 5 GMS and LD 327 (sel.)	Synchronous in maturity, fluffy opening and shattering tolerance <i>desi</i> hybrid
PKV DH – 1	<i>G. arboreum</i> x <i>G. arboreum</i>	2004	Dr. PDKV, Akola	GAK-423 x HD-110-151	GMS based high yielding <i>desi</i> hybrid
PKV Hy.5	<i>G. hirsutum</i> x <i>G. hirsutum</i>	2004	Dr. PDKV, Akola	CAK-053A x AKH-02R	Cytoplasmic male sterility based single cross hybrid with high seed cotton yield and superior fibre properties
NH.545	<i>G. hirsutum</i>	2004	MAU, Nanded	DCI-118 x NH-262	High yielding with improved fiber properties
Parbhani Turab	<i>G. arboretum</i>	2004	MAU, Parbhani	(CJ 73 x NA 39) x (CJ 73 x A4)	Long lintered arboreum variety
Pratap Kapi (RBDV.7)	<i>G. herbaceum</i>	2004	MPKV, Banswara	Digvijay x 4272	High yielding with improved fiber properties
HD 324	<i>G. arboretum</i>	2005	CCSHAU, Hisar	HD 167 x (HD 203 X DS 5)	High yielding with improved fiber properties
MCU 13	<i>G. hirsutum</i>	2005	TNAU, Coimbatore	Multiple cross derivative involving [(TCH 665 x LS 149) x (TCH 665 x TCH 21)] x (TCH 21 x EECH) x (TCH 92-7 x EECH)]	High yielding long staple cotton
Raj DH 9	<i>G. arboreum</i> x	2005	RAU,	GMS-1 x RG148	GMS based high

	<i>G. arboreum</i>		Sriganganagar		yielding <i>desi</i> hybrid with improved fibre quality
HHH 287	<i>G. hirsutum</i> x <i>G. hirsutum</i>	2005	CCSHAU, Hisar	HGMS-1 x HHM-1	GMS based high yielding hybrid
CASA 310 (CICR 1)	<i>G. arboreum</i>	2006	CICR, RS, Sirsa	CSA 9-8 X AC 3479	High yielding with improved fiber properties
CSHH 238 (Kalyan)	<i>G. hirsutum</i> x <i>G. hirsutum</i>	2006	CICR, RS, Sirsa	SH2379 Y x PIL 8 Selection	High yielding with improved fiber properties
CSHH 243 (Simran)	<i>G. hirsutum</i> x <i>G. hirsutum</i>	2007	CICR, RS, Sirsa	CSH 2013 x CSH 43	High yielding with improved fiber properties
Suraj	<i>G. hirsutum</i>	2008	CICR, RS, Coimbatore	LRA 5166 (CCH 526612 x HLS 329)	High yielding Long staple variety
RAHH 98	<i>G. hirsutum</i> x <i>G. hirsutum</i>	2008	UAS, Dharwad		High yielding intrahirsutum hybrid
RAS 299-1	<i>G. hirsutum</i>	2009	UAS, Dharwad		Improved cotton genotype
DDhc-11	<i>G. herbaceum</i>	2009	UAS, Dharwad		Suitable for organic farming
Suvidha	<i>G. hirsutum</i> x <i>G. hirsutum</i>	2009	UAS, Dharwad		High yielding intrahirsutum hybrid
CNHO 12	<i>G. hirsutum</i>	2009	CICR, Nagpur		High yielding in irrigated central zone conditions with good jassid tolerance
CISA 614	<i>G. arboreum</i>	2009	CICR, RS, Sirsa		High yielding, non-spinnable purpose cotton for wilt-free north zone conditions

### Breeder Seed Production

The entire Breeder Seed Production of cotton is organized and monitored by the Project Coordinator employing various Proforma developed by the Indian Council of Agricultural Research. There was no mismatch between Government of India indent and production for the past 15 years.

### Details of Breeder seed indented and produced in respect of national varieties (in quintal)

Year	Indent			Production		
	Variety	Parent of hybrid	Total	Variety	Parent of hybrid	Total
1993-94	90.80	4.23	94.31	473.70	52.10	524.28
1994-95	114.29	9.90	124.28	422.90	4.00	424.39
1995-96	124.46	18.80	144.33	394.47	44.35	444.20
1996-97	203.60	28.20	231.80	304.23	54.39	362.20
1997-98	114.32	22.20	138.40	164.70	104.50	269.20

1998-99	168.60	9.00	177.60	142.90	34.48	180.70
1999-00	130.90	8.40	139.30	214.10	54.45	271.60
2000-01	104.29	9.50	114.24	249.80	59.80	309.60
2001-02	128.60	9.60	138.20	161.20	23.40	184.70
2002-03	84.10	4.37	90.80	104.70	23.20	130.90
2003-04	72.70	1.48	74.18	249.22	13.78	203.00
2004-05	110.13	1.99	112.12	160.51	34.43	194.94
2005-06	191.07	1.57	192.64	392.53	57.59	450.12
2006-07	58.93	3.28	62.21	189.86	27.43	217.29
2007-08	151.83	1.79	153.62	167.29	19.24	186.53
2008-09	84.90	1.31	86.21	79.84	0.64	80.48

### Cotton Crop Production technologies developed by AICCIP:

- Use of *Azospirillum* and *Azotobacter* was found beneficial in supplementing nitrogen needs of the cotton crop by 20-30 Kg/ha
- Use of 5-10 tonnes of farmyard manure per ha and foliar spray of 2% DAP or Urea is suggested to reduce 50% of recommended dose of chemical fertilizers
- Use of Naphthalene acetic acid (40 ppm) to prevent bud and boll shedding
- Use of weedicides like fluchloralin @ 1 Kg a.i./ha, Pendimethalin @ 1.5 Kg a.i./ha with interculture at 35 days after sowing was seen at par with manual weeding practice
- Ridges and furrow system of sowing; Drip irrigation with fertigation for saving irrigation water and to improve seed cotton yield by 25% in southern zone
- Detopping of apical bud under irrigated conditions ensures better development and retention of late-formed bolls besides arresting further vegetative growth.
- Possibilities of crop diversification in traditional and non-traditional areas were explored and through the efforts of AICCIP, cotton area has increased from 10,000 ha in 1995-96 to 60,000 ha in Orissa, a non-traditional cotton growing state. Potentiality exists to increase the area up to 1.0 lakh ha.
- High yielding *G. herbaceum* cotton genotypes RAHS14, G.Cot.21 and *desi* hybrids G.Cot DH 7 and G.Cot.DH 9 were seen well adapted to coastal areas of the country with yield levels ranging from 10- 25 q/ha due to better physiological and biochemical adaptability attributes.
- Modified seed rate, spacing and plant population for different species (New Genotypes) of cotton in three Zones have been identified.
- Diversified cropping systems and crop rotations suited to various agro-niches have been identified and are very popular among cotton growing farmers.

### Soil types suitable for cotton identified under AICCIP

Soil type	States
Black soils	Maharashtra, Gujarat, Madhya Pradesh, Andhra Pradesh and parts of Karnataka and southern Tamil Nadu
Alluvial soils :- clay-loam loamy and sandy loam soils	Punjab Haryana, Rajasthan, delta areas of Andhra Pradesh and Tamil Nadu
Red soils	parts of Andhra Pradesh, Karnataka and Tamil Nadu
Laterite soils	parts of Tamil Nadu, Orissa and North Eastern states
Coastal Saline-Alkali Soils	Gujarat State

### Cropping & Intercropping system in Cotton developed under AICCIP

State	Cropping system	Intercrop
Punjab, Haryana, Rajasthan	Cotton - Wheat, Cotton – Mustard, Cotton – Berseem	No intercropping
Madhya Pradesh	Cotton ( Monocrop), Cotton-Jowar (two yr. rotation), Cotton –Wheat	Cotton + Black gram ( 1:1 or 2:1) Cotton +Soybean ( 2:1)
Gujarat	Cotton ( Monocrop), Cotton-Jowar (two yr. rotation), Cotton –Wheat	Hy Cotton + Groundnut Desi Cotton + Black gram
Maharashtra	Cotton ( Monocrop), Cotton-Jowar (two yr. rotation)	Cotton + green gram, black gram Cotton + Soybean Cotton + Groundnut Mixed cropping with red gram
Karnataka	Cotton ( Monocrop), Cotton –Wheat	Cotton+ Chilly/Onion ( irrigated) Cotton ( DCH-32) + Rice ( high rainfall area)
Tamil Nadu	Cotton ( Monocrop), Rice - Cotton , Rice-Rice-Cotton, Cotton Jowar, Cotton-Pulse-Jowar	Cotton + Onion Cotton + Groundnut Cotton + Blackgram ( paired row) Mixed cropping with horse gram & minor millets
Andhra Pradesh	Mono cropped, Cotton-Rice(Sequence), Cotton-Chilli, Cotton-Tobacco( two yrs rotation)	Cotton + Blackgram (1: 2) Cotton + peagion pea Cotton+ Chilli Mixed cropping with Soyabean

## Cotton Crop Protection Strategies Developed by AICCIP:

- Several genotypes have been identified for their pest and disease tolerance and have been appropriately deployed in the resistance breeding programme for development of multi adversity resistance lines with better yielding ability for different regions
- Thiodicarb 75 SP @ 750 g. ai / ha and lambdacyhalothrin 5% EC @25 g ai/ha have been found to be most effective against the pink bollworm in cotton.
- Different chemical insecticides were tested against the cotton pests. Among these, seed treatment with imidacloprid 70 WS @ 7.5 gai/ha, thiamethoxam 70 WS, Chlothianidine 600 FS, thiamethoxam 350 FS @ 3 g ai/kg seed were found effective in controlling the sucking pests, whereas lambdacyhalothrin 5 % EC @15 and 20 g ai/ha, Spinosad 45 SC @ 75 g ai/ha and Indoxacarb 14.5 SC @ 75 g ai/ha etc were found best against the bollworms.
- Diafenthiuron 50 SC @ 400 g ai/ ha has been found effective in checking the incidence of whiteflies
- Newer insecticides like Methoxy fenozide, Lufenuron, Deltamethrin, and Alanycarb were found effective in the control of bollworms. However, usage of all the chemical insecticides shall be need-based and after taking into account the ETL, principles of Insecticide Resistance Management strategies and also taking into cognizance the biological control options.

Following genotypes have been identified for their pest and disease tolerance and have been appropriately deployed in the resistance breeding programme for development of still better multi adversity resistance lines with better yielding ability for different regions

Biotic Stress	Variety
White fly	Abhadita, LK 861, Kanchana, Supriya
Boll worms	Abhadita,
Pink Bollworm	Bikaneri Narma, H 777, F 414, F 286, Ganganagar Ageti
Cotton leaf curl virus disease	LHH 144, CSHH 198,RS 810, RS 875, RS 2013, F 1861, H1117
Jassids	B 1007, Khandwa 2, Kirti, Mahalakshmi, CNHO 12
Fusarium wilt	G Cot 13, Eknath, Rohini
Bacterial Blight	Arogya
Verticillium wilt	MCU 5 VT, Surabhi

## Management Strategies for Mealybug control

- Three species of mealybug are found on cotton in our country. The *Solenopsis* mealybug, *Phenacoccus solenopsis* (Tinsley), and the pink hibiscus mealybug, *Maconellicoccus hirsutus* (Green), were found to infest cotton plants from all nine cotton growing states of the country. The main species of the mealy bug reported from all the nine cotton growing States is *Phenacoccus solenopsis*, comprising 95% of the samples examined from 47 locations representing nine cotton growing states of India. Papaya mealy bug *Paracoccus marginatus* Williams and Ganara de willink also infests cotton and was found to be sporadic cum potential pest in South Zone (Coimbatore).
- This species with the multiple advantages of parthenogenesis and ovisacs for population explosion, ability to withstand extremes of temperatures from 0°C to 45°C during the crop free periods and availability of the equally attractive alternate hosts almost round the year, is all set to be even more dreaded than the earlier major pest *Helicoverpa armigera*.
- All over the country, several parasitoids (predominantly *Aenasius* sp.) and coccinellid beetle predators are now found to keep mealybug populations under control, thereby preventing spread and damage. Recent collection new hymenopterous parasitoids, *Aenasius* sp. (Chalcidodea: Aphelinidae) from Delhi and Coimbatore with 82 per cent parasitisation and *Promuscidea unfasciati* Girault (Chalcidodea: Encyrtidae) from Parbhani (Maharashtra) on *P. solenopsis* with 30–80 per cent parasitization in nature has added new hopes for management of this pest with biological control.
- An efficient lepidopteran predator *Spalgis epius* (Lycaenidae) was also recorded on *Paracoccus marginatus* from Coimbatore. The caterpillar can feed voraciously on young nymphs of the mealybug. Each full grown caterpillar is capable of eating as many as 300 nymphs per day.

Chemical control can be resorted when only severe infestations (>25% incidence) with severity (>grade 2,) where reproducing females and crawlers are found at least on any one branch of plant with chemical application in the entire field/area. Chemicals such as profenophos 50 EC or chlorpyrifos 20 EC or buprofezin 25FS or dimethoate 30 EC @ 2 ml/lit of water, or imidacloprid 17.8 SL @ 0.6 ml or thiomethoxam 25 WG 0.6 g/lit of water are suitable. Proper dosage and coverage of plants and fields should be ensured to prevent the subsequent flare up. (Inadequate spray coverage and lower dosages of pesticides lead to further spread of incidence). Second insecticidal spray a week after the first spray may be done, if necessary following careful monitoring. Good agricultural practices such as field sanitation, regular weeding, frequent monitoring through field visits, removal and destruction of plant parts and use of clean farm implements should be the basic

strategies for tackling the spread of this mealybug before applying insecticides after outbreaks.

### Recommended chemicals to manage foliar diseases

Disease	Recommended fungicide/bactericide
Root rot	Carbendazim or vitavax as seed treatment
Bacterial blight	Streptomycin sulphate (100 ppm) + copper oxychloride (0.3%) as foliar spray twice at an interval of 10 days
Alternaria leaf spot	Dithane M 45 or copper oxychloride as foliar spray twice at an interval of 10 days
Grey mildew	Carbendazim @250g/ha as foliar spray
Myrothecium leaf spot	Carbendazim, copper oxychloride as foliar spray

### Biological control

Several antagonistic organisms were evaluated for the management of Root Rot and foliar diseases of cotton. *Trichoderma harzianum* has been found to control the root rot effectively in northern cotton growing states such as Rajasthan and Haryana. This species is also recommended for seed and soil application just before sowing. Commercial formulations containing *Trichoderma* are readily available for this purpose. *Flavobacterium* and *Pseudomonas fluorescens* have been found effective in the control of bacterial blight.

**Location specific IPM modules were tested at different centres of AICCIP in all the three zones and indicated the following advantages of IPM Module.**

- Incidence and damage of pest was less
- Activity of natural enemies to insect pests was more
- Number of sprays were reduced by 50 %
- The net income and cost benefit ratio were higher in the range of 1:2.5
- Foliar application of *Imidacloprid* 35SC, *Chlothianidine* 50WDG, *diafenthiuron* 50SC were found effective against sap Sucking insect pests. Emamectin benzoate, Spinosad were found effective in controlling boll worm complex.

### Fine Tuning of Integrated Pest Management

With the help of the network programme of entomological trials under AICCIP, elaborate integrated pest management strategies have been evolved using cultural, mechanical and chemical components to reduce the insecticide application and make it more environmental friendly and sustainable. Biocontrol agents like

*Trichogramma* and NPV virus and plant products like Neem, mineral oil and fish oil rosin soap for controlling the cotton pests have helped to reduce the dependence on chemical pesticides. Monitoring of insecticide resistance to *Helicoverpa* in several agro-ecosystems has helped to better manage the pest in the farmer's fields.

Large scale field demonstrations of IPM technologies in farmer's fields in several cotton growing regions across the country showed that the pesticides usage was reduced by 30-40%, cost of pesticide application reduced by 40-50% and farmers obtain 20-30% higher seed cotton yield as compared to control villages, where farmers used only pesticides for the control of insect pests.

**The main components of IPM technologies developed for cotton by AICCIP are:**

- Deep summer ploughing to expose soil borne pests, pathogens and their destruction
- Avoiding monocropping and proper crop rotation, selection of pest resistant cultivars
- Using certified acid delinted seeds for good plant stand and preventing seed borne disease causing organisms and pink bollworm
- Seed treatment with Imidacloprid to prevent the early season sucking pests and *Trichoderma* to prevent seedling rot
- Monitoring with pheromone traps and assessment of pest population through scouting and ETL based application of appropriate technology to reduce the pest build up
- Application of biopesticides (*Trichogramma*, neem, NPV) in the early phase of the crop growth. Phased application of proper pesticides ensuring correct dosage and coverage depending upon the pest and age of the crop
- Adoption of recommended agronomic practices ; Avoiding closer spacing, high dose of nitrogenous fertilizers and excess irrigation
- Inter cropping with cowpea/sorghum/soybean to enhance the natural enemy population of cotton pests and to diversify the cropping system
- Trap cropping of castor for *Spodoptera* and Bhendi/pigeon pea for *Helicoverpa*
- Hand collection and destruction of grown up larvae and damaged plant parts e
- IPM strategy consisted of sex pheromone, release of *Trichogramma* and spraying of neem based insecticides and neem based synthetic insecticides. This proved to be effective in managing cotton pest complex
- Basal application of neem cake at 150 kg/ha coupled with drenching 1% neem oil helped in minimising stem weevil damage
- Major emphasis is given for developing varieties/hybrids resistant to key pests

- Role of egg larval parasite- *Chelonus blackburni*- in control of bollworms was established
- Growing of intercrops like cluster bean and Maize reduced pest infestation
- Cotton intercropped with cowpea, blackgram and greengram had lesser incidence of jassids and bollworms
- New Pesticide molecules viz., **Imidacloprid** ( 10g/kg of seed) and **Thiomethoxam** ( 4.3 g/kg of seed) were **effective in controlling jassid and whitefly population**
- **Topsin M** (0.05%) and **Carbendazim** (0.05%) were effective in control of Myrothecium and Alternaria leaf spot
- Estimation of yield loss due to Grey mildew was found to be of the order of 20 to 40% in Central Zone. **Prochloraz** and **Propiconazole** gave significant control of Grey mildew
- *Flavobacterium* sp. was found effective in control of bacterial blight

### Front Line Demonstration (FLD) through AICRP on Cotton

The All India Coordinated Cotton Improvement Project (AICCIP) acts as the Nodal Agency for conducting the cotton Front Line Demonstration programme in the country with active support from the Director, Directorate of Cotton Development, Mumbai. The Project Coordinator (Cotton) coordinates and monitors the implementation of the FLD programme with Headquarters at the Central Institute for Cotton Research, Regional Station, Coimbatore. The FLDs are organized through AICCIP network spread over ten cotton-growing states through Technology Mission on Cotton Mini Mission- II with financial support of Ministry of Agriculture, Govt.of India. Besides, Central Institute for Cotton Research, Nagpur and its Regional Stations at Coimbatore and Sirsa also actively participated in the programme.

### Objectives of FLD

- To demonstrate the usefulness of the latest improved crop production and protection technologies besides newly developed varieties/hybrids to the farmers as well as extension workers with a view to reduce the time gap between technology generation and its adoption.
- To enable scientists obtain direct feed back from cotton farmers and suitably reorient their research programmes and develop appropriate technology packages.
- To create effective linkage among scientists, extension personnel and farmers.

The major technologies transferred were popularization of new cotton varieties and hybrids, approved Bt cotton hybrids, hybrid seed production,

Integrated plant nutrient management practices, intercropping, drip irrigation system, seed treatment with bio-fertilizers, Maintenance of plant population, Soil moisture conservation techniques, Residue management including vermicomposting and foliar nutrition, Integrated Pest Management practices, Disease Management practices. Besides, improved farm implements demonstrations helped in reducing drudgery in Cotton farming.

**The significant achievements of the Front Line Demonstrations in Cotton are:**

- Noticeable improvement in seed cotton yields in FLD fields compared to general Farmers' practices by adopting better conventional and newly released cotton varieties/hybrids
- Wide spread adoption of Bt cotton hybrids and thereby enhanced yield realization by FLD farmers
- Reduction in cost of cultivation due to reduced use of herbicides and pesticides with resultant better soil health maintenance and reduction in environmental pollution
- Improved farm implement demonstrations that bring about reduction in drudgery among rural women folk.
- Commensurate price for the quality produce by FLD farmers, especially extra long staple cotton cultivation

**State-wise Results of Cotton Front Line Demonstrations conducted through AICCIP on Improved Cotton varieties/hybrids including Bt Cotton hybrids from 2007 to 2009**

S.No	States	Mean yield of FLDs (kg/ha)	Mean yield of Farmers' practices (Kg/ha)	% increase Over Farmers Practice
1	Punjab	2355	2207	7 %
2	Haryana	2245	1954	15%
3	Rajasthan	2495	2032	23%
	<b>North Zone Average</b>	<b>2365</b>	<b>2064</b>	<b>15%</b>
4	Gujarat	2519	2290	10 %
5	Madhya Pradesh	1924	1575	22%
6	Maharashtra	1469	1258	17 %
7	Orissa	1600	1206	33%
	<b>Central Zone Average</b>	<b>1878</b>	<b>1582</b>	<b>19 %</b>
8	Andhra Pradesh	1987	1414	41%
9	Karnataka	2380	2240	6 %
10	Tamil Nadu	1170	910	29%
	<b>South Zone Average</b>	<b>1845</b>	<b>1521</b>	<b>21%</b>

**State-wise Results of Cotton Front Line Demonstrations conducted through AICRP on Cotton on Natural Resource Management from 2007 to 2009**

S.No	States	Mean yield of FLDs ( kg/ha)	Mean yield of Farmers practices ( kg/ha)	% increase
1	Punjab	2533	2043	24%
2	Haryana	1869	1634	14 %
3	Rajasthan	2474	2034	13 %
	<b>North Zone Average</b>	<b>2292</b>	<b>1903</b>	<b>20%</b>
4	Gujarat	2648	2464	8 %
5	Madhya Pradesh	2140	1805	19 %
6	Maharashtra	1581	1423	11.1%
7	Orissa	1644	1240	33 %
	<b>Central Zone Average</b>	<b>2003</b>	<b>1733</b>	<b>16 %</b>
8	Andhra Pradesh	2768	2315	20 %
9	Karnataka	1864	1630	14 %
10	Tamil Nadu	1536	1154	33 %
	<b>South Zone Average</b>	<b>2056</b>	<b>1700</b>	<b>21 %</b>

**State-wise Results of Cotton Front Line Demonstrations conducted through AICRP on Cotton on Integrated Pest Management from 2007 to 2009**

S.No	States	Mean yield of FLDs ( kg/ha)	Mean yield of Farmers' practices ( kg/ha)	% increase
1	Punjab	2618	2338	11.98
2	Haryana	2012	1875	7.31
3	Rajasthan	1120	880	27.27
	<b>North Zone Average</b>	<b>1916</b>	<b>1697</b>	<b>13 %</b>
4	Gujarat	2887	2588	11.55
5	Madhya Pradesh	1730	1375	25.81
6	Maharashtra	1439	1235	16.52
7	Orissa	1590	1210	31.40
	<b>Central Zone Average</b>	<b>1912</b>	<b>1602</b>	<b>19%</b>
8	Andhra Pradesh	3604	3316	8.69
9	Karnataka	2402	2292	4.79
10	Tamil Nadu	1407	1070	31.49
	<b>South Zone Average</b>	<b>2471</b>	<b>2226</b>	<b>11 %</b>

**Insect pest of cotton and their symptoms of damages**

<b>Insect pest</b>	<b>Scientific name</b>	<b>Symptoms of damage</b>
<b>Sucking pests</b>		
Jassids	<i>Amrasca biguttula biguttula</i>	Affected leaves curl downwards, turn yellowish, then to brownish before drying and shedding, "hopper burn" stunts young plants
Aphids	<i>Aphis gossypii</i>	Leaf crumpling and downward curling of leaves, sticky cotton due to deposits of honey dew on open bolls
Thrips	<i>Thrips tabaci</i>	Leaves of seedlings become wrinkled and distorted with white shiny patches, older crop presents rusty appearance from a distance
Whiteflies	<i>Bemisia tabaci</i>	Upward curling of leaves, reduced plant vigour, lint contamination with honey dew and associated fungi, transmission of leaf curl virus disease
Mealy bug	<i>Phenacoccus solenopsis</i>	Feed on plant sap, normally in roots or other crevices. Attach themselves to the plant and secrete a powdery wax layer. Moves from plant to plant and row-to-row causing severe
<b>Bollworms</b>		
Spotted & spiny bollworms	<i>Earias vitella &amp; E.insulana</i>	Boremark in main shoot, dried and withered away shoot, twining of main stem due to axillary monopodia, feeding holes in flower buds and bolls blocked by excrement
American bollworm	<i>Helicoverpa armigera</i>	Small amount of webbing on small squares injured by young larvae, squares have a round hole near the base, larval frass and flaring of bracts on larger squares, clean feeding of internal contents of bolls, excessive shedding of buds and bolls
Pink bollworm	<i>Pectinophora gossypiella</i>	"Rosetted" bloom, pink larvae inside developing bolls with interloculi movement
<b>Stainers</b>		
Red cotton bug	<i>Dysdercus cingulatus</i>	Feed on developing and mature seeds, stain the lint to typical yellow colour, reddish nymphs seen in aggregations around developing and open bolls
Dusky cotton bug	<i>Oxycarenus hyalipennis</i>	Associated with ripe seeds, all stages characterized by a powerful smell, discolour the lint if crushed
<b>Stem , Leaf and Foliar feeders</b>		
Semi – looper	<i>Anomis flava</i>	Causes significant loss of leaf area to young plants, larvae with looping action are seen on plant parts.
Leaf roller	<i>Syllepte derogata</i>	Leaves are folded and larvae are seen in groups amidst fecal materials, commonly seen on leaves at the bottom of crop canopy at low infestation levels, severe infestation defoliates the whole plant

Cotton leafworm /Tobacco Caterpillar	<i>Spodoptera litura</i>	Young larvae in groups skeletonise leaves and older larvae voraciously defoliate leaves
Grey weevil	<i>Myloccerus subfasciatus</i>	Marginal notching – off of leaves
Grass hopper	<i>Crytoanthacris ranacea</i>	Defoliation of leaves – partial or full
Hairy caterpillar	<i>Amscacta albistriga</i>	Defoliates the crop, attacks in large group.
Stem weevil	<i>Pempherulus affinis</i>	Root damage by grubs kills young seedlings, gall like swelling seen on lower stem, wilting of seedlings
Shoot Weevil	<i>Alcidodes fabric.</i>	Lay eggs at the node axil and the grubs feed on the tissue at the axil. The affected leaves wilt and droop.
Sesabnia stem borer	<i>Azygophleps scalaris</i>	Lay eggs in the bark of young plants, caterpillars bore into stem and form galleries.
Cotton stem borer	<i>Sphenoptera gossypii</i>	Lay eggs on young plants at collar. Grubs bore into stem and form galleries.

### Cotton Zones at a glance in India

Particulars	North Zone	Central Zone	South Zone
States	Punjab, Haryana, Rajasthan, Uttar Pradesh	Maharashtra, Madhya Pradesh, Gujarat, Orissa	Andhra Pradesh, Karnataka, Tamil Nadu
Area	15.0 lakh ha	68.0 lakh ha	18.0 lakh ha
Production	40.0 lakh bales	180 lakh bales	62 lakh bales
Productivity	460 kg lint per ha	445 kg lint per ha	585 kg lint per ha
Ecology	Irrigated (100%)	Irrigated, Rainfed	Irrigated rainfed
Nature of Genotype	Varieties, Hybrids, Bt cotton hybrids	Varieties, Hybrids, Bt cotton hybrids	Varieties, Hybrids, Bt cotton hybrids
Species	<i>G. hirsutum</i> <i>G. arboreum</i>	<i>G. hirsutum</i> , <i>G. arboreum</i> , Intra hirsutum, <i>G. herbaceum</i>	Interspecific tetraploids (HB), Intrahirsutum hybrids, <i>G. hirsutum</i> , <i>G. arboreum</i> , <i>G. herbaceum</i> , <i>G. barbendense</i>
Pests	Helicoverpa, White fly, Jassids, Pink bollworm	Helicoverpa, White fly, Jassids, Aphids, Pink bollworm	Helicoverpa, White fly, Jassids, Aphids, Pink bollworm, mealy bug
Diseases	Leaf Curl Virus, wilt	Wilt, bacterial blight	Wilt, Foliar disease
Sowing Method	Drill sown	Hand dibbling	Hand dibbling
Time of Sowing	April-May	June-July	July-Aug

### Classification of cottons

2.5% span length		Length Uniformity (%)			
Category	Range in mm	Category	Range		
Short	20.0 and below	Poor	Below 42		
Medium	20.5 to 24.5	Fair	42 to 43		
Medium Long	25.0 to 27.0	Average	44 to 45		
Long	27.5 to 32.0	Good	46 to 47		
Extra- long	32.5 and above	Excellent	Above 47		
Micronaire Value (microgram/inch)		Maturity Coefficient			
Category	Range	Category	Range		
Very Fine	Below 3.0	Very Immature	Below 40		
Fine	3.0 to 3.9	Immature	40 to 50		
Average	4.0 to 4.9	Average Maturity	51 to 67		
Coarse	5.0 to 5.9	Good Maturity	68 to 84		
Very Coarse	6.0 and above	Very high Maturity	Above 84		
Bundle Tenacity (g/t) 3.2 mm gauge length		Standard CSP Value			
Category	Range	Count	CSP	Count	CSP
Poor	Below 16.0	20s	1870	70s	2295
Low	16.1 to 20.0	30s	1955	80s	2380
Average	20.1 to 23.0	40s	2040	90s	2465
Good	23.1 to 26.0	50s	2125	100s	2550
Very Good	26.1 and above	60s	2210	120s	2720

### List of Cotton Varieties/ Hybrids with Abiotic Stress Tolerance (decade-wise)

Characteristic	1970-80	1981-90	1991-2000	2000-09
<b>North zone</b>				
Water logging tolerance	H 777	--	LRK 516, AAH-1	F 1861, HHH 287
Saline tolerance	G 27, Pusa Ageti	--	AAH 1	CICR-2, RAJ DH9
<b>Central Zone</b>				
Drought tolerant	AK 235	LRA 5166 NHH 44,	G.Cot.15, G.Cot.16, G.Cot.19 Jawahar Tapti	PKV Hy 5, AKDH 5 AKDH-7 G.Cot.MDH 11, PDKV DH-1, Pratap Kapi , Wagad Kalyan, PA 402, PA 225, , G.Cot.18, NH 545, JK 4, AKA 8
Water logging tolerant	---	NHH 44, LRA 5166	Anjali	G.Cot.Hy.12 Parbhani Turab
Saline tolerant	---	G.Cot.13 G.Cot. DH 7, G.Cot.DH 9	G.Cot.17	G.Cot.21, G.Cot.23

<b>South zone</b>				
Drought tolerant	--	LRA 5166, MCU 5 VT	Surya, RCH 2, KC 2, Bunny, Surabhi	LAHH 4, SVPR 3 Sumangala, Veena DLSa 17
Water logging tolerant	--	LRA 5166 Savita	LRK 516 DHH 11,	RAHS 14,
Saline tolerant	--	G.Cot.DH 7 G.Cot.DH 9, JAYADHAR, DB 3-12	Surya, DHB 105	RAHS 14 DDHC 11

### List of the Bt cotton events approved for cultivation in India

Event name	Event number	Source company/ institution	Genes	Year of approval
Bollgard I	MON 531	Monsanto	<i>cry1Ac</i>	2002
Bollgard II	MON 15985	Monsanto	<i>cry1Ac</i> and <i>cry2Ab</i>	2006
Event 1	Event 1	IIT, Kharagpur	Truncated <i>cry1Ac</i>	2006
GFM Cry1A	GFM Cry1A	Chinese Academy of Sciences	<i>cry1Ab+cry1Ac</i>	2006
BN Bt	BNLA 601	CICR, Nagpur UAS, Dharwad	Truncated <i>cry1Ac</i>	2008
9124	9124	Metahelix	<i>cry1C</i>	2009

### List of Private sector Bt cotton hybrids approved for commercial cultivation in India after multi location evaluation through AICCIP.

Name of the company	North Zone	Central Zone	South Zone
<b>Ajeet Seeds</b>	ACH 33-2 BG II (2007)	ACH 33-1 (2006) ACH 155-1(2006) ACH 11-2 BG II (2006) Ajeet 155 BG II (2007) ACH 111-2 (2008) ACH 177-1 (2008) ACH 177-2 (2008)	ACH 33-1(2006) ACH 155-1 (2006) ACH 33-2 BG II (2007) ACH 21 (2007) ACH 1 (2008) ACH 155-2 (2008) ACH 177-2 (2008) ACHB 901-1 (2008)*
<b>Amar Bio-tech Ltd.</b>		ABCH 1165 Bt (2007) ABCH 1065 BG II (2008)	ABCH 1165 Bt (2007) ABCH 1220 Bt (2007) ABCH 3083 Bt (2008) ABCH 1020 BG II (2008) ABCH 1065 BG II (2008)
<b>Ankur Seeds</b>	Ankur 651 (2005) Ankur 2534 (2005) Ankur 226 BG (2007) Jassi BG II (2008) Ankur 8120 BG II (2008)	Ankur 651 (2005) Ankur 09 (2005) Jai BG (2007) Akka BG (2007) Ankur 3032 (2008)	Jai BG (2007) Akka BG (2007) Akka BG II (2008) Ankur 3042 Bt (2008) Ankur HB 1902 (2008)*

	Ankur 5642 BG II (2008)	Ankur HB 1950 (2008)* Akka BG II (2008)	Ankur HB 1976 (2008)* Ankur 5642 BG II (2008) Ankur 10122 BG II (2008)
<b>Bayer Bioscience Pvt. Ltd</b>	6488-2 (2008) 2510-2 (2008) 2113-2 (2008)	SP 923 Bt (IT 923 Bt) (2007) SP 503 B1 (2008) SP 499 B1 (2008) SP 904 B1 (2008)* SP 1037 B2 (2008)	SP 700 B1 (2008) SP 503 B1 (2008) SP 1037 B2 (2008)
<b>Bio-seeds Research</b>	6317 Bt (2007) 6488 Bt (2007)	322 Bt (2007) 110 Bt (2007) 6188 Bt (2007) 563 Bt (2007)	6188 Bt (2007) 340 Bt (2007) 322-2 (2008) 113-2 (2008) 340-2 (2008)
<b>Central Institute for Cotton Research#</b>	BN Bt (2008)	BN Bt (2008) NHH 44 Bt (2009)	BN Bt (2008) NHH 44 Bt (2009)
<b>Emergent genetics</b>		Brahma (2006)	Brahma (2006)
<b>Ganga Kaveri Seeds</b>	GK 206 Bt (2007) GK 212 BG II (2008)	GK 204 (2006) GK 205 (2006)	GK 209 (2006) GK 207 (2006) GK 217 BG II (2008)
<b>JK Seeds</b>	JKCH 1947 (2006) JKCH 1050 Bt (2007) JKCH 1945 Bt (2008) JKCH 226 Bt (2008)	JK Varun (2006) JKCH 99 (2007) JKCH 666 Bt (2007) JKCH 226 Bt (2007) JK-Indra Bt (2008)	JK Durga (2006) JKCH 99 (2006) JKCH 634 Bt (2007) JK-Indra Bt (2008) JK- Chamundi Bt (2008)* JK-Gowri Bt (2008) JKCH 2245 (2008)
<b>Kaveri Seeds Ltd</b>	KCH 707 BG II (2008)	KCH 135 Bt (2007) KCH 707 Bt (2007) KCH 135 BG II (2008)	KCH 135 Bt (2007) KCH 707 Bt (2007) KCH 135 BG II (2008)
<b>Krishidhan Seeds</b>	KDCHH 9810 (2007) KDCHH 441 BG II (2008)	KDCHH 441 BG II (2006) KDCHH 9810 (2006) KDCHH 9632 (2006) KDCHH 9821 (2006) KDCHH 786 Bt (2007) 621 BG II (2007) KDCHH 9632 BG II (2008)	KDCHH 9632 (2006) KDCHH 9810 (2006) KDCHB 407 Bt (2007)* 621 BG II (2007) KDCHH 441 BG II (2008) KDCHH 9632 BG II (2008)
<b>MAHYCO Seeds</b>	MRC 6301 (2005) MRC 6304 (2005) MRC 6025 (2006) MRC 6029 (2006) MRC 7017 BG II (2007) MRC 7031 BG II (2007) MRC 7041 BG II (2008) MRC 7045BG II (2008)	MECH. 12 (2002), MECH. 162 (2002), MECH. 184 (2002), MRC 6301 (2005) MRC 7301 BG II (2006) MRC 7326 BG II (2006) MRC 7347 BG II (2006) MRC 7351 BG II (2007) MRC 7918 BG II (2008)*	MECH. 12 (2002) MECH. 162 (2002) MECH. 184 (2002) MRC 6918 (2005)* MRC 6322 (2005) MRC 7351 BG II(2006) MRC 7201 BG II (2006) MRC 7347 BG II (2007) MRC 7160 BG II (2007) MRC 7918 BG II (2008)* MRC 7929 BG II (2008)*
<b>Monsanto Genetics Ltd.</b>		Atal BG II (2008) Paras Laxmi BG II (2008)*	Brahma BG II (2008)
<b>Namdhari Seeds Pvt Ltd</b>	NAMCOT 402 Bt (2007)		NAMCOT 607 BG II (2008) NAMCOT 612 BG II (2008)

<b>Nandi Seeds</b>	SDS 1368 Bt (2007) SDS 9 Bt (2007) SDS P BG II (2008) SDS 36 BG II (2008)	NSPL 406 Bt (2007) NSPL 36 Bt (2007) NSPL 999 BG I (2007) NSPL 999 BG II (2008) NSPL 36 BG II (2008) NSPL 405 BG II (2008)	NSPL 36 Bt (2007) NSPL 999 BG I (2007) NSPL 405Bt (2007) NSPL 999 BG II (2008) NSPL 405 BG II (2008) NSPL 9 BG I (2008) NSPL 603 BG I (2008) NSPL 666 BG I (2008)
<b>Nath Seeds</b>	NCEH 6 (2006) NCEH 26 Bt (2008) NCEH 31 Bt (2008)	NCEH 2R (2006) NCEH 3R (2007) Kashinath (2007)* NCEH 14 Bt (2008) NCEH 21 Bt (2008) NCEH 23 Bt (2008)*	NCEH 3R (2006) NCEH 2R (2007) Kashinath (2007)* NCEH 34 Bt (2008) NCEH 13 Bt (2008)
<b>Navkar Hybrids Pvt. Ltd</b>	Navkar 5 Bt (2008)	Navkar Bt (2007)	
<b>Nuziveedu Seeds</b>	NCS 913 (2006) NCS 138 (2006) NCS 145 BG II (2007)	Bunny (2005) Mallika (2005) NCS 913 (2006) NCS 954 (2007) NCHB 992 (2007)* NCS 955 (2007) NCS 207 (2007) NCS 145 BG II (2008) NCS 854 BG II (2008) NCS 945 Bt (2008)*	Bunny (2005) Mallika (2005) NCS 913 (2006) NCS 145 BG II (2007) NCS 954 (2007) NCHB 992 (2007)* NCS 950 (2007) NCS 929 Bt (2007) NCHB 990 Bt (2007)* NCS 854 BG II (2008) NCS 940 Bt (2008)* NCS 945 Bt (2008)* NCS 207 Bt (2008) NCS 906 Bt (2008) NCS 907 Bt (2008) NCS 908 Bt (2008) NCS 909 Bt (2008) NCS 910 Bt (2008)
<b>Prabhat Seeds Ltd</b>	PCH 406 Bt (2007)	NPH 2171 (2006) PCH 115 (2007) PCH 205 (2007) PCH 923 (2007) PCH 2171 BG II (2008) PCH 205 BG II (2008)	PCH 2270 (2006) NPH 2171 (2006) PCH 115 (2007) PCH 930 Bt (2007) PCH 207 Bt (2007) PCH 2270 BG II (2008) PCH 105 BG II (2008) PCH 409 Bt (2008)
<b>Pravardhan Seeds</b>		PRCH 102 (2006) PRCH 31 Bt (2007) Rudra Bt (2007) PRCH 504 BG II (2008)	Rudra Bt (2007) PRCHB 405 (2008)* PRCH 504 BG II (2008) PRCH 505 BG II (2008)
<b>Proagro Seed Company</b>	IT 905 BG I (2007)	SP 504 BI (Dhanno) (2007)	SP 504 BI (Dhanno) (2007)
<b>Rasi Seeds</b>	RCH 134 (2005) RCH 317 (2005) RCH 308 (2006) RCH 314 (2006) RCH 569 BG II (2008) RCH 134 BG II (2008)	RCH 2 (2004), RCH 118 (2005) RCH 138 (2005), RCH 144 (2005) RCH 377 (2006) RCH 386 BG I (2007) RCH 2 BG II (2007)	RCH 2 (2004) RCH 20 (2005) RCH 368 (2005) RCH 111 (2006) RCH 371 (2006) RCHB 708 (2006)* RCH 2 BG II (2007)

		RCH 515 BG II (2007) RCH 578 BG II (2008) RCH 395 BG II (2008)	RCH 530 BG II (2007) RCH 533 BG II (2007) RCH 596 BG II (2008)
<b>Safal Seeds &amp; Biotech Ltd.</b>			SBCH 292 Bt (2008)
<b>Seed Works India Pvt. Ltd.</b>		SWCH 4314 Bt (2008)	SWCH 4531 Bt (2008)
<b>Soalr Agrotech Pvt. Ltd.</b>		Mahasangram Bt (2008) Sarju Bt (2008)	Mahasangram Bt (2008)
<b>Tulasi Seeds</b>	Tulasi 4 BG II (2008) Tulasi 45 BG II (2008)	Tulasi 4 (2006) Tulasi 117 (2006) Tulasi 9 BG I (2007) Tulasi 4 BG II (2008) Tulasi 9 BG II (2008) Tulasi 118 BG II (2008) Tulasi 5 Bt (2008)	Tulasi 4 (2006) Tulasi 117 (2006)
<b>Uniphos Enterprises Ltd.</b>	UPLHH 1 Bt (2008)		UPLHH 5 Bt (2008) UPLHH 12 Bt (2008)
<b>Vibha Agrotech Ltd</b>	Sigma Bt (2007) Ole Bt (2007) VBCH 1006 Bt (2008) VBCH 1008 Bt (2008) VBCH 1501 BG II (2008) VBCH 1504 BG II (2008)	Sigma Bt (2007) Dyna Bt (2007) VBCH 1009 (2007) VBCH 1010 (2007) VBCH 1006 Bt (2008) VBCH 1016 Bt (2008) VBCH 1017 Bt (2008) VBCH 1018 Bt (2008)	Sigma Bt (2007) Ole Bt (2007) Dyna Bt (2007) VBCH 1501 BG II (2008) VBCH 1016 Bt (2008) VBCH 1018 Bt (2008) VBCHB 1010 Bt (2008)* VBCHB 1203 Bt (2008)* VBCH 1505 BG II (2008) VBCH 1506 BG II (2008)
<b>Vikki's Agro Tech</b>		VCH 111 (2006)	
<b>Vikram Seeds</b>	VICH 9 BG II(2008) VICH 11 Bt (2008) VICH 11 BG II (2008)	VICH 5 (2006) VICH 9 (2006) VICH 15 Bt (2007) VICH 15 BG II (2008)	VICH 5 (2006) VICH 9 (2006) VICH 15 BG II (2008) VICH 5 BG II (2008)
<b>Yashoda Hybrids</b>		Monsoon Bt (2008)	Monsoon Bt (2008)
<b>Zuari Seeds Ltd.</b>		Dhruv Bt (2007) ZCH 50005 Bt (2008) ZCH 50072 Bt (2008)	Dhruv Bt (2007) ZCH 50072 Bt (2008)

\*hir x bar hybrids,

More number of transgenic Bt cotton hybrids have been suggested for commercial cultivation in different States of the country based on the recommendations of the Standing Committee on Event Based Approval Mechanism (constituted by GEAC). The details are available in the IGMORIS website  
[http://igmoris.nic.in/files/Recommendations\\_of\\_Standing\\_Committee.pdf](http://igmoris.nic.in/files/Recommendations_of_Standing_Committee.pdf)

### Salient Features of select cotton varieties/hybrids

Name of the variety	F 1861	LD 694	CISAA 2	CSHH 198 (Shresth)	LAHH 4
Species	<i>G. hirsutum</i>	<i>G. arboreum</i>	<i>G. arboreum</i> x <i>G. arboreum</i>	<i>G. hirsutum</i>	<i>G. hirsutum</i>
Year of release	2003	2001	2005	2005	2000
Pedigree	F 505 x F 380	LD 260 x LD 360	DS 5 GMS and LD 327 (sel.)	CSH19 and CSH 8	AB 6 x M 2
Area of adoption	Punjab	Punjab	North Zone	North Zone	Andhra Pradesh
Eco system	Irrigated	Irrigated	Irrigated	Irrigated	Irrigated
Remarks	Resistant to CLCuV	Tolerant to Fusarium wilt and bacterial blight	Synchronous in maturity, fluffy opening and shattering tolerance desi hybrid	Resistant to CLCuV	
Petal colour	Cream	Pink	Pink	Cream	Cream
Pollen	Cream	Yellow	Yellow	Cream	Cream
Petal spot	Absent	Present	Present	Absent	Absent
Boll shape	Round	Round	Ovate	Ovate	Round
Boll weight [g]	3.2	2.6	2.9	4.5	
Maturity (days)			160-170	160-170	160-170
Average yield (q/ha)	25.0	20.0	30.0	25.0	20.0
Ginning percent	35.0	40.0	40.0	33.0	35.0
Fibre length (mm)	26.0	22.0	19.0	26.5	27.0
Bundle Strength g/t 1/8" gauge	20.0	18.0	16.4	23.5	21.7
Mic value	4.7	6.7	8.0	4.5	4.0
Spinning potential (Counts)	30s	20s	20s	50s	40s

Name of the variety	H 1117	AAH 1	RG 18	RS 810	Vagad Kalyan
Species	<i>G. hirsutum</i>	<i>G. arboreum</i> X <i>G. arboreum</i>	<i>G. arboreum</i>	<i>G. hirsutum</i>	<i>G. hirsutum</i>
Year of release	2002	1999	2001	2001	2001
Pedigree	(H 777 x Ac 134) x (H 777 x GS 21)	GMS -1 x HD 266	Sc 75 x RG 2-1	RS 644 x Khandwa 3	SRT 1 x MCU 7
Area of adoption	Haryana	Haryana	Rajasthan	Rajasthan	Rajasthan
Eco system	Irrigated	Irrigated	Irrigated	Irrigated	Irrigated
Remarks	High yielding with superior fibre properties, and early maturing	GMS based desi hybrid with Red coloured bolls		Resistant to CLCuV	Moderately resistant to bacterial leaf blight & alternaria leaf blight as well as sucking pests & boll worms
Petal colour	Cream	Cream	Pink	Yellow	Light Yellow
Pollen	Cream	Yellow	Yellow	Yellow	Cream
Petal spot	Absent	Present	Present	Absent	Absent
Boll shape	Ovate	Ovate	Ovate	Round	Ovate
Boll weight [g]	3.4	2.3	2.2	3.2	3.0
Maturity (days)	160	170			160
Average yield (q/ha)	25.0	25.0	20.0	25.0	15.0
Ginning percent	37.0	38.0	36.0	35.0	30.0
Fibre length (mm)	25.0	20.0	20.0	26.0	25.3
Bundle Strength g/t 1/8" gauge	18.5	16.3	15.0	20.0	21.0
Mic value	5.3	7.0	7.0	6.0	3.7
Spinning potential (Counts)	30s	20s	Non Spinnable	30s	30s

Name of the variety	G. Cot. 10	G. Cot. 19	PKV Rajat	Turab (PA 255)	Sri Nandi (NDLA 2463)
Species	<i>G. hirsutum</i>	<i>G. arboreum</i>	<i>G. hirsutum</i>	<i>G. arboreum</i>	<i>G. arboreum</i>
Year of release	1982	1997	1996	2004	2006
Pedigree	Reselection from KW 66-2096	Jyoti x <i>G. arboreum</i> NG	AC 938 x SRT-1	(CJ 73 x NA 39) x (CJ 73 x A4)	Racherla Local Desi Type
Area of adoption	Gujarat	Gujarat	Maharashtra	Maharashtra	Andhra Pradesh
Eco system	Irrigated	Rainfed	Rainfed	Rainfed	Rainfed
Remarks	Resistant to Jassids and BLB			Long linted arboreum variety	
Petal colour	Cream	White		Yellow	White
Pollen	Yellow	Yellow		Yellow	Yellow
Petal spot	Absent	Present		Present	Present
Boll shape	Ovate	Elliptic		Ovate	Elliptic
Boll weight [g]	4.5	2.4	3.5		2.5
Maturity (days)					160-170
Average yield (q/ha)	22.0	22.0	15.0	16.0	25.0
Ginning percent	36.0	34.0	38.0	38.0	37.0
Fibre length (mm)	27.0	25.0	25.0	25.0	21.0
Bundle Strength g/t 1/8" gauge	21.5	22.0	18.0	23.0	
Mic value	5.5	4.4	4.5	4.7	
Spinning potential (Counts)	40s	30s	30s	30s	20s

<b>Name of the variety</b>	<b>Suvin</b>	<b>LRA 5166</b>	<b>MCU 5 VT</b>
Species	<i>G. barbadense</i>	<i>G. hirsutum</i>	<i>G. hirsutum</i>
Year of release	1978	1983	1984
Central/ State Release	Central	Central	Central
Pedigree	Sujata x SIV 135	Laxmi x (Reba-B50 x AC 122)	Reselection from MCU 5
Area of adoption	Tamil nadu	South zone	South zone
Eco system	Irrigated	Irrigated & Rainfed	Irrigated
Remarks	Extra Long Staple	Drought Tolerant	Extra Long Staple, Verticillium Wilt Tolerant
Petal colour	Yellow	Cream	Cream
Pollen	Yellow	Yellow	Yellow
Petal spot	Present	Absent	Absent
Boll shape	Conical medium	Medium ovoid with pointed tip	Medium ovoid
Boll weight [g]	2.8 - 3.0	3.5-4.0	3.5-4.0
Seeds	Naked, Medium sized	Medium with white fuzz	Medium with white fuzz
Seeds / boll	18-21	28-32	28-32
Maturity	200	165 days	175
Average yield (q/ha)	26	I:25-30, R:10-14	25
Ginning percent	29	32	34
Fibre length (mm)	40	26	32
Bundle Strength g/t 1/8" gauge	38	25	25
Mic value	3.2	3.8	3.3
Spinning potential (Counts)	120s	40-50s	60s

Name of the variety	Surabhi (VRS 7)	Sumangala (CWROK 165)	Suraj (CCH 510-4)
Species	<i>G. hirsutum</i>	<i>G. hirsutum</i>	<i>G. hirsutum</i>
Year of release	1997	2001	2008
Central/ State Release	Central	Central	Central
Pedigree	MCU 5VT (MCU 5 x <i>G. mexicanum</i> )	CW134 x Reba-b-50 x Khandwa-2	LRA 5166 (CCH 526612 x HLS 329)
Area of adoption	South zone	South zone	Central and South Zone
Eco system	Irrigated	Irrigated & Rainfed	Irrigated
Remarks	Extra Long Staple, Resistant to verticillium wilt, bacterial blight, dry root rot and alternaria leaf spot. Moderately resistant to jassids and bollworms	Medium staple and long branching. Moderately resistant to sucking pests and recorded less incidence of bollworm infestation	High yielding Long staple variety
Petal colour	Cream	Cream	Cream
Pollen	Yellow	Yellow	Cream
Petal spot	Absent	Absent	Absent
Boll shape	Medium ovoid with pointed tip	Medium, smooth, tapering to pointed tip	Oblong
Boll weight [g]	4.0	4.0 - 4.5	5.9
Seeds	Fuzzy [seed index 9.5 g]	Bold with white fuzz [seed index 9.0 - 10.0]	Bold (10.0 g SI) with dense fuzz
Seeds / boll	28-32	28-32	32
Maturity	165 days	165 days	165
Average yield (q/ha)	16	I:25-30, R:10-14	18.0
Ginning percent	35	38.0	34.0
Fibre length (mm)	32	26.5	32.0
Bundle Strength g/t 1/8" gauge	24.4	21.2	25.9
Mic value	3.2	3.9	4.2
Spinning potential (Counts)	60s	40s	50s

Name of the variety	SVPR 3	MCU 13	DCH 32	L 604
Species	<i>G. hirsutum</i>	<i>G. hirsutum</i>	<i>G. hirsutum</i> x <i>G. barbadense</i>	<i>G. hirsutum</i>
Year of release	2000	2005	1983	2000
Pedigree	LH 900 x 1301 DD	Multiple cross derivative involving [(TCH 665 x LS 149) x (TCH 665 x TCH 21)] x (TCH 21 x EECH) x (TCH 92-7 x EECH]	DS 28 x SB 425 (YF)	MCU-5 x (L 389 x SRT 1)
Area of adoption	Tamil Nadu	Tamil Nadu	South Zone	Andhra Pradesh
Eco system	Irrigated	Irrigated	Irrigated	Irrigated
Remarks		Long staple		Resistance to blackarm disease
Petal colour	Cream	Cream	Yellow	Yellow
Pollen	Cream	Yellow	Yellow	Cream
Petal spot	Absent	Absent	Present	Absent
Boll shape	Round	Round	Conical	Round
Boll weight [g]	3.8	4.5	2.8	3.6
Maturity (days)	135	160-170	180-200	160-170
Average yield (q/ha)	15.0	18.0	15.0	16.0
Ginning percent	35.0	33.0	36.0	34.0
Fibre length (mm)	26.0	31.0	35.0	26.0
Bundle Strength g/t 1/8" gauge	21.0	22.0	29.0	20.0
Mic value	4.0	4.5	2.8	3.8
Spinning potential (Counts)	40s	50s	80s	40s



DCH 32



BN Bt



MCU 5-VT



Sri Nandi



F 1861



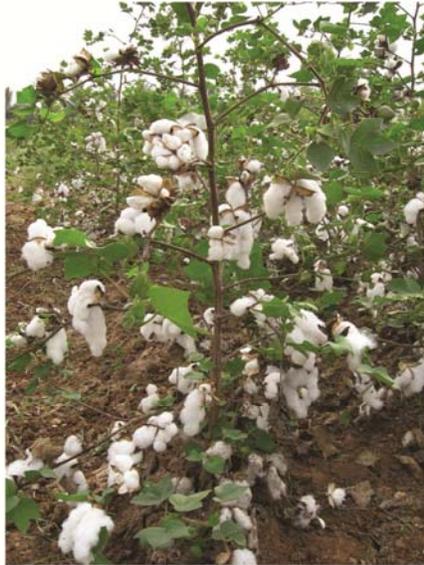
CSHH 198



LD 694



CISAA 2



MCU 13



PA 255



G Cot 19



SVPR 3



**Suvin**



**Suraj**



**Sumangala**



**Surabhi**



Multi-tier cropping system



Surabhi intercropped with Blackgram



Cotton Drip Irrigation with intercrop



Poly tube irrigation with intercropping



Multi-tier cropping system



Intergation of drip, mulch and fertigation



Poly Mulch at Farmers field



Multi-tier cropping system at Farmers filed



**Jassid Adult**



**Jassid Damage**



**Aphid Infestation**



**Thrips Infestation**



**Adult Lady bird**



**Stem weevil Damage**



**Square Flareup**



**Rosetted Flower**



**Adult Stem weevil**



**Spiralling whitefly**



**Dusky bug**



**Red cotton bug**

## **Insects pests of Cotton**



**Bollworm damaging Square**



**Bollworm damaging Boll**



**Helicoverpa (Adult)**



**Mealybug Egg**



**Mealybug Adult**



**Mealybug infestation**



**Mirid bug Egg**



**Mirid bug young**



**Mirid bug Adult**



**Pink Bollworm damage**



**Pink Bollworm Larva**



**Stem Borer**

## **Insects pests of Cotton**



**Alternaria**



**Grey mildew**



**Cotton Boll Rot**



**Blackarm**



**Boll Rot**



**Cotton Leaf Curl Virus (CLCV)**

### **Diseases in Cotton**



**Zinc Deficiency**



**Phosphorous Deficiency**



**Potassium Deficiency**



**Leaf Reddening**



**Sulfur Deficiency**

### **Nutritional Deficiencies in Cotton**

**All India Coordinated Cotton Improvement Project**  
 receives  
**Chaudhary Devi Lal Outstanding**  
**All-India Coordinated Research Project (AICRP) Award**  
 for the Year 2006



**INDIAN COUNCIL OF AGRICULTURAL RESEARCH**

**CHAUDHARY DEVI LAL OUTSTANDING ALL-INDIA CO-ORDINATED RESEARCH PROJECT AWARD**  
**2006**

**CITATION**

Chaudhary Devi Lal Outstanding All-India Co-ordinated Research Project Award, 2006 is bestowed upon the All-India Co-ordinated Cotton Improvement Project (AICCP), ICAR, Regional Station, Coimbatore, for its stupendous role in developing profitable and implementable technologies for cotton. Research efforts, since the formation of the AICCP, have led to the release of around 250 improved cotton varieties and hybrids for different cotton-growing tracts of the country and development of economical and eco-friendly cotton production and also protection practices for realizing enhanced productivity. India is the first and leading country to have established hybrid cotton production on commercial scale. The on-farm demonstrations (FDs) conducted by the AICCP scientists in farmers' fields, have spread the cotton crop production technologies, whereas, 10-20% yield increases have been demonstrated. At the AICCP unbiased evaluation trials of new Bt cotton hybrids were conducted and tested in the release of 62 private sector Bt cotton hybrids in 30-Plan period. The information generated at the AICCP centres have filled in the knowledge gap. The issues related to better farm returns under optimum resource utilization were also addressed by the AICCP. Proactive role of AICCP in technology dissemination through on-farm demonstrations, farmer field schools, Trainers' Training etc., assumes great significance in record cotton production witnessed at present. The growing interest in farmers to follow integrated practices of nutrient and pest management is visible through the efforts of the AICCP. Emphasis on crucial issues of cotton farming like reduction in cost of cultivation, maintenance of purity of nucleus and breeder seeds, IPM/IBM strategies for insect pest management, ferti-irrigation and water management approaches besides weed management strategies, physiological and bio-chemical approaches to crop yield enhancement and soil health management for development of newer cotton genotypes, provide a continuous platform for meeting challenges posed by biotic and abiotic stresses. The establishment and development of AICCP has led to development of many desirable technologies, improved cotton varieties and hybrids and implementable farm practices for sustainable income to farm families and livelihood security to rural women folk. All these efforts have led to the present vibrant cotton scenario in the country.

**Indian Council of Agricultural Research**

**Chaudhary Devi Lal Outstanding**  
**All-India Co-ordinated Research Project (AICRP) Award**  
**2006**

**The Chaudhary Devi Lal Outstanding All-India Co-ordinated Research Project (AICRP) Award for the year 2006 is presented to**

*All-India Co-ordinated Cotton Improvement Project, Central Institute for Cotton Research, Regional Station, Coimbatore (Maharashtra)*

**for outstanding contribution in the field of**  
*Co-ordinated Research on Cotton*

New Delhi, 16 July 2007

Mangal Patil  
 Director General

S. P. Singh  
 Director of Agriculture



**Central Institute for Cotton Research, Regional Station, Coimbatore**

The screenshots display the following content:

- Home Page:** Navigation menu (HOME, MANDATE, PROGRAMMES, ORGANISATION STRUCTURE, CENTRES, ACHIEVEMENTS, REPORTS, BY COTTON EVALUATION, FRONTLINE DEMONSTRATIONS, BREEDER SEED PRODUCTION, RELEASE PROPOSAL) and introductory text about the project's history and goals.
- Organizational Structure:** A flowchart showing the hierarchy from the Director (ICR, Nagpur) and ADG (Commercial Crop, ICAR) down to various research centers and field stations across North, Central, and South zones.
- North Zone - Inbred Trials:**

Year	Trial Name	Description
Br-07b	Initial Evaluation Trial on G. Airovatan	
Br-05b-1	Preliminary Hybrid Trial on Intra Airovatan hybrids (Conventional)	
Br-05b-2	Preliminary Hybrid Trial on Intra Airovatan hybrids (male sterility based)	
- Central Zone - Inbred Trials:**

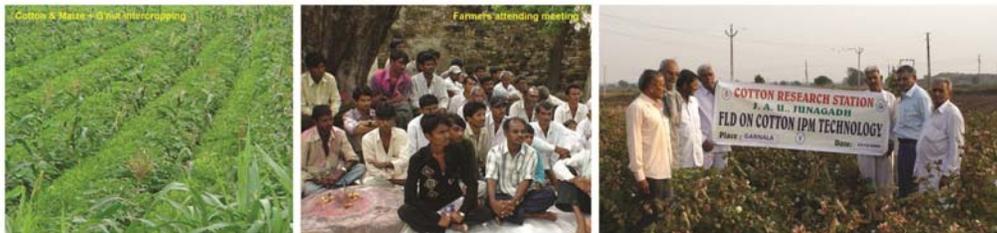
Year	Trial Name	Description
Br-01	Initial Evaluation of Germplasm	
Br-03-a	Preliminary Varietal Trial (G. Airovatan)	
Br-04-a	Coordinated Varietal Trial (G. Airovatan)	
Br-05-1	Coordinated hybrid Trial (Intra Airovatan Hybrid - Conventional)	
Br-01-II	Coordinated hybrid Trial (Intra Airovatan Hybrid - Male sterility based)	
Br-24	Coordinated Variety Trial (G. airovatan)	
Br-25	Coordinated Hybrid Trial (Dona Hybrid)	
- Objectives:**
  - To develop cultivars and hybrids best suited for different agro-climatic zones of India.
  - To develop viable and economical area based agro-techniques for realizing maximum yields / profits from general cultivars to both irrigated and rainfed conditions including management of abiotic stresses.
  - To develop economic and effective pest and disease management practices under different agro-biological conditions.
- Crop Improvement:**

Research efforts since the formation of AICCP in 1967 have led to the release of around 224 Cotton varieties and hybrids for the different cotton growing tracts of the country and development of economical and eco-friendly packages of practices for realizing enhanced productivity. World class cotton varieties & hybrids like Neva, DC II 32, NHR 44, TCRB 213, DBH 161, LHR 144, Shweta, ERA 5166, Anah, Surahi, MCC5, MCC 7, MCU 13, HBR 287, Akasha, HD 224, DBH 11, BA, B6, BR, AAR 1, RG 8, RAJ DH 9, PKV B-2 and scores of others with higher yield, special characteristics and suitable to low cost production technologies have all been released over the years owing to the needs and bringing net profit to the farming community in the Country. During the IX Plan period (1997-2002), 23 hybrids and 40 varieties have been released for commercial cultivation catering to the needs of the various agro-climatic regions of the country.

During the X Plan period, high yielding cotton varieties and hybrids have been released for commercial cultivation through AICCP catering to specific needs and possessing special characteristics. Most of these varieties/hybrids are capable of yielding 18-25q/ha. The details of the varieties/hybrids are presented below.

Name	Species	Year of Release	Institution/AICCP centre
H 1117	G. Airovatan	2002	CSRSV, Bilar

**AICCP details on the Internet  
(www.cicr.org.in)**



**FLD & Extention activities under AICCIP**



**AICCIP Reports and Publications**