

## All India Coordinated Cotton Improvement Projects

### PROJECT COORDINATOR'S REPORT: 2007-08

Cotton cultivation, practiced since ages, has to be low cost input responsive, sustainable, environment-friendly and definitely profitable production system in the present day context. Cotton, the King of Fibres, is one of the most important commercial crops of our country. Cotton cultivation has the full potential to offer livelihood security to millions of marginal and small farmers; such an enterprise 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. This shall ensure our country face the challenge of emerging international and national demands. In this context, it is pertinent to mention that an urgent need has arisen to enhance the productivity from present levels to moderately higher levels (i.e.) under irrigated conditions from the existing range of 550-600 kg/ha to 800-900 kg/ha and under rainfed conditions from the present range of 300-350 kg /ha to 450-500 kg lint per hectare.

India is the only country where all four cultivated species of cotton are grown on commercial scale spanning around 9.0 million hectares. Hybrid cotton cultivation on a very large area is a significant milestone achievement in Indian Cotton scenario. Qualitative and quantitative transformation has taken place in cotton production in India. ***The production increased from a meager 28 lakh bales (170 kg lint /bale) in 1947-48 to a high of 176 lakh bales in 1996-97 and an all time record of 280 lakh bales during 2006-07 (AICCIP, 2007). Still higher and phenomenal production of 310 lakh bales has been projected during 2007-08.*** During the pre-independence period, India produced short and medium staple cottons. Today, India produces cotton fibres with varying staple lengths, from non-spinnable coarse to medium, long, extra long and superfine cotton for spinning 6 to 120<sup>s</sup> counts. Due to rapid growth in Indian economy and increasing demand for cotton due to cessation of Quota Regime, the requirement of cotton has been projected at 350 lakh bales by the year 2010 and 475 lakh bales by 2020.

With the abolition of ICCA in 1966, the ALL INDIA COORDINATED COTTON IMPROVEMENT PROJECT (AICCIP) was launched in 1967 with its Headquarters at Coimbatore (Tamil Nadu) with timely funding from Indian Council of Agricultural Research (ICAR). Concerted efforts by various AICCIP centers 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 centers in 15 State

Agricultural Universities involved in cotton research. The Central Institute for Cotton Research, Nagpur and its Regional Stations at Coimbatore and Sirsa provide basic research support and also take part in certain 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 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 during XI Plan period. 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. The role of AICCIP in ensuring sustainability of cotton production, employment generation, foreign exchange and improving general economy of the country assuming greater significance; and hence, the programmes proposed under AICCIP need to be continued with more fervour and vigour by all concerned during XI Plan.

### **World and Indian Cotton Scenario**

World cotton production is estimated at 25.9 million tones in 2007-08, 3% lower than during previous season due to decline in world area by 1.2 million hectares to 33.6 million hectares (ICAC , 2008). However, India registered an increase in cotton area by 4% and is projected to reach 9.6 million hectares in coming season. As regards production is concerned, India has scaled to spectacular level of production of 5.3 million tons with 11% increase, compared to previous season best of 280 lakh bales during 2007-08. Exports by India are projected to be 1.2 million tons during 2007-08, making India the second largest exporter of cotton and supplier to China.

As regards Indian situation, the average yield was stepped up and total yield was high by 11 %, thanks to fairly good weather, increased use of biotech Bt cotton hybrids being continuously developed by Private sector Cotton R & D firms, other public sector high yielding hybrids / varieties and adoption of improved packages of practices developed by ICAR and SAUs and above all the tireless efforts of toiling cotton farmers, all contributing cumulatively.

**Table 1. Supply and Use of Cotton (2007-08)** (000 Metric tonnes)

Country	Area (000 ha)	Yield (Kg/ha)	Production	Opening Stocks	Imports	Consumption	Export	Ending Stocks
China	6450	1260	8127	2936	3467	11791	19	2720
<b>India</b>	<b>9585</b>	<b>589</b>	<b>5642</b>	<b>1587</b>	<b>95</b>	<b>4252</b>	<b>1485</b>	<b>1587</b>
U.S.A	4246	976	4144	2063	4	1002	3556	1654
Pakistan	3082	607	1870	654	684	2527	30	651
Brazil	1149	1390	1598	1173	40	900	630	1280
Uzbekistan	1450	760	1102	325	1	260	887	281

(Source: ICAC, Washington)

The Indian cotton scenario looks brighter as compared to many other countries in the world. The year 2007-08 was a record year of sorts for Indian cotton scenario, with the highest production of 310 lakh bales and exports touching a high of 65 lakh bales.

**Export of Cotton by India:** Export of cotton has registered a sharp increase in cotton season 2005-06 when the country exported a record quantity of 47 lakh bales as against 9.14 lakh bales during 2004-05. During the year 2006-07, the cotton exports touched 58 lakh bales. The Cotton Advisory Board has estimated cotton exports during 2007-08 at 65 lakh bales.

**Table2. Cotton Balance Sheet (October-September)** (in Lakh bales of 170 kg per bale)

	2006-07	2007-08 (estimate)
<b>Supply</b>		
Opening Stock	52.0	47.50
Cotton Crop Production	280	310.0
Imports	5.53	6.50
<b>Total Supply</b>	<b>337.53</b>	<b>364.0</b>
<b>Demand</b>		
Mill Consumption	194.89	207.0
Consumption by SSI units	21.26	23.0
Non-mill consumption	15.88	15.0
Exports	58.0	65.0
<b>Total Off-take</b>	<b>290.03</b>	<b>310.0</b>
Closing Stock	47.50	54.0

(Source: Cotton Advisory Board & South India Cotton Association)

### State-wise Cotton Scenario

Most of the States have shown an increasing trend as regards productivity is concerned, with scope of still higher targets that can be scaled in the coming season. The trend in area, production and productivity of cotton is presented in Table 3 – 5 and Fig. 1-2. Notable progress is seen in case of Gujarat, Maharashtra, Madhya Pradesh, Andhra Pradesh, Punjab and Karnataka. However, much progress is desired as regards per hectare productivity is concerned necessitating further R & D efforts from the point of view of enhanced yielding ability and harnessing the full genetic potential further for improved gains.

**Table 3. State wise cotton area (lakh hectare) during last ten years**

State	98-99	99-00	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08
Punjab	5.62	4.75	4.74	6.00	4.49	4.52	5.09	5.57	6.07	6.48
Haryana	5.82	5.46	5.55	6.10	5.19	5.26	6.21	5.83	5.30	4.78
Rajasthan	6.45	5.83	5.10	3.47	3.86	3.44	4.38	4.71	3.50	3.68
<b>North total</b>	<b>17.89</b>	<b>16.04</b>	<b>15.39</b>	<b>15.57</b>	<b>13.54</b>	<b>13.22</b>	<b>15.68</b>	<b>16.11</b>	<b>14.87</b>	<b>14.94</b>
Gujarat	16.07	15.39	16.15	16.87	16.34	16.47	19.06	19.06	23.90	25.16
Maharashtra	31.99	32.54	30.77	29.80	28.00	27.66	28.40	28.75	30.70	31.91
Madhya Pradesh	5.01	5.25	5.06	6.23	5.45	5.91	5.76	6.20	6.39	6.62
<b>Central total</b>	<b>53.07</b>	<b>53.18</b>	<b>51.98</b>	<b>52.90</b>	<b>49.79</b>	<b>50.04</b>	<b>53.22</b>	<b>54.01</b>	<b>60.99</b>	<b>63.69</b>
Andhra Pradesh	12.78	10.39	10.22	10.02	8.03	8.37	11.78	10.33	9.72	10.96
Karnataka	6.08	5.40	5.60	5.91	3.93	3.13	5.21	4.13	3.75	3.71
Tamil Nadu	2.43	1.85	1.93	2.00	0.85	1.03	1.29	1.40	1.22	1.23
<b>South total</b>	<b>21.29</b>	<b>17.64</b>	<b>17.75</b>	<b>17.93</b>	<b>12.81</b>	<b>12.53</b>	<b>18.28</b>	<b>15.86</b>	<b>14.69</b>	<b>15.90</b>
Others	0.62	0.45	0.64	0.90	0.53	0.51	0.68	0.79	0.87	0.77
<b>Total</b>	<b>92.87</b>	<b>87.31</b>	<b>85.76</b>	<b>87.30</b>	<b>76.67</b>	<b>76.30</b>	<b>87.86</b>	<b>86.77</b>	<b>91.42</b>	<b>95.30</b>

**Table 4. State wise cotton production (lakh bales) during last ten years**

State	98-99	99-00	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08
Punjab	5.00	7.85	9.50	9.25	7.50	10.35	16.50	21.00	26.00	24.00
Haryana	7.00	10.65	10.00	5.50	8.75	11.50	15.50	14.00	16.00	16.00
Rajasthan	11.50	13.00	10.75	7.00	5.00	9.15	11.00	11.00	8.00	9.00
<b>North total</b>	<b>23.50</b>	<b>31.50</b>	<b>30.25</b>	<b>21.75</b>	<b>21.25</b>	<b>31.00</b>	<b>43.00</b>	<b>46.00</b>	<b>50.00</b>	<b>49.00</b>
Gujarat	47.50	27.50	23.75	32.50	30.50	50.00	73.00	89.00	101.00	110.00
Maharashtra	26.50	38.00	18.25	34.25	26.00	31.00	52.00	36.00	52.00	60.00
Madhya Pradesh	18.75	15.50	19.25	20.00	18.00	19.65	16.00	18.00	18.00	21.00
<b>Central total</b>	<b>92.75</b>	<b>81.00</b>	<b>61.25</b>	<b>86.75</b>	<b>74.50</b>	<b>100.65</b>	<b>141.00</b>	<b>143.00</b>	<b>171.00</b>	<b>191.00</b>
Andhra Pradesh	25.00	22.50	25.25	26.75	19.75	27.40	32.50	30.00	35.00	43.00
Karnataka	8.75	7.00	7.75	7.00	5.00	4.20	8.00	6.50	6.00	8.00
Tamil Nadu	5.50	5.50	5.50	5.00	3.00	3.75	5.50	5.50	5.00	5.00
<b>South total</b>	<b>39.25</b>	<b>35.00</b>	<b>38.50</b>	<b>38.75</b>	<b>27.75</b>	<b>35.35</b>	<b>46.00</b>	<b>42.00</b>	<b>46.00</b>	<b>56.00</b>
Others	1.25	1.50	1.00	0.75	1.00	1.00	1.00	1.00	1.00	2.00
<b>Total</b>	<b>156.75</b>	<b>149.00</b>	<b>131.00</b>	<b>148.00</b>	<b>124.50</b>	<b>168.00</b>	<b>231.00</b>	<b>232.00</b>	<b>268.00</b>	<b>298.00</b>
Loose lint	8.25	7.00	9.00	10.00	11.50	11.00	12.00	12.00	12.00	12.00
<b>Grand Total</b>	<b>165.00</b>	<b>156.00</b>	<b>140.00</b>	<b>158.00</b>	<b>136.00</b>	<b>179.00</b>	<b>243.00</b>	<b>244.00</b>	<b>280.00</b>	<b>310.00</b>

**Table 5. State wise cotton productivity (kg/ha) during last ten years**

State	98-99	99-00	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08
Punjab	151	281	341	262	284	389	551	610	728	630
Haryana	204	332	306	153	287	372	424	379	513	569
Rajasthan	303	379	358	343	220	452	427	397	389	416
<b>North total</b>	<b>223</b>	<b>334</b>	<b>334</b>	<b>237</b>	<b>267</b>	<b>399</b>	<b>466</b>	<b>464</b>	<b>572</b>	<b>558</b>
Gujarat	502	304	250	328	317	516	651	794	718	743
Maharashtra	141	199	101	195	158	191	311	213	288	320
Madhya Pradesh	636	502	647	546	561	565	472	494	479	539
<b>Central total</b>	<b>297</b>	<b>259</b>	<b>200</b>	<b>279</b>	<b>254</b>	<b>342</b>	<b>450</b>	<b>450</b>	<b>477</b>	<b>510</b>
Andhra Pradesh	333	368	420	454	418	557	469	527	612	667
Karnataka	245	220	235	201	216	228	261	268	272	367
Tamil Nadu	385	505	484	425	600	619	725	668	697	691
<b>South total</b>	<b>313</b>	<b>337</b>	<b>369</b>	<b>367</b>	<b>368</b>	<b>480</b>	<b>428</b>	<b>472</b>	<b>532</b>	<b>599</b>

Source: Cotton Advisory Board

**Growth of Cotton Production:** It is very gratifying to note that India has registered a highest growth as regards cotton production is concerned with a share of 21 % in the global production of cotton, more than double its share of 9.6% in 1980-81.

**Table 6. Growth of Cotton production (000 tonnes)**

Year	China	USA	India	World Total
1980-81	2707 (19.6)	2422 (17.5)	1322 (9.6)	13831
1990-91	4508 (23.8)	3376 (17.8)	1989 (10.5)	18978
2000-01	4417 (22.7)	3742 (19.2)	2380 (12.2)	19457
2006-07	6729 (26.8)	4637 (18.5)	4590 (18.3)	25073
2007-08	7750 (30.0)	4140 (16.0)	5300 (20.5)	25900

**Growth in Average yield (kg lint per hectare)**

Year	China	USA	India	World Total
1980-81	550	453	169	411
1990-91	807	711	267	574
2000-01	1093	1008	278	612
2006-07	1245	894	520	733
2007-08	1225	976	555	794

Similarly, the productivity of cotton in India has also rallied to a higher level despite the major cotton growing areas remaining still under rainfed conditions. Eventhough it is very noteworthy to mention that Indian average lint yield has jumped from a meager 169 kg/ha to touch 555 kg/ha (70% of world average), the need for overcoming the gap between potential yields and realized yields still exists and efforts have to be made by all concerned for recording overall growth. Here again, it is imperative that the AICCIP Scientists need to synergize their efforts in enhancing the cotton productivity.

**General Crop condition, Climate, Pest and Disease Situation**

The general weather and crop condition during the cotton growing period in all the three zones were by and large conducive for cotton crop growth and development (Figures 4-7). Despite some damages caused by excessive rains and floods in some areas in Gujarat, the production prospects have been bright and another record crop production could be achieved. Significant cotton production, especially driven by higher yields due to cultivation of Bt cotton hybrids on a larger scale, adoption of effective integrated nutrient and weed management practices, integrated pest and disease management strategies, favourable weather besides lesser insect pest load, especially bollworms, cumulatively led to record yields.

However, there are certain issues that need to be attended to like minor pests like mealy bugs becoming major threat in intense cotton growing tracts in Punjab, Haryana, Rajasthan, Gujarat and parts of Maharashtra and Karnataka, mired bugs in certain locations, problem of pink bollworm in many areas, thrips and diseases like CLCuV in

North Zone and grey mildew in Central and South Zone. A National Level Meet at Central Institute for Cotton Research, Nagpur and various level discussions by National Centre for Integrated Pest Management (NCIPM), New Delhi are addressing the menace of mealy bugs in cotton and several cultural, mechanical, biological and need-based chemical control measures have been thought of. The issue needs to be addressed by Scientists of AICRP on Cotton with missionary zeal so that the gains made so far in production front are not eroded in the coming years. Parawilt has been noticed in Bt cotton hybrids in certain areas.

### Future Requirements of Cotton

**Global requirements of cotton:** It is estimated that the world demand for all fibres is expected to rise in volume terms from 52.651 million tonnes in 2000 to 74 million tones in 2010 and to 95 million tonnes in 2020. Going by the current contribution of different fibres to the basket and future trends viz. cotton (45%), jute and other natural fibres (5%) (not included in the above estimate), wool (2-3%), cellulosics (5%) and synthesis (42%) the projected requirement of different fibres in volume terms would be as shown below.

<b>Projected Global Fibre Demand / Consumption</b>						(Million Metric Tonnes)
Year	Cotton	Jute and allied fibres	Wool	Cellulosics	Synthetics	Total
2000	20.01	2.63	1.58	2.63	28.43	55.28
2005	24.74	2.94	1.76	2.94	32.78	65.16
2010	33.30	3.70	2.22	3.70	34.78	77.70
2020	42.75	4.75	2.85	4.75	44.65	99.75

(Source Courtesy: Dr.S.Sreenivasan , CIRCOT, Mumbai)

The above bifurcation in terms of different fibres has been, made on the following premises:

- A revival of sort has taken place in the production of natural fibres and this tempo is likely to sustain and grow. Therefore a higher percentage contribution from natural fibres like cotton is assumed.
- The limited and non-renewable resources of crude oil and other petroleum products would put a constraint on the growth of synthetic fibre production despite continuing rise in the production and market of biodegradable polymers made of natural materials.

From the table it is clear that almost the double the amount of cotton would be required from the 2000 level during 2020. This has to be achieved essentially without any substantial increase in area of cultivation. Low productivity zones particularly in the Afro-Asian region would have to contribute substantially by improved productivity to achieve the above requirement.

**Cotton Requirement in India:** The Indian Cotton Mills Federation now known as Confederation of Indian Textile Industry (CITI) being the apex body of the industry in India enjoying the consultative status with the national government and international agencies; has projected the requirement of cotton at 350 lakh bales by 2010; by which time India is expected to catch 6% share of global trade in textiles. Going by the current production figures in different staple groups as per the industry's demand, the staple wise cotton requirements for 2006-07 and 2010 are given below:.

**Staple-wise Cotton Production: Current and Future Requirements (lakh bales)**

Staple group	2003-04	2006-07	2009-10
Short (20mm and below)	18	31	34
Medium (20.5mm-24.5mm)	61	91	121
Medium long (25.5mm – 27.0mm)	30	63	65
Long (27.5mm -32mm)	61	82	110
Extra-long(32.5mm and above)	7	13	20
Total	177	280	350

(Source: Dr. S. Sreenivasan, CIRCOT, Mumbai)

About 35% of the cotton required would be in the medium staple category while 30% of the demand would be in the “long” group. In the ELS category, about 6% of the total demand is forecasted which works out to 13 lakh bales in 2007 and a significant quantity of 20 lakh bales by 2010. It is in this category that India has to find the right quality cotton as quickly as possible to avoid inflow of material from USA (Supima) and Egypt (Improved Giza types)

**Looking beyond 2010**

As already noted the cotton consumption is growing at the rate of 10%. However, a more pragmatic approach for a long term would suggest that the use of cotton would pick up at the rate of 5%. The mill and non-mill consumption put together for 2005-06 has been 280 lakh bales. With a CARG of 5% this consumption is likely to go up to 430 lakh bales in 2020 as seen from Table below.

**Cotton Requirement in 2020 / 2025 (on the basis of consumption)**

Year	Requirement* (in lakh bales)	
	2020	2025
Consumption	430	548
Export(@10% of consumption)	45	52
Total	475	600

\*Assuming a CARG of 5%

It is clear that the requirement of cotton in 2020 would be double the consumption at the current point of time. Productivity improvement atleast to match global average with special attention towards improvement in rain-fed production / productivity is urgently called for from all concerned.

## Front Line Demonstration in Cotton

During the year 2007-08, 1400 Front Line Demonstrations (FLDs) on Cotton Production Technology, 24 unit demonstrations on cotton Integrated Pest Management (IPM) and 22 unit demonstrations on Farm Implements were conducted all over India: The number of demonstrations conducted centre-wise and the budgetary outlay are as follows:

**Table-1. Budget allocation for Front Line Demonstrations in Cotton during 2007-08**

S.No	Centres	FLDs on Production Technology		FLDs on IPM		FLDs on Farm Implement		Total (Rs.)
		No.	Budget (Rs)	No.	Budget (Rs)	No.	Budget (Rs.)	
<b>North Zone</b>								
1	PAU, Faridkot	50	100000	1	100000	2	200000	400000
2	HAU, Hisar	100	200000	1	100000	1	100000	400000
3	RAU, Sriganaganagar	30	60000	1	100000	1	100000	260000
4	MPUAT, Banswara	25	50000	1	100000	1	100000	250000
5	CICR, Sirsa	50	100000	1	100000	1	100000	300000
<b>North Zone Total</b>		<b>255</b>	<b>510000</b>	<b>5</b>	<b>500000</b>	<b>6</b>	<b>600000</b>	<b>1610000</b>
<b>Central Zone</b>								
6	NAU, Surat	75	150000	2	200000	1	100000	450000
7	JAU, Junagath	50	100000	1	100000	1	100000	300000
8	JNKVV, Khandwa	40	80000	2	200000	1	100000	380000
9	JNKVV, Indore	40	80000	-	-	1	100000	180000
10	PDKV, Akola	120	240000	2	200000	1	100000	540000
11	MAU, Nanded	120	240000	2	200000	1	100000	540000
12	MPKV, Rahuri	50	100000	1	100000	1	100000	300000
13	OUAT, Bhavanipatna	150	300000	1	100000	1	100000	500000
14	CICR, Nagpur	50	100000	1	100000	1	100000	300000
15	IGKV, Raipur	50	100000	-	-	-	-	100000
16	BCKV, West Bengal	50	100000	-	-	-	-	100000
<b>Central Zone Total</b>		<b>795</b>	<b>1590000</b>	<b>12</b>	<b>1200000</b>	<b>9</b>	<b>900000</b>	<b>3690000</b>
<b>South Zone</b>								
17	ANGRAU, Guntur	75	150000	2	200000	2	200000	550000
18	CRIDA, Hyderabad	100	200000	1	100000	-	-	300000
19	UAS, Dharwad	75	150000	2	200000	2	200000	550000
20	TNAU, Coimbatore	75	150000	1	100000	2	200000	450000
21	CICR, Coimbatore	25	50000	1	100000	1	100000	250000
22	PC's Cell, Coimbatore	-	-	-	-	-	-	100000
<b>South Zone Total</b>		<b>350</b>	<b>700000</b>	<b>7</b>	<b>700000</b>	<b>7</b>	<b>700000</b>	<b>2200000</b>
<b>Grand Total</b>		<b>1400</b>	<b>2800000</b>	<b>24</b>	<b>2400000</b>	<b>22</b>	<b>2200000</b>	<b>7500000</b>

## **North Zone**

### **Punjab Agricultural University, Faridkot**

During the year 2007-08, the center had conducted fifty demonstrations on cotton production technology, one unit demonstration on cotton IPM and two unit demonstrations on farm implements. The technologies demonstrated under cotton production technologies were improved cotton varieties / hybrids MRC 6304 Bt, RCH 314 Bt, RCH 134 Bt, MRC 6301 Bt, PAU 626 H and JK 1947, optimal plant population, time of sowing, weed control and balanced nutrition. In all the demonstrations, the demonstrated hybrids / varieties recorded higher seed cotton yield than the respective checks. It was observed that there was 10-50% per cent increase in the mean yield of Bt hybrids compared to respective check hybrids. Demonstration on cotton IPM was conducted in an area of 50 hectares in 12 different units using the PAU –IPM module. Overall, there was 16.3% increase in seed cotton yield due to IPM demonstrations. Demonstrations on farm implements viz., disc harrow, aero blast sprayer and rotavator were conducted in an area of 48 hectares. Also, hybrid cotton planter and disc harrow were demonstrated in an area of 18.4 hectares.

### **Haryana agricultural University, Hisar**

One hundred front line demonstrations on Cotton production technology, one unit of demonstration on cotton IPM and one unit of demonstration on farm implements were conducted during the year 2007-08. The technologies demonstrated under cotton production technology were yield maximization of cotton varieties / hybrids AAH 1, HD 123, HD 324, H 1117 and H 1226. The average range of yield increase in these improved varieties and hybrids was between 10 to 12%. One unit of demonstration on cotton IPM was carried out on farmers' fields of Hisar district. Deep ploughing, selection of variety, seed treatment, balanced use of fertilizer, regular monitoring of pest, spray at ETL level, proper dose of pesticide and water were adopted in the IPM demonstration. Highest seed cotton yield of (2190 kg/ha) was obtained in the demonstration field of Shri. Prem Singh S/o Chalu Ram of Village Dhiran was. In IPM trials 10.78 per cent higher seed cotton yield was recorded as compared to the local farmers' practices. To demonstrate implements like Sub soiler for deep ploughing and Rotavator for hoeing one unit of demonstration was conducted in the Village Shahpur Begu of Sirsa district. It was observed that Shri. Ramdev S/o Nanak Ram picked (1570 kg/ha) seed cotton yield against (1350 kg/ha) local check. On average basis seed cotton yield in Farm implements trials was 10.91 % higher than farmers' practices.

### **Rajasthan Agricultural University, Sriganganagar**

Thirty front line demonstration were conducted during *Kharif* season of 2007 on different farmers' fields of Sriganganagar and Hanumangarh districts. G.hirsutum Bt

hybrid RCH-134, MRC-6029, MRC-6304, Variety RS-810, RST-9 *G. arborium* hybrid Raj DH-9, AAH-1, CICR-2 and variety RG-8 were demonstrated as against local cultivars Bikaneri nerma, RST-9 and F-846. Improved varieties / hybrids recorded an average of 21.53% higher seed cotton yield than local cultivars. One unit of demonstration was conducted on cotton IPM. During the season 4 and 6 sprays were given to the crop raised under IPM and Non-IPM, respectively. The average seed cotton yield was recorded 20.30 q/ha in IPM as compared 18.50q/ha of non-IPM. Considering the total income and expenditure incurred on IPM and N-IPM fields, clearly indicated that in IPM got more profit (1:2.63) than farmers practice (N-IPM) (1:2.15).

### **MPUAT, Banswara**

During the year the centre had conducted twenty five demonstrations on cotton production technology, one unit demonstration on cotton IPM and one unit demonstration on farm implements. The technologies demonstrated under production technology were improved varieties / hybrids H8 and PA 255. One unit of demonstration was conducted on IPM with the techniques viz., Deep summer ploughing, seed treatment, Okra as trap crop, hand picking of early shoot borer damage, use of pheromone traps and use of neem products. Under the demonstration on farm implements, the implements like Rotary tiller, ridger plough, power weeder, power sprayer, local improved weeder, wheel hoe and tractor mounted high capacity sprayer were demonstrated.

### **Central Institute for Cotton Research, Sirsa**

The Central Institute for Cotton Research, Regional Station, Sirsa had conducted 50 front line demonstrations under production technologies, one unit of demonstration each under implements and IPM technologies. The newly released cotton hybrid CICR 2, variety CISA 310, *intra-hirsutum* hybrid CSHH 198 and hybrid seed production of CICR 2 and CSHH 198 were the cotton production technologies demonstrated during the year. One unit of demonstration on cotton IPM with the technologies viz., deep ploughing after harvest of the wheat, FYM or decomposed compost application, recommended fertilizers application, resistant / Bt hybrid / variety against insect- pest & diseases, use of pheromone traps, application of pest management interventions based on pest surveillance and Economic Threshold Levels (ETL) and use of plant products & bio-agents depending on availability was demonstrated. The average yield obtained in IPM and non-IPM plots of Bt cotton hybrids was 28q and 25.5 q/ha as but it was 23 and 22 q/ha in IPM and non-IPM plots of varieties. The net profit gained per hectare was Rs. 55750 and Rs. 46767.5 in IPM and non-IPM plots of hybrids along with C:B ratio 1:5.58 and 1:4.10.

## **Central Zone**

### **Navsari Agricultural University, Surat**

During the year 2007-08, seventy five demonstrations on cotton production technology, two units demonstration on cotton IPM and one unit demonstration on farm implements were conducted by NAU, Surat. The improved varieties/ hybrids demonstrated were G.Cot Hy 12, G.Cot Hy 10, G.Cot 23, G.Cot 21, approved Bt cotton hybrids, balanced nutrition and correct spacing.

### **Junagath Agricultural University, Junagath**

Fifty demonstrations on cotton production technologies, one unit demonstration on cotton IPM and one unit demonstration on farm implements were conducted by JAU, Junagadh during the year 2007-08. The varieties / hybrids demonstrated were Vikram – 5, Ankur -9, Alto 377, Gopal, Rasi-sai. Parash Brahma, MRCH 6301, RCH 2, RCH 2BG II, Mallika, Vijay 1, Tulsi 117, RCH 118 (Sai), Ajita 155, Mallika 207, MRC 7301, Ganesh 205, Parash bramha, Dolarmaruti (441-Bg II), Bunny 245, MRC 7351, Gold 50, Narmada 145, Deviraj, intercropping with green gram, groundnut and uradbean, alternate furrow irrigation and Skipping DAP application. Results of varietal FLDs indicated 9.60 per cent average yield increase over check with a range of 2.33 to 50.00 per cent. Demonstration on IPM saved an average of five pesticides sprays.

### **J.N. Krishi Vishwa Vidyalaya, Khandwa**

During the year 2007-08, JNKVV, Indore had conducted forty demonstrations on cotton production technology and one unit demonstration on farm implements. Thirty three demonstrations conducted on Integrated Nutrient Management in cotton produced on an average 29.29 quintal /ha seed cotton as compared to 25.95 quintals from the farmer's practices. Seven front line demonstrations were conducted on intercropping Arher with cotton in the ratio of 4:2 rows, respectively. The results indicated that intercropping of Arher with cotton recorded monetary returns in the range of Rs 76130-48200/-per hectare and the average returns were Rs. 61515/- per hectare. The sole crop of Bt cotton recorded maximum monetary returns of Rs 66250/- while minimum was Rs 42500/- per hectare.

### **J.N. Krishi Vishwa Vidyalaya, Indore**

During the year 2007-08, JNKVV, Indore had conducted forty demonstrations on cotton production technology and one unit demonstration on farm implements. The technologies demonstrated under production technology were improved cotton varieties / hybrids viz., VICH 05, VICH 15, VICH 09, MRC 6301 Bt, DCH 32, JK 35, Phule 358, IH 63, intercropping with maize (2:1) ratio and Integrated Nutrient Management. Results

indicated that the improved varieties / hybrids recorded on an average 12.4% to 25.3% higher yield over farmer's practices. Intercropping system Cotton + Maize 2:1 row ratio was found more remunerative by Rs. 12620/ha to Rs.15910/ha more income as compared to sole crop of Cotton / Farmers' practices. The INM practices in cotton recorded an average range of 13.8% to 27.0% higher yield over application of chemical fertilizer / farmers practices. IPM demonstrations recorded 19.5% to 30.2% higher yield as compared to farmer's practices / pest management through chemicals.

### **PDKV, Akola**

One hundred and twenty demonstrations on cotton production technology, two unit demonstrations on cotton IPM and one unit demonstration on farm implements were conducted by PDKV, Akola during 2007-08. Improved varieties / hybrids, soil management, *in situ* soil moisture conservation, crop canopy management, clean cotton picking, organic cotton production and plant spacing were the technologies demonstrated.

### **MAU, Nanded**

One hundred and twenty demonstrations on cotton production technology, two unit demonstrations on cotton IPM and one unit demonstration on farm implements were conducted by MAU, Nanded during 2007-08. Improved Desi cotton varieties Plant population, INM, strip cropping of red gram (6:2), intercropping of green gram (1:1), Spraying of micro nutrients, rain water management techniques, spraying of 25% urea and DAP at 45 & 75 DAS and application of organic manures were the technologies demonstrated.

### **MPKV, Rahuri**

During the year, the centre had conducted fifty demonstrations on cotton production technology, one unit demonstration on cotton IPM and one unit demonstration on farm implements. Intercropping, improved varieties and Hybrids, INM and IDM were the technologies demonstrated under the programme.

### **OUAT, Bhawanipatna**

One hundred and fifty demonstrations on cotton production technology, one unit of demonstrations on cotton IPM and one unit of demonstration on farm implements were conducted by OUAT, Bhawanipatna. Integrated cotton management practices viz., application of 12 cart loads of FYM, supply of arhar seeds for inter-cropping, fertilizer application based on soil test report, use of tricho cards, pheromone traps and HaNPV, foliar spray of NAA at flowering period, foliar spray of DAP at boll formation stage and clean picking were demonstrated. Results indicated that the FLD farmers obtained gross return of Rs.35, 111/- for a lower cost of cultivation of Rs.11, 938/- as compared to

Rs.29, 618/- for an investment of Rs.12, 538/- in the farmer's own practice. The cotton equivalent yield advantage was 21.4 percent in the demonstrated plots compared to the farmers practice. The return per rupee invested was 2.9 in the production technology plots and 2.4 in the farmers' plots.

### **CICR, Nagpur**

The centre had conducted fifty demonstrations on cotton production technology, one unit demonstration on cotton IPM and one unit demonstration farm implements. Integrated Nutrient Management, Cotton based intercropping, foliar application of DAP, de-topping for yield improvement, opening of ridges and furrows for moisture conservation, Bt cotton hybrids and Bt cotton detection kit were the technologies demonstrated under cotton production technology. The IPM module developed the centre was adopted for demonstration on cotton IPM. Brahma animal drawn cotton sprayers, mould board plough, power tiller operated weeder, cotton stalk puller, Liliput gin, Cotton seed delinter, tractor / bullock drawn cotton planter and power sprayer were the farm implements demonstrated.

### **South Zone**

#### **ANGRAU, Guntur**

The centre had conducted seventy five demonstrations on cotton production technology, two unit demonstrations on cotton IPM and two unit demonstrations on farm implements. Performance of Bt hybrids with improved technologies viz., high yielding Bt hybrids, modified scheduled of fertilizer application (at 30, 50, 70 DAS), foliar application of micronutrients (boron @0.1% & MgSo<sub>4</sub>@1% at 60, 90 DAS) and foliar application of multi 'K' at 60, 90 and 110 DAS were demonstrated as against farmers' practices. FLD plots recorded an average of 39.2 q/ha with net returns of Rs.54068/ha and B: C ration of 1.7. Under farmers' practice the productivity was reduced by 5.2q/ha with net returns of Rs.43059/ha with B: C ratio 1.35. Under IPM demonstration, IPM components like seed treatment with imidacloprid, stem application of Monocrotophos, (1:4) – Sowing of intercrop of redgram, jowar and maize as guard crops, installation of pheromone traps for monitoring of *Spodoptera*, erection of bird perches, application NSKE thrice during the crop period and need based application of pesticides when the pest was noticed above ETL were demonstrated as against the farmers' practices. By adopting IPM practices farmers were benefited with higher yield of 36.3 q/ha and Rs. 50102/ as returns as against farmer practice of 33.2 q/ha with Rs. 41013 returns. Farmers were benefited with an additional income of Rs.0.45 for every rupee spent in IPM when compared with non IPM. Under demonstration on farm implements, cotton stalk were incorporated in the field itself with rotavator. This practice reduced the labour cost on removal of cotton stalks after picking and also added organic matter to the soil which improved physical properties of soil. Use of Taiwan sprayer has improved the

effectiveness of spray fluid by higher atomization and uniform coverage. Besides the area covered in a day of six working hours has increased by reducing the cost per unit area (ha) to an extent of Rs. 700 /- over seven sprayings in a crop season.

### **CRIDA, Hyderabad**

The centre had conducted one hundred demonstrations on cotton production technology and one unit demonstration on cotton IPM. The technologies demonstrated were Bunny Bt, Mallika Bt, PCH 2171 Bt, Deep summer ploughing, crop rotation, avoiding crop rationing, certified seeds, acid de-linting, seed treatment, timely sowings, weed management, intercrops, removal of crop residues, topping and pest management practices. The APAU-IPM module was used for demonstrations on cotton IPM.

### **UAS, Dharwad**

During the year, seventy five demonstrations on cotton production technology, two unit demonstrations on cotton IPM and two unit demonstrations on farm implements were conducted by UAS, Dharwad. The varieties/ hybrids demonstrated were Interspecific hybrids viz., DHB-105 v/s DCH-32, RAHB-87 v/s DCH-32, DHB-290 v/s DCH-32, Inter *hirsutum* hybrids viz., DHH-11 v/s DHH-543, *Hirsutum / Arboreum* varieties viz., Sahana v/s DLS a-17 and *herbaceum* varieties viz., DDhc-11 v/s jayadhar. The other technologies demonstrated were intercropping in cotton (Cotton + beans (1:1)) v/s Sole cotton, 25% N, K and full dose P as basal dose, 50% N and K at 30 DAS and 25% N and K at 60 DAS v/s RDF or Farmers practice, INM, leaf reddening management and Integrated Crop Management. An increase of about 15-30% in the seed cotton yield was obtained due to replacement of old hybrids /varieties with newly released genotypes. The implements demonstrated were Self propelled cotton stalk slasher-with 5 HP diesel engine, Cotton stalk shredder with 10 HP motor, Grass cutter / cotton stalk cutter with 2-extra blades, Cloy gin (Modified), Lilliput gin (4-5kg capacity), Brahama bullock drawn sprayer, Taiwan sprayer with Konabsu engine (AP Agro. Industries) HTP-Power sprayer and Agrimate-Electric sprayer (Knapsack).

### **TNAU, Coimbatore**

The centre had conducted seventy five demonstrations on cotton production technology, one unit demonstration on cotton IPM and two unit demonstrations on farm implements. The imposed components in Adoptable Srivilliputtur IPM (ASIPM) module with the technologies basal application of neem cake @ 150 Kg/ha, seed treatment with *Pseudomonas fluorescense* @ 10 g/kg, soil application of *Pseudomonas fluorescense* @ 1 kg/acre, sowing in ridges and furrows, acid delinting of cotton fuzzy seeds with 100 ml of Sulphuric acid per kg of seeds, drenching with 1% neem oil at 20 DAS, trap crops – castor and sunflower, eco-feast crops- Maize and cowpea, installation of pheromone and yellow sticky traps, clipping of terminals at 75DAS and need based application of safer

insecticides was demonstrated under IPM demonstrations. The yield in ASIPM based FLD plots, ranged from 1099 to 1638 kg/ha, whereas under farmers' plant protection practices the yield varied between 774 and 1001 kg/ha. The B:C ratio ranged from 1.92 to 2.58 under IPM demonstrations. Under non-IPM it ranged from 1.05 to 1.40.

### **CICR, Coimbatore**

Twenty five demonstrations on cotton production technology, one unit demonstration each in cotton IPM and farm implements were conducted by CICR, Coimbatore during the year 2007-08. The technologies demonstrated under production technology were improved cotton varieties Surabhi and Sumangala, Bt cotton hybrids RCH 2Bt and RCH 20 Bt, ELS cotton hybrids DCH 32 and RCH 708Bt, INM, Intercropping with vegetables and Integrated Weed Management. Demonstrations on improved varieties and Bt cotton hybrids increased the seed cotton yield to the maximum of 50.00 per cent. The IPM module developed by CICR, Coimbatore was adopted for IPM demonstration. Demonstrations on IPM reduced the number of sprays from six to three. Bullock drawn ridger and junior hoe were demonstrated under farm implements. It reduced the cost of weeding to the extent of Rs.4350/-per hectare.

### **Monitoring of AICCIP Trials**

Monitoring of AICCIP trials and also the Bt cotton hybrid evaluation trials under the aegis of ICAR being conducted by the AICCIP centres has been carried out by specially constituted team of AICCIP scientists. As in the earlier years, independent monitoring teams were constituted for monitoring of trials and suggestions made by tem shall be discussed during the Annual Group Meeting for follow-up action. The details of the composition of the Monitoring team were as below:

STATE / AREA	Team members	Institution	Discipline
PUNJAB	Dr. S.S.Siwach	CCS HAU,Hisar	Breeding
	Dr. L.K.Bishnoi	CCS HAU,Hisar	Agronomy
	Dr. Vichiter Singh	RAU,Sriganganagar	Entomology
	Dr. B.D.Ajmera	RAU,Sriganganagar	Pathology
HARYANA & RAJASTHAN (Sriganga Nagar)	Dr. M.S.Gill	PAU, Ludhiana	Breeding
	Dr. Kulvir Singh	PAU, Faridkot	Agronomy
	Dr. P.Jeyakumar	NCIPM, New Delhi	Entomology
	Dr. P.S.Sekhon	PAU, Ludhiana	Pathology
GUJARAT and Banswara of Rajasthan	Dr. Deosarkar	CRS, Nanded	Breeding
	Dr. J.G.Thokale	MPKV,Rahuri	Agronomy
	Dr.N.V.V.S.Durga Prasad	ANGRAU, Guntur	Entomology
	Dr. Jagdish Beniwal	CCS HAU, Hisar	Pathology
MADHYA PRADESH	Dr. V.V.Singh	CICR, Nagpur	Breeding

	Dr. A.R.Aladakatti	UAS, Dharwad	Agronomy
	Dr. S.B.Patil	UAS, Dharwad	Entomology
	Dr. Dilip Monga	CICR, RS, Sirsa	Pathology
MAHARASHTRA	Dr. M.Gopinath	ANGRAU, Guntur	Breeding
	Dr. R.S.Tomar	JNKVV, Indore	Agronomy
	Dr. S.S.Udikeri	UAS, Dharwad	Entomology
	Dr. H.J.Kapadia	JAU, Junagath	Pathology
CICR, NAGPUR & BHAVANIPATNA (ORISSA-Only AICCIP trials)	Dr. P.D.Gaikwad	JNKVV, Indore	Breeding
	Dr. R.K.Patel	JAU, Junagarh	Agronomy
	Dr. Vikas Jindal	PAU, Faridkot	Entomology
	Dr. Jagdish Beniwal	HAU, Hisar	Pathology
ANDHRA PRADESH	Dr. S.K.Verma	CICR, RS, Sirsa	Breeding
	Dr. Gururajan	TNAU, Srivilliputtur	Agronomy
	Dr. Bheemanna	UAS, Raichur	Entomology
	Dr. P.D.Mahajan	MPKV, Pune	Pathology
KARNATAKA	Dr. S.M.Palve	CICR, Nagpur	Breeding
	Dr. V.Kumar	NAU, Surat	Agronomy
	Dr.A.V.Kolhe	Dr.PDKV, Akola	Entomology
	Dr. P.V.Patil	NAU, Surat	Pathology
TAMIL NADU	Dr. J.S.Gill	PAU, Faridkot	Breeding
	Dr. E.Narayana	ANGRAU, Guntur	Agronomy
	Dr. I.M.Maisuriya	NAU, Surat	Entomology
	Dr. Daljeet Singh	PAU, Faridkot	Pathology

### Maintenance of Nucleus and Breeder Seeds

An effective maintenance of Nucleus and Breeder Seeds programme was undertaken by concerned participating centres of AICCIP by utilizing the grants received from the Ministry of Agriculture through Directorate of Cotton Development, Mumbai. The Breeder Seed production in respect of National indents was taken up at nine centres of State Agricultural Universities and three ICAR centres. A total quantity of Breeder seeds of 19.24 quintals of parental lines and 167.29 quintals of varieties were produced. There were no major mismatched between indent and production, except in certain locations.

S.No	Name of Hybrids/Varieties	Name of the producing centre	2007-08	
			DAC Indent	Actual Production
	<b>Hybrids</b>			
1	LHH 144	PAU, Ludhiana		
	PIL 43	"	0.04	2.98
	PIL 8	"	0.03	7.09
2	AAH 1	CCSHAU, Hisar		
	Female:	"	0.01	0.15
	Male:	"	0.02	0.50

3	HH 287	"		
	Female:	"	0.02	0.10
	Male:	"	0.01	0.15
4	HHH 287	"		
	Female:	"	0.02	0.05
	Male:	"	0.01	0.15
5	Raj DH 9	RAU, Sriganaganagar		
	Female:	"	0.60	NIL
	Male:	"	0.30	NIL
6	JK Hy 3	JNKVV, Khandwa		
	JK4	"	0.01	0.16
	KH 11	"	0.01	0.13
7	Hybrid 8	NAU, Surat		
	G.Cot 10	"	-	-
	Surat Dwarf	"	0.05	1.90
8	Hybrid 10	"		
	BC 68-2	"	-	-
	LRA 5166	"	0.01	0.70
9	PKV Hy.2	PDKV, Akola		
	AK 32 (F)	"	0.05	1.47
	DHY 286-1 (M)	"	0.02	0.51
10	NHH -44	MAU, Nanded		
	BN-1	"	0.05	0.80
	AC 738	"	0.03	1.90
11	Varalaxmi	UAS, Dharwad		
	Laxmi (F)	"	0.04	0.04
	SB 289 E (M)	"	0.03	0.03
12	DCH 32	"		
	DS 28 (F)	"	0.14	0.14
	SB 425 YF (M)	"	0.16	0.16
13	DHH 11	UAS, Dharwad		
	CPD 423 (F)	"	0.08	0.08
	CPD 420 (M)	"	0.05	0.05
	<b>Total</b>		<b>1.79</b>	<b>19.24</b>
	<b>Varieties</b>			
1	LH 900	PAU, Ludhiana	3.44	4.90
2	LH 1556	"	5.84	7.92
3	LD 327	"	4.87	11.10
4	F 505	"	7.62	2.30
5	F 846	"	16.30	5.80
6	F 1054	"	3.18	6.17
7	F 1378	"	10.13	7.08
8	F 1861	"	0.98	5.84
9	HS 6	CCSHAU, Hisar	4.14	1.00
10	H 777	"	1.34	0.20
11	H 1098	"	12.28	13.00
12	H 1117	"	5.03	21.00
13	H 1226	"	0.85	21.00
14	H 974	"	1.00	NIL
15	HD 123	"	19.90	22.00
16	HD 324	"	0.20	12.00
17	RST 9	RAU, Sriganaganagar	16.34	1.50
18	RS 810	"	3.50	1.30
19	RS 875	"	0.50	0.60

20	RS 2013	"	6.54	0.20
21	RG 8	"	22.29	6.35
22	RG 18	"	1.90	1.15
23	Pusa 8-6	IARI, New Delhi	1.00	1.00
24	JK4	JNKVV, Khandwa	0.05	0.26
25	Turab	NAU, Nanded	0.20	2.00
26	Jayadhar	UAS, Dharwad	0.01	0.01
27	Sahana	"	0.01	0.01
28	Narasimha	LAM, Guntur	0.10	0.60
29	LRA 5166	CICR, Coimbatore	0.76	1.50
30	Anjali	"	0.01	0.50
31	Surabhi	"	0.56	2.50
32	Supriya	"	0.10	0.50
33	MCU 5 VT	"	0.50	1.50
34	Sumangala	"	0.03	0.25
35	MCU 5	TNAU, Coimbatore	0.18	1.35
36	MCU 7	"	0.13	2.40
37	MCU 12	"	0.02	0.50
	<b>Total</b>		<b>151.83</b>	<b>167.29</b>
	<b>Grand Total</b>		<b>153.62</b>	<b>176.53</b>

### Notification of Cotton genotypes for cultivation

During the year, Cotton varieties/hybrids viz., H 1226 (Haryana), Jawahar Kapas-35 and JK 5 (Madhya Pradesh), Nandyal Cotton Hybrid-240, Nandyal-1, Lam Cotton hybrid-7 (Andhra Pradesh), KC-3 (Tamil Nadu), Aurobindo (West Bengal), AKA 8, AKH 8828 (Maharashtra) have been notified for seed production and cultivation in specific econiches after extensive testing in AICCIP and respective SAUs.

**New intra- *hirsutum* hybrid CSHH 243** (developed and tested in AICCIP trials from 2002-05 over 44 locations) recorded a mean seed cotton yield of 22 q/ha; ginning outturn of 33.3 % ; 2.5% mean fiber of 26.7 mm, Micronaire value of 4.6; Uniformity ratio value of 50.7% and fiber strength of 24.0 g/tex; and resistance to cotton leaf curl virus. The Varietal Identification Committee, which met during the AICCIP group meeting at NAU, Navsari during April 2007, recommended Cotton hybrid CSHH 243 developed by CICR, Regional Station, Sirsa for submission to Central Sub-committee on Crop Standards and release varieties of Agricultural crops for Release & Notification.

### Preparedness for Implementation of DUS testing of Cotton under AICCIP System

In the light of Ministry of Agriculture, government of India gazette notification dated 31<sup>st</sup> December, 2007 for cotton species and genera eligible for registration under the protection of Plant Varieties and Farmers' Rights Act, 2001, all efforts have been made to conduct the Distinctness, Uniformity and Stability (DUS) test at AICCIP Headquarters, Coimbatore and other notified centres such as CICR Nagpur, National Seeds Project Unit, UAS, Dharwad, Department of Seed Science & Technology, CCS HAU, Hisar, National Seeds Project Unit, PAU, Ludhiana. Primarily, the DUS test

guidelines for cotton have been revised based on the suggestions of the experts committee, the Task Force II, set up by PPV & FRA for revision of National test guidelines for Cotton and Jute. The guidelines have been drawn separately to fulfill the requirements of tetraploid and diploid species. Several characters have been omitted and few new characters added so as to measure the morphological characters of varieties/hybrids species-wise. The two new guidelines viz., National test guideline for tetraploid cotton and National test guideline for diploid cotton as approved by the Task force II appear in **www.plantauthority.in**, the official website of PPV&FRA. The reformatting of morphological characters recorded for extant varieties/hybrids, varieties of common knowledge and example varieties prior to the new test guidelines is in progress.

Up to 2006-07, 176 genotypes belonging to all the four species were characterized and during 2007-08, 247 genotypes (including extant varieties / hybrids, parental lines, example varieties, reference varieties and varieties of common knowledge) were grown at Coimbatore for varietal purification through rigorous selfing of flowers and uniform multiplication of seeds which serve as a reference in the ensuing DUS trial and also for recording newer characteristics included subsequently in both the guidelines. The participating AICCIP centers were informed of the gazette notification regarding the registration of plant varieties under cotton specie and the cotton breeders are requested to file application for registration of eligible extant cotton varieties released under AICCIP system. Apart from this, infrastructure facilities like allotment of separate land, irrigation and laboratory facilities have also been developed at respective centers as well. The data base on extant cotton varieties / hybrids, varieties of common knowledge, example varieties, and reference varieties have been generated and provided to PPV&FRA. The package of practices for growing of cotton under DUS trial was submitted and published in the Plant variety journal. The requisite application forms for registration of plant varieties can be downloaded from the official website of the PPV & FRA.

**Information System on Cotton Cultivars:** InsCot, which provides information on all the cultivars released so far by different agencies. This user friendly CD has been developed using Visual Basic.NET as front end and Microsoft Access as back end for data storage. The information includes, name of the cultivar, agency developed, year released, notification number, area adopt, species, pedigree/parentage, agro-ecology, yield, duration of the crop, ginning out turn, staple Length, micronaire value, bundle strength, counts, resistance and susceptibility to biotic / abiotic stresses, and special features.

## Organization of All India Coordinated Cotton Improvement Project Mandate and objectives of AICCIP

- 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 improved cultivars for 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.

### Organisation and structure

The AICCIP has 21 centres (11 major and 10 Sub-centres) in North, Central and South zones spanning major agro-climatic zones of the country. The detail of the centres are as follows:

Name of Agricultural University	Main Centre	Sub Centre
Punjab Agril. University	Faridkot	Ludhiana
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	-
Junagath Agricultural University	-	Jungath
Orisa University of Agril. & Tech	-	Bhawanipatna
Mahatma Phule Krishi Vidyapeeth	Rahuri	Pune
Marathwada Agril. University	Nanded	-
Dr.Panjabrao Deshmukh Krishi Vidyapeeth	Akola	-
Jawaharlal Nehru Krishi Vishwa Vidyalaya	Khandwa	Indore
University of Agril. Sciences, Dharwad	Dharwad	Siruguppa
Acharya N.G.Ranga Agril. University	Guntur	Nandyal
Tamil Nadu Agricultural University	Coimbatore	Srivilliputthur

### Manpower in AICCIP

Category Post	Sanctioned strength till IX Plan	Sanctioned strength in X Plan / Proposed strength in XI Plan
RMP	-	-
Scientist	99	99
Technical	93	93
Administration	17	17
Supporting and auxiliary	13 + 5	13 + 5
Total	227	227

## List of AICCIP Scientists

Name	Designation
<b>Faridkot</b>	
Dr. J.S.Gill	Sr.Cotton Breeder
Dr. Daljit Singh	Pathologist
Dr. Kulvir Singh	Asst. Agronomist
Dr. Vikas Jindal	Asst. Entomologist
Dr. Naveen Agarwal	Asst. Entomologist
Ms. Inderpreet Dhaliwal	Asst. Plant Breeder
<b>Ludhiana</b>	
Dr. M.S.Gill	Senior Plant Breeder
Dr. P.S. Sekhon	Pathologist
Dr. Parminder Kaur	Agronomist
Dr. P.S. Shera	Assistant Entomologist
Dr. R.S. Sohu	Plant Breeder
<b>Hisar</b>	
Dr. S.S. Nehra	Senior Cotton Breeder
Dr. S.S. Siwach	Sr. Cotton Breeder
---	Senior Agronomist
Dr. Jagdish Beniwal	Sr. Pathologist
Dr. K.K.Dahiya	Senior Entomologist
---	Asst. Biochemist
Dr. (Mrs). Promilla Kumari	Asst. Physiologist
<b>RAU, Sriganaganagar</b>	
Dr. Pramod Pundhir	Senior Cotton Breeder
Dr. P.L. Nehra	Senior Agronomist
Dr. C.J. Kapoor	Cotton Breeder
Dr. B.D. Ajmera	Plant Pathologist
Dr. Vichiter Singh	Asst. Entomologist
<b>Banswara</b>	
Dr. D.P.Saini	Cotton Breeder
Dr. P.K.Prem Meena	Asst. Breeder
Shri. R.K. Kalyan	Asst. Entomologist
Sh. Harphool Meena	Asst. Agronomist
<b>Kanpur</b>	
Dr. M.S. Parihar	Breeder
Dr. Jagdish Kumar	Agronomist
<b>Surat</b>	
Dr. V.Kumar	Research Scientist
Dr. P.V.Patel	Research Scientist (Pathology)
Dr. K.G. Patel	Asso. Res. Scientist
Shri. B.G.Solanki	Asst. Res. Scientist
Shri. P.G. Patel	Asst. Research Scientist
Shri. I.M.Maisuria	Asst. Research Scientist
Shri. J.G.Patel	Asst. Res. Scientist
Shri. K.M.Patel	Asst. Research Scientist
<b>Junagadh</b>	
Dr. M.D.Khanpara	Associate Res. Scientist
Sh.B.V. Sureja	Asst. Res. Scientist
Sh.H.J.Kapadia	Asst. Res. Scientist
Sh.R.K.Patel	Asst. Res. Scientist
<b>Khandwa</b>	

Dr. P.P. Shastri	Principal Scientist
Dr. S.K. Khamparia	Principal Scientist
Dr. S.K. Parsai	Senior Scientist
Dr. B.R. Baraiya	Asst. Plant Physiologist
Dr. Lekh Ram	Asst. Plant Breeder
<b>Indore</b>	
Dr. P.G.Gaikwad	Senior Scientist
Dr. R.S.S. Tomar	Senior
<b>Akola</b>	
Dr. B.R. Patil	Professor
Dr. P.D. Bhalerao	Asso. Professor (Agronomy)
Sh. U.V. Ingole	Assistant Professor (Pathology)
Dr. B.A. Sakhare	Assistant Breeder
Shri. A.V.Kolhe	Assistant Professor (Entomology)
<b>Nanded</b>	
Dr. S.S. Bhatade	Associate Breeder
Sh. V.K. Khargkharate	Asst.Agronomist
Sh. D.V. Patil	Asst.Professor
Dr. P.R. Zawar	Asst.Entomologist
Sh. K.G.More	Asst.Pathologist
<b>Rahuri</b>	
Dr. P.A.Navale	Cotton Breeder
Prof. J.G. Thokale	Agronomist
Sr. R.R. Perane	Pathologist
Dr. S.B. Kharbade	Entomologist
<b>PUNE</b>	
Dr. P.D. Mahajan	Asst. Pathologist
<b>Bhawanipatna</b>	
Dr. Ravi Kumar Patnaick	Breeder
Dr. S.M.A. Mandal	Asst. Entomologist
Dr. R.K. Tripathi	Agronomist
<b>Dharwad</b>	
Dr. S.S. Patil	Principal Scientist
Dr. B.C.Patil	Principal Scientist (Plant Physiology)
Dr. Y.R. Aladakatti	Senior Scientist (Agronomy)
Dr. S.B. Patil	Senior Scientist (Entomology)
Dr. S.N. Chattannavar	Senior Scientist (Plant Pathology)
Dr. H.M. Vamadevaiah	Senior Scientist (Biochemistry)
Dr. (Mrs.) Manjula Maralappannavar	Asst. Cotton Breeder
Dr. S.S.Udikerai	Scientist (Entomology)
<b>Siruguppa</b>	
Sh. J.M. Nidagundi	Assistant Cotton Breeder
Dr. M.A. Basavanneppa	Assistant Agronomist
<b>Guntur</b>	
Dr. M. Gopinath	Principal Scientist(Breeding)
Dr. V. Chenga Reddy	Senior Scientist(Breeding)
Dr. E. Narayana	Principal Scientist(Agronomy)
Dr. (Mrs). Srilakshmi	Sr. Scientist(Pathology)
Dr. (Mrs). S. Ratnakumari	Sr. Scientist(Plant Physiology)
Dr. G.M.V. Prasad	Sr. Scientist
Dr. N.V.V.S.D. Prasad	Sr. Scientist
<b>Nandyal</b>	
Dr. Chandra Mohan Reddy	Cotton Breeder
Dr. E. Aruna	Agronomist

Dr. Sitarama Sharma	Entomologist
<b>TNAU, Coimbatore</b>	
Dr. S. Rajarathinam	Professor & Head (Cotton)
Dr. S. Mohan	Professor (Entomologist)
Dr. K. Rajendran	Professor (Agronomy)
Dr. V.Chandrasekharan	Professor (Pathology)
<b>Srivilliputhur</b>	
Dr. A. Ramalingam	Professor (Cotton) & Head
Dr. G. Gururajan	Professor (Agronomy)
Dr. Shanmugavalli	Professor (Breeding)

### **Tasks Ahead- Visionary role with Missionary zeal for AICCIP envisaged**

Taking clues from the stakeholders in different platforms, it is felt that the AICCIP needs to further address emerging researchable issues, fine tuning their existing research programmes, suitable and profitable technology generation, speedy dissemination of viable technologies as per specific locations and priorities. The following are few that could be given thought of by the AICCIP fraternity in collaborative, consortium mode so that the fruits of such labour are translated in farmers' fields in a splendid manner for noble national cause.

- *Development of biotic and abiotic stress tolerant genotypes, especially with special attention to Cotton leaf curl virus, mealy bug, mired bug, pink bollworm, drought and salinity/waterlogging stress.*
- *Conscious efforts are needed for developing efficient genotypes suitable to shallow soils, especially for Vidarbha region.*
- *Enhancement in productivity of quality Extra long staple cotton hybrids.*
- *Development of high yielding desi hybrids with improvement in fibre quality*
- *Thrust to desi hybrids in coastal areas for sustainable higher production*
- *Identification of resistant genes in wild relatives, molecular marker mapping, marker-assisted transfer to elite germplasm.*
- *Quality seed production and effective seed treatment technologies.*
- *Irrigation as an input combined with integrated nutrient and pest management can trigger higher productivity in Central and South Zone. Modern Drip and Fertigation system in the Central and South Zone states, besides increasing the Irrigation Water Use Efficiency in the Northern states are the need of the hour.*

- *Efficient crop management strategies, successful extension of INM and water harvest programme and “Ashta” model IPM approach hold the key for record production in Central zone.*
- *Natural Resource Management: Efficient and sustainable management of water resources, soil health monitoring, ICNM approaches, precision agriculture to tackle inadequate replenishment of nutrients to soil, global warming issues for sustainable cotton crop production need pointed attention so that overall input use efficiency is ensured.*
- *On-Farm experimentation shall receive priority for testing and dissemination of technologies and improving the livelihoods of resource-poor farmers.*
- *Classical Intercropping Systems that have been evaluated under AICCIP trials can be further successfully adopted and disseminated to farm holdings for sustainability.*
- *Cotton yields are reduced by 50-85%, with unchecked weed growth or ineffective weed control. Fine-tuning weed control strategies augurs well for cotton. Use of polymulching and drip irrigation in a combinatorial approach needs to be tested in different locations for validation and needful utilization.*
- *Insecticide Resistance management strategies and Integrated crop Management with better options of IPM with Bt cotton hybrids and INM need to be further refined for still better results- Integrated Management Approaches for sustainability.*
- *Novel approach towards mechanization of cotton cultivation in the face of acute shortage of farm labour and need for overcoming drudgery is a felt need.*
- *Issue of enhanced Cotton Value Chain as approved by NAIP and being pursued by CIRCOT, CICR & Super Spinning Mills in a Public-Private partnership mode needs further attention by all concerned.*

Implementable Technologies that are to be developed / finetuned in coming years by AICCIP	Areas of relevance
High yielding varieties for rainfed areas	Maharashtra, Gujarat, Madhya Pradesh, Karnataka, Andhra Pradesh and Tamil Nadu
High yielding, early maturing hybrids with quality fibre	All Zones
High yielding, Short duration, varieties / hybrids (diploid and tetraploid)	North Zone (Punjab, Haryana, Rajasthan)
Low input responsive varieties / hybrids	Maharashtra, Gujarat, Madhya Pradesh, Karnataka, Andhra Pradesh and Tamil Nadu
Leaf Curl Virus resistant varieties / hybrids	North Zone (Punjab, Haryana, Rajasthan)
High yielding and stress tolerant Extra Long staple cotton	Parts of Central and South Zone
High yielding G. <i>herbaceum</i> varieties / Desi hybrids	Gujarat, Karnataka and Coastal areas of Tamil Nadu, Andhra Pradesh, UT of Pondicherry
Integrated Pest Management strategies with refined modules	All Zones

Insecticide Resistance Management	All Zones
Integrated Disease Management Approaches	All Zones
Integrated Crop Production practices	All Zones
Water conservative measures	Drought prone areas
Integrated Weed Management approaches	All Zones
Alleviation of abiotic stresses	Salinity and water logging stressed areas of North Zone: Drought prone areas of Central and South Zone
Novel intercropping approaches	All Zones

The details of technologies to be developed by the AICCIP centres will be disseminated through brochures / bulletins / technical handouts etc. in English, Hindi and Regional languages and also through mass media. Besides, the information will be put on Website for the use of farming community with regular updates and news and views that manner to the clientele. All stakeholders are requested to post information on cotton and related issues so that the same can be incorporated on the basis of need in official website of CICR and AICCIP viz. [www.cicr.org.in](http://www.cicr.org.in)

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